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IMPLICATIONS OF THE ROLE OF TOURISM CARRYING CAPACITY IN THE DEVELOPMENT OF SUSTAINABLE TOURISM DESTINATIONS

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Abstract

Tourism contributes to increasing global and national Gross Domestic Product (GDP) growth. However, there are also negative impacts on tourism activities. One of the implementations to minimize negative impacts can be carried out by applying the carrying capacity of the destination (tourism carrying capacity/TCC). This study aims to determine the implications of the role of tourism carrying capacity in sustainable tourism development, which focuses on the causality relationship between tourism destination governance policies and tourism carrying capacity (TCC). This study uses a qualitative library/desk study method with a Driving Forces, Pressures, State, Impacts, and Responses (DPSIR) framework analysis approach. The five dimensions of the carrying capacity of tourism destinations used in the DPSIR framework are territorial, governance, economic, social, and environmental. As a result, three framework findings and strategic analysis implications were obtained. First, it required the restoration of natural resources, environment, and ecosystems; second, carrying out integrated planning in land use, economic growth, strengthening socio-demographics, and a sustainable environment; third, educating tourists to transform the attitude, behavior, and ethics of tourists. The overall strategic analysis framework aligns with various tourism development programs to maintain natural, economic, social, and environmental balances that apply sustainable tourism by implementing stakeholder cooperation.

Keywords: *destinations, DPSIR framework, sustainable tourism, tourism carrying capacity*

INTRODUCTION

Tourism is a dynamic industry that accelerates global economic growth. The recent global data shows that travel and tourism's direct contribution to Gross Domestic Product (GDP) is approximately US$5.8 billion in 2021 (Statista, 2022). As COVID-19 pandemic conditions recovered, at the global level, there was a 60% increase from pre-pandemic levels, and international tourist arrivals almost tripled from January to July 2022 (+172%) compared to the same period in 2021 (UNWTO, 2022b). Meanwhile, data in Indonesia shows that in the period 2016 to 2019, the contribution of the tourism sector to the national GDP is equal to the value of the Tourism Gross Domestic Product (GDP), increasing from 4.63% in 2016 to 4.97% or reaching 1,734 trillion IDR in 2019 which shows the contribution of the added value of the tourism industry to the entire Gross Added Value (GAV) of national income (BPS, 2022). In addition to being beneficial to the global and national economy, the tourism industry also has the potential to cause environmental problems, including increasing levels of Greenhouse Gas (GHG) emissions arising from the increasingly massive use of fossil energy (Zhu et al., 2017); failing to ensure the cleanliness of destinations based on the inability to manage waste (Chaabane et al., 2019; Tsai et al., 2021); and contributing more than 5% of global greenhouse gas emissions, and by 2030, a 25% increase in CO2 emissions from tourism activities compared to 2016 is expected from 1,597 million tons to 1,998 million tons (Statista, 2021). Meanwhile, the results of a survey of global risk perceptions arising from human activities conducted by the World Economic Forum in 2022-2023 show that of the ten risks that the global community will face in a decade, six risks are closely related to the implications of harmful excesses on the environment, including climate change mitigation failure; climate change adaptation failure; natural disasters and extreme weather events; biodiversity loss and ecosystem destruction; natural resource crisis; and large-scale environmental damage incidents (World Economic Forum, 2023).

There is a concept and framework of sustainable tourism to minimize the negative impacts or excesses of tourism practices on the environment. According to the provisions of the Minister of Tourism and Creative Economy Regulation No. 9 of 2021 concerning Guidelines for Sustainable Tourism Destinations (2021), sustainable tourism is tourism that takes into account current and future economic, social, and environmental impacts, meets the needs of visitors, industry, the environment, and local communities and can be applied to all forms of tourism activities in all types of tourist destinations, including mass tourism and various other types of tourism activities. In addition, sustainable tourism is a tourism paradigm that prioritizes the interests of current generations and meets the interests of future generations, including the preservation of nature, preservation of local cultural existence, education for local communities in the context of interacting with tourists and aims to reduce negative impacts on the environment and local culture, by helping to increase income, employment, and conservation of local ecosystems (Arida & Sunarta, 2017). This paradigm emphasizes that the success of tourism is not merely measured by the quantity and intensity of tourist visits but also focuses on the positive impacts that tourism can have at the local level, namely the benefits to the local economy, as well as its external impacts on society and the environment (UNWTO, 2022a). There are several

forms of efforts that can support sustainable tourism, including encouraging, integrated, agile, and forward-looking policies; building tourism ecosystem resilience; and encouraging tourism recovery based on environmentally friendly amenities and activities (OECD, 2022).

At the conceptual level, several indicators can be used as preferences in formulating and formulating policy directions, as well as effective sustainable tourism development planning. (UNWTO, 2004), among others:

1. Increase GDP growth, investment, employment, and foreign exchange earnings;
2. Emphasize the role of tourism development in reducing poverty and improving the quality of life of the entire population;
3. Protect and preserve the local culture and natural resources on which the tourism industry is based in most destinations;
4. Ensure that the protection of natural and cultural resources is seen as a collaborative activity between the public and private sectors and nongovernmental groups and communities;
5. Establish the role of the private sector in the design, finance, implementation, ownership, and operation of tourism facilities;
6. Ensuring participation of the poor in all decision-making and seen as important stakeholders in the tourism development process;
7. Facilitate more effective coordination of public services at national, regional, and local levels;
8. Develop effective marketing and promotion programs through a series of public/private sector cooperative efforts;
9. Implement technical mechanisms whereby the public sector's control/regulatory role can be combined with that of planner/facilitator/collaborator;
10. Fostering positive public awareness of tourism's contribution to destination prosperity; and
11. reducing poverty and improving the overall quality of life of the community.

In addition, at the national policy level, the Minister of Tourism and Creative Economy Regulation No. 9 of 2021 aims to provide a comprehensive reference regarding the management of tourism destinations in a sustainable manner to realize the management of protection, utilization, and development of the area as a sustainable tourism destination. In this regulation, there are substantive contents that regulate the criteria for sustainable tourism destinations, including:

1. Sustainable management comprising management structures and frameworks; stakeholder engagement; and managing stress and change;
2. Socio-economic sustainability consisting of providing local economic benefits and social welfare and impacts;
3. Cultural sustainability consisting of protecting cultural heritage, visiting cultural sites, and
4. Environmental sustainability consists of conserving natural resources, managing natural resources, and managing waste and emissions.

Based on the description of conceptual information and national policies above, there is a conformity in the formulation of sustainable tourism indicators between the

conceptual level of global preferences and the criteria of Indonesia's national policy level. Furthermore, in addition to the criteria and indicators, the development of sustainable tourism destinations is also determined by the carrying capacity of the destination (TCC). TCC is the maximum ability limit (in terms of size and intensity) of the human natural environment, tourism facilities, socio-economic environment, and residents of tourist areas to accommodate tourism activities within a certain period and in a specific area within the framework of sustainable development (Deng, 2009). Carrying capacity is closely related to the capacity or volume of tourist arrivals, without ignoring other variables, such as destination development and excessive intensity of tourist arrivals, including unsustainable impacts and residents' dissatisfaction (R. W. Butler, 2020), and focuses on the protection and conservation of local resources and seeks to measure the limits that allow the preservation of the original conditions of the destination, minimizing negative impacts or excesses on cultural and natural resources (Castellani & Sala, 2012; Zelenka & Kacetl, 2014).

The carrying capacity of tourist destinations is measured by considering five dimensions that include the three main components of sustainable tourism (socio-economic, cultural, and environmental), the governance dimension, and the regional dimension, as follows (Fernández-Villarán et al., 2020):

1. The territorial dimension refers to and relates to the region's distribution and concentration of tourism activities to the local population, including the availability and carrying capacity of infrastructure.
2. The governance or political dimension related to the capacity and competence of the destination management organization.
3. The economic dimension refers to the destination's capacity to absorb tourism's function on local economic development.
4. The social dimension, or socio-demographic dimension, considers not only the impact on tourists but also the perceptions of local communities regarding the influence of tourism activities on their quality of life.
5. The environmental dimension includes the existence and implementation of regulations, policies, and carrying capacity protocols.

Based on the author's search, there are several previous studies related to the topic of TCC in the Indonesian context, including Sadikin et al. (2017) that examines land suitability for ecotourism; Pratiwi (2018) that examines cultural arts preservation based on community involvement and empowerment; Armono et al. (2017) which calculates the ideal number of visitors to ecotourism destinations in relation to the carrying capacity of the environment; Maryono et al. (2019) which examined the significant differences between the physical-ecological and socio-cultural carrying capacity of tourism destinations; Insani et al. (2020) determine the estimated carrying capacity of beach tourism objects; Winata et al. (2020) that assesses the suitability and carrying capacity of mangrove ecosystems for ecotourism activities; Faiz and Komalasari (2020) examine the need to balance the increasing number of tourist arrivals with the ability of the destination environment and develop tourism control and management; Adrianto et al. (2021) that assesses the suitability of using the model of a socio-ecological system to calculate the optimal carrying capacity of tourism destinations; dan Sunkar et al. (2022) which identifies

potential tourism hazards from physical, biological and human activities and calculates the carrying capacity of geotourism sites.

There are similar characteristics among these studies, namely selecting a specific research locus and dealing with implementing special interest tourism. The research gaps in some of these previous studies, among others, have not explicitly elaborated the five dimensions of TCC as described above, have not elaborated the causal relationship between tourism policy and TCC, and have not shown the strategic implications of TCC in the context of sustainable tourism destination development. Based on the above, this study aims to discover how the DPSIR framework encourages tourism destinations carrying capacity and the implications of tourism carrying capacity in sustainable tourism development, emphasizing the causal relationship between tourism destination governance policies and tourism carrying capacity (TCC).

METHODOLOGY

This study uses a qualitative library/desk study method (Creswell & Creswell, 2018). The data used in this research is secondary data derived from selected literature, including journals, books, study reports, statistical reports, and laws and regulations. The data were then analyzed using the DPSIR analysis approach. This approach, which stands for Driving Forces, Pressures, State, Impacts, and Responses (DPSIR), is an analytical framework that elaborates the causal and reciprocal relationships between humans and the environment from a systems perspective (Ruan et al., 2019). This systematic and comprehensive analytical framework allows for a more comprehensive evaluation of the continuous feedback mechanisms between the indicators, namely Driving Forces, Pressures, States, Impacts, and Responses (Borji et al., 2018).

The use of the DPSIR analysis approach is due to two aspects closely related to the advantages of the DPSIR model. First, the DPSIR model is comprehensive and based on solid logic, and the DPSIR framework represents the interaction relationship between tourists, tourism destinations, and the environment (Castellani et al., 2007; Castellani & Sala, 2012). Specifically, "Driving Forces" are potential factors that exert pressure on the tourism ecosystem, including direct and indirect drivers of tourism economic development and social and economic development (Xi et al., 2023). 'Pressure' consists of factors that threaten the ecological security of tourism through the direct effects of drivers, reflecting the consumption of resources by tourists and residents that ultimately leads to environmental pollution and other pressures (Pinto et al., 2013). "State" is a state of coordination between the tourism economy, the ecological environment, and the tourism industry under pressure (Malekmohammadi & Jahanishakib, 2017). "Impact" is the overall impact on socio-economic development and the tourism industry when the tourism ecosystem is under shock and pressure (Swangjang & Kornpiphat, 2021). "Responses" consist of several measures provided to maintain the stable operation of the tourism ecosystem; these measures include prevention, compensation, and repair, whereby when a tourism ecosystem is in a state of imbalance, an appropriate set of measures is required to respond actively, and the level of response will affect the coordinated development of the

tourism ecosystem (Pivčević et al., 2020). The reciprocal relationship and causality between these indicators are illustrated in the DPSIR analysis framework, as shown below.

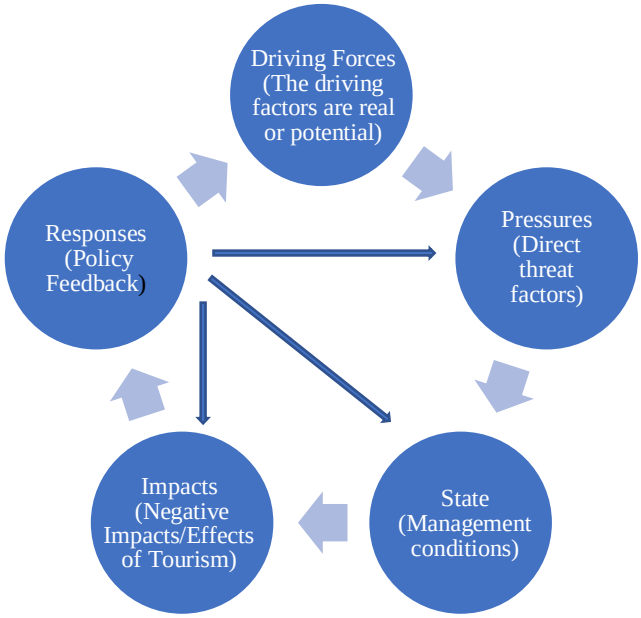

Figure 1. DPSIR Analysis Framework
Source: Modified from Quevedo et al., 2021 and Carnohan et al., 2023

Second, the DPSIR framework has two aspects that help to elaborate the object of study: procedural and analytical (Carnohan et al., 2023). The procedural aspect of DPSIR supports communication and interaction between stakeholders, while the analytic aspect supports the analysis and collection of data to support the understanding of complex systems.

Some of these indicators were analyzed to determine the carrying capacity of tourism destinations. The results are then used to determine the implications of TCC's role in developing sustainable tourism destinations and then develop strategic analysis to develop further recommendations. Specifically, the technical implementation of this study consisted of four stages, namely:

1. Identifying issues related to destination carrying capacity to support sustainable tourism through library research. In this research process, the data used came from secondary data sourced from books, journals, articles, report documents, and laws and regulations. To obtain relevant literature, data, and information, related article references were searched through scientific database search engine tools such as Google Scholar and other similar website pages and news/article websites;
2. Conducting DPSIR framework analysis. Through this analysis process, several indicators, namely Driving Forces, Pressures, State, Impacts, and Responses, are analyzed qualitatively to find a more comprehensive picture of strategic issues and factors that have implications for carrying capacity in the development of sustainable tourism destinations;

3. Discussing the results of the DPSIR analysis to synthesize strategic implications. These implications help as preferences develop relevant strategic recommendations for sustainable tourism destinations; and
4. Drawing up conclusions and formulating further strategic recommendations.

FINDINGS AND DISCUSSION

DPSIR Framework in Promoting Tourism Destinations Carrying Capacity

The concept of carrying capacity (CC) was first introduced in 1936 to assess the amount of cargo that could be safely carried on a ship and has since evolved and been introduced in the fields of ecology, biology, sociology, recreation, and tourism (Pirdaus Bin Yusoh et al., 2021). In relation to the tourism sector, the introduction of the CC concept has been implemented since the 1960s (Kennell, 2016). In addition, CC is a term often used to measure the level of tourism development of a destination without adverse effects on resident communities, the natural environment, or the quality of the visitor experience (Saptutyningsih, 2004), This corresponds with what was revealed by (Jovicic & Dragin, 2008) concerning the concept of carrying capacity assessment is used as a sign of the impact of tourism on space and the environment. The concept ultimately relates to maintaining sustainable development, both ecologically and socially, as well as activities beyond environmental degradation (Faiz & Komalasari, 2020).

The context of carrying capacity in tourism development will relate to the capacity of each destination and the maximum acceptable level of tourism development in an area (Coccossis et al., 2002). The growth of tourism generally affects the social, cultural, and economic conditions in tourism destinations (Shantika & Mahagangga, 2018; Thelisa et al., 2018). Therefore, a tourism destination needs to be managed based on sustainable criteria through proper tourism carrying capacity planning so that the destination will retain its ability to generate benefits from the tourism sector. Tourism carrying capacity, known as Tourism Carrying Capacity (TCC), will provide benefits in reducing the negative impacts of tourism activities (Kostopoulou & Kyritsis, 2006) on all destinations without causing environmental, economic, social, and cultural damage (Marsiglio, 2015; Sulistyadi et al., 2021).

The development of TCC has been carried out in various countries regarding various dimensions. According to The Priority Actions Programme (1997), the TCC-related analysis follows a systemic analysis based on the impact of tourism in an area through three principal axes: the physical environment (natural and manufactured, including infrastructure), social (population and social structure and dynamics), and economic (including institutions and organizations) with interrelationships between components. This also follows the dimensions conveyed by O'Reilly (1986) and Simón et al. (2004) about the dimensions of TCC, namely physical carrying capacity, social carrying capacity, and economic carrying capacity (O'Reilly, 1986; Simón et al., 2004). In addition, according to Coccossis et al. (2001), the three essential components or dimensions of TCC, namely physical-ecological, socio-demographic, and political-economic, also reflect the various issues considered in practice, as the impact of tourism in an area can be analyzed in terms of three main axes, namely the physical environment (natural and manufactured

including infrastructure), social (population and social structures and dynamics) and economic (including institutions and organizations) (Coccossis et al., 2002).

The various dimensions above only explain the three main dimensions, namely environmental, social, and economic, and have yet to explain the tourism activities in a destination and the governance that supports the tourism sector to grow and develop the concept of sustainable tourism. The TCC concept can be further developed as a management tool for managing tourism destinations to have positive benefits in developing a tourism destination. For this reason, Karagiannis and Thomakos (2020) add one other dimension in the form of a territorial dimension which is used to determine the relationship of tourism carrying capacity in tourism development (Karagiannis & Thomakos, 2020). Next, Fernández-Villarán et al. (2020) define the carrying capacity of tourism destinations considering five dimensions, namely the territorial dimension, governance or political dimension, economic dimension, social dimension, and environmental dimension (Fernández-Villarán et al., 2020). These dimensions include the three main components of sustainability, plus two other dimensions such as governance and territoriality that are important for strengthening carrying capacity.

Table 1. Dimensions and Indicators of Tourism Destination Carrying Capacity

No.	Dimensions	Description
1.	Territorial	a. Characteristics and dimensions of the offering b. Territorial cohesion c. Public transportation d. Study of the profile of tourists and the distribution of their activities starting from a sample of tourists accommodated in the capital city
2.	Governance	a. Competency Development − Tourism competence − Organizational Development Public-private, public-public, private-private-private cooperation. − DMO − Crisis and Emergency Management b. Normative Development − Sustainability Strategy (Land use and resource planning and regulation) − Health and Safety c. Executive Development − Emergency measures (if necessary) on carrying capacity − Reduce and prevent seasonality − Accessibility − Responsible Promotion and Marketing − Observatory Monitoring/Sustainability Strategy
3.	Economy	a. Support local economic development − The economic impact of tourism − Business profitability − Business competitiveness − Encourage business structure development − Stable and quality employment b. Socio-economic benefits to host communities/ Support poverty reduction. − Local tourism companies − Community support programs − Seasonality of tourism

No.	Dimensions		Description
			− Dependence on tourism
			− Equitable distribution of economic benefits generated by tourism
			− Cost of living
4.	Social	a.	Tourists/Visitors, Access for all
		b.	Tourist satisfaction
		c.	Acceptable limit of change
		d.	Host capacity Residents
		e.	Resident profile
		f.	Residents' perceptions
		g.	Local participation in tourism planning
		h.	Community knowledge about tourism and education
		i.	Safety
		j.	Gentrification
		k.	Support for local entrepreneurship and fair trade
		l.	Pressure on local population / Degree of congestion of tourist destinations
5.	Environment	a.	Adaptation to climate change
		b.	Environmental sustainability standards
		c.	Protection of tourist attractions
		d.	Management of visitors and their behavior
		e.	Environmental risk assessment and protection systems
		f.	Greenhouse gasses
		g.	Energy consumption
		h.	Water consumption, safety, and quality
		i.	Waste Management
		j.	Light and sound pollution
		k.	Low impact transportation
		l.	Air Quality

Source: Fernández-Villarán et al., 2020; Karagiannis & Thomakos, 2020, and Uresandi et al., 2017

The five dimensions related to TCC are utilized in strengthening the competitiveness of tourism destinations. In the context of sustainability, the territorial dimension is usually considered in the global concept (Uresandi et al., 2017). Nonetheless, it is a necessary dimension of sustainable tourism development that involves relevant local aspects (Ruhanen, 2013). These dimensions should be juxtaposed with tourism governance to produce a carrying capacity that can build a tourism ecosystem in a destination. This will be in line with the concept of sustainable tourism in the economic, social, and environmental contexts. For this reason, ideally, in building TCC in a destination, it should pay attention to the indicators following the dimensions in Table 1 above.

According to Fernández-Villarán et al. (2020), indicators of tourism carrying capacity are divided into two interconnected classifications: contest indicators and core indicators. Both indicators will provide a warning system on the level of tourism carrying capacity in a destination by considering broader issues affecting tourism sustainability. Given that the indicators can be used for measurement in the TCC, thresholds must be set as qualitative thresholds that respond to logic and quantitative thresholds that respond to literature review (Fernández-Villarán et al., 2020; Uresandi et al., 2017). It is used to assess whether the TCC measurement indicators are red, yellow, green, high, medium, or low, in a warning system (Castellani & Sala, 2012; Fernández-Villarán et al., 2020).

Various indicators in assessing tourism carrying capacity will be synchronized using the DPSIR analysis approach. This aims to assess the causal relationship for certain tourist destination conditions (Skondras & Karavitis, 2015). In addition, the use of the DPSIR analysis approach in supporting the TCC is because this model is more comprehensive and can present the interaction relationship between tourists, tourism destinations, and the environment (Castellani et al., 2007; Castellani & Sala, 2012). DPSIR is used as a decision-making tool (Tscherning et al., 2012) that can cope with complex environmental conditions and the utilization of alternative management which is suitable for specific areas (Swangjang & Kornpiphat, 2021).

The DPSIR framework then analyzes conditions at tourism destinations to have an appropriate carrying capacity level. DPSIR starts with the driving forces (Drivers (D)) interacting with the environment. Drivers primarily refer to the underlying social processes that shape human activities that directly impact the environment (Carr et al., 2007). This results in pressures (P) to balance the environment; the state of the environment (State (S)) then changes according to the applicable standardization or rules. Eventually, if the changes exceed the ecosystem's carrying capacity, impacts (I), which are threats to humans, will be realized. Therefore, society or the tourism ecosystem must create instruments to respond to or mitigate these impacts (Responses (R)) and restore balance (Lewison et al., 2016). DPSIR is an integrated system that includes a system of human and natural relations so that adjustments in dynamic change, adaptation, and transformation of various forms and dimensions can be expressed in one format (Swangjang & Kornpiphat, 2021).

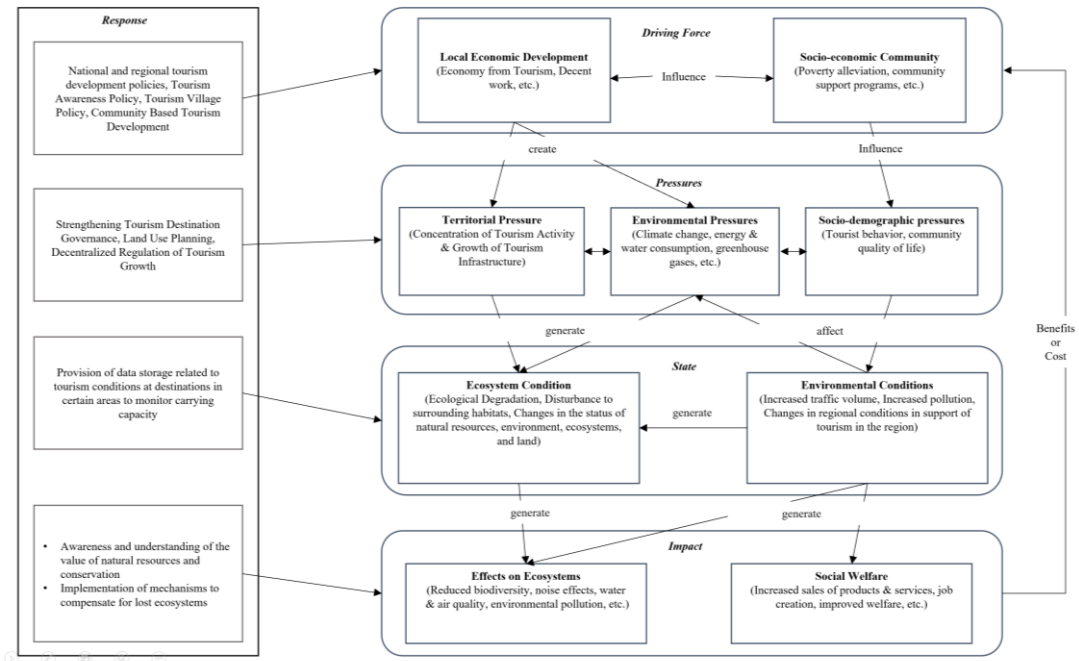

Figure 2. DPSIR Framework in supporting the carrying capacity of tourism destinations
Source: Analysis processed from Bradley & Yee, 2015, Castellani et al., 2007, Mimidis et al., 2017, and Swangjang & Kornpiphat, 2021

The framework above assumes that the causal relationships between economic, social, and environmental components and territorial and governance aspects interact simultaneously (Bradley & Yee, 2015; Castellani et al., 2007). The DPSIR framework is used to encourage the carrying capacity of tourism in a destination to follow the national tourism destination development and development plan. It can integrate various aspects, such as social, cultural, economic, political, environmental, and human health, into one framework format (Yee et al., 2012). DPSIR is often used in environmental management to link ecological and socioeconomic factors.

Based on Figure 2 above, the driving force of tourism development is related to the development of the local economy and the socio-economy of the community. This local economic development can create territorial pressure and pressure on the environment. These pressures in the future can produce positive and negative impacts on the carrying capacity of tourism in a destination. In addition, socio-demographic pressure is influenced by socio-economic factors that have implications for poverty reduction efforts. This also aligns with the government's role in the community's welfare and reducing poverty through inclusive tourism development (Sentanu & Mahadiansar, 2020). Concerning tourism carrying capacity, this condition falls into the economic, territorial, social, and environmental dimensions, which indicates that the framework can recognize the driving factors in strengthening tourism carrying capacity.

The three pressures from tourism development activities produce or affect ecosystem and environmental conditions. Both conditions directly and indirectly influence the environment's ecological state due to the surrounding tourism activities. An increase in the number of visitors can produce pollution or disturbance and changes in the status of natural resources. These conditions will impact ecosystems and social welfare, which may affect the carrying capacity of tourism destinations. The four aspects of the DPSIR framework should be followed up through mitigation or response steps to strengthen the carrying capacity of tourism to make the tourism sector a sustainable sector from various aspects. Response in strengthening the carrying capacity of tourism can be implemented through strengthening tourism policies, strengthening tourism destination governance, providing data storage related to tourism conditions, as well as awareness and understanding of the value of natural resources and conservation in the development of national tourism in a sustainable manner.

Strategic Implications of the DPSIR Framework for Sustainable Tourism Destination Development

The framework for the development of DPSIR in promoting the strengthening of carrying capacity is not fully complete, but it can show that the situation is critical for several aspects, resulting in sustainable tourism policies for the future must be able to consider several measures to prevent environmental damage and the emergence of problems for destination territorial management and socio-demographics. Strengthening the governance of tourism destinations is necessary to mitigate risks (Eddyono, 2021) such as strengthening human resource competencies, sustainable tourism strategies, as well as tourism organization development and tourism development cooperation (Fernández-Villarán et al., 2020; Uresandi et al., 2017). The management of tourism destinations will

provide conditions related to the management of a destination so that it can be measured and directed so that it is easy to understand in providing a positive impact on the social and economic development of tourism in the area around the destination (Rhama, 2020).

Sustainable tourism destination development will focus on sustainable economic growth, sustainable social welfare, and ecological sustainability (Eddyono, 2021). In the context of sustainable development, the DPSIR framework is used as the basis for sustainable environmental and socio-economic management (Koundouri et al., 2016; Pivčević et al., 2020). In addition, the use of the DPSIR framework to focus on improving understanding of social and economic biodiversity pressures and drivers (Haberl et al., 2009) and can develop as an interdisciplinary tool for providing and communicating causal factors regarding environmental issues (Svarstad et al., 2008). The results show that the DPSIR framework is more compatible with the discourse of environmental conservation and tends to support the responsible use of natural resources and nature conservation than other conditions (Pivčević et al., 2020). This can have the best effect on developing the carrying capacity of tourism destinations.

Strengthening the tourism carrying capacity of a destination is in line with the context of sustainable development. The concept can be juxtaposed with the DPSIR framework through which the tourism life cycle can conceptualize the fundamental mechanisms that drive tourism transformation and development into seven phases: exploration, engagement, development, consolidation, stagnation, decline, and rejuvenation (R. W. Butler, 2006). To support sustainable tourism, it is crucial to focus on the knowledge capacity and understanding of people in the tourism ecosystem, as well as continuous monitoring and evaluation of the ecosystem's carrying capacity. That will build sustainable tourism to be measured and directed according to the supporting components and tourism activities developed.

Table 2. Implications of strategies to strengthen tourism carrying capacity through the DPSIR framework in sustainable tourism development.

Category	Dimensions of Tourism Destination Supportability				
	Territorial	**Governance**	**Economy**	**Social**	**Environment**
***Driving Force* (D)**	Continuous development of the tourism sector must be able to pay attention to the conditions around the destination	Tourism management strategies should be in line with economic, social, and environmental sustainability	Growth in the value of investment in the tourism sector must be in accordance with sustainable tourism schemes	Socio-economic community becomes a reference in poverty reduction through sustainable tourism development	Environmental sustainability is an important factor in sustainable tourism development

Category	Dimensions of Tourism Destination Supportability				
	Territorial	**Governance**	**Economy**	**Social**	**Environment**
***Pressures* (P)**	The concentration of Tourism Activity in a few spots & Growth of Tourism Infrastructure become an environmental issue	Sustainable management of tourism destinations is still not running optimally	Increased number of tourists in destinations and expansion of tourism activities	Traveler behavior and community quality of life become socio-demographic impacts on tourism	Climate change pressures, over-consumption of energy and water, and generation of tourism waste
***State* (S)**	Land degradation due to tourism development	Competence and Capability of Human Resources are not yet in accordance with the concept of sustainable tourism	Inequality of economic benefits received by local residents	Changes in regional social conditions in tourism development	Disturbance and degradation of ecosystems or habitats due to excessive tourism development
***Impact* (I)**	Imbalance in land use for tourism activities	Optimization of organizational tasks and functions in accordance with sustainable tourism development	Economic impact of tourism and Business competitiveness for tourism growth	Job creation, Community Participation, and support for local communities in tourism development	Decreased ecological and biodiversity and accumulation of garbage or tourism waste
***Responses* (R)**	Integration of Land Use Planning and Sustainable Tourism Activity Development	Development of cooperation between stakeholders in building sustainable tourism	Utilization of financing schemes in the form of Green and Blue Financing in future tourism development	Strengthening social participation in the planning, implementation, and evaluation of tourism activities	Utilization of Green Innovation and Technology that supports tourism and environmental preservation
	1) Supply Chain Management (improving and restoring natural resources, environment and ecosystem) 2) Integrated planning in land use, economic growth, strengthening socio-demographics, and environmental sustainability 3) Demand management among tourists (changing attitudes, behavior, and ethics of tourists) and among stakeholders in the context of sustainable tourism				

Source: Authors' analysis

If TCC is targeted at sustainable tourism development, one of the policy and managerial strategies to achieve this can be developed through the DPSIR framework (Castellani et al., 2007). As described in the table above, this DPSIR framework explains various implications related to the combination of DPSIR with the dimensions of the

carrying capacity of tourism destinations. The combination above illustrates the condition of tourism that occurs in each tourist destination that continues to be developed by stakeholders. In the territorial dimension, tourism development must consider the conditions around the destination; otherwise, it will impact the imbalance of land use from tourism activities. Thus, the thing that should be a concern is carrying out integrated planning in land use and developing sustainable tourism activities. The planning of any tourism development should consider the relationship between local tourism activities and the local environment and potential restrictions in the environmental, social, and environmental dimensions (Reimer & Walter, 2013), and the economy (Spencer & Nsiah, 2013) of the area. If there are no efforts made in sustainable tourism management, the ability to maintain ecosystem supply in tourism destinations will be reduced (Swangjang & Kornpiphat, 2021).

Tourism governance is also crucial in building the concept of sustainable tourism. The governance must align with economic, social, and environmental sustainability. These three aspects must be supported by the competence of human resources to be able to optimize the duties and functions of the organization in building sustainable tourism. One of the things that can be done is to synergize the role of stakeholders through the penta-helix concept to achieve sustainable tourism goals (Arsandi, 2022; Soemaryani, 2016). This role must be built together to become a locomotive for the progress of the tourism sector by paying attention to the three aspects of sustainable tourism. With appropriate destination management, it will have an economic impact on tourism for the surrounding community and other stakeholders and be able to become a business competitiveness lever for tourism growth (Khan et al., 2021). The impact is a result of the increase in the number of tourist visits and the development of alternative tourism activities, as a result of the growth in the value of investment in various tourism infrastructures (Hariyani, 2018; Nguyen, 2021; Rasool et al., 2021).

Economic growth that comes from the tourism sector changes the socio-demographic conditions of a destination, which is one of the references in the context of poverty reduction (Uzar & Eyuboglu, 2019; Zeng & Wang, 2021). One of the impacts of the growth of the tourism sector is the creation of jobs and the strengthening of community participation and local communities in tourism development in line with the context of tourist destinations in inclusive tourism that practices a sustainable tourism model and supports the value of the tourism ecosystem (Costa, 2020). Thus, as an action in strengthening the social dimension as described, it is possible to strengthen social participation in the planning, implementing, and evaluating of tourism activities. This social participation will also be a leverage factor in preserving the environment around tourist destinations.

Through the context of sustainable tourism, the pressures of climate change, excessive energy and water consumption, and the generation of tourism waste are of particular concern to tourism sector stakeholders. The decline in the environment's ecological carrying capacity in tourist destinations will impact various components of the natural environment (Adikusuma et al., 2014). That will impact the condition of biodiversity and ecosystems in natural environmental habitats. The relationship between the environment and the tourism sector does not always have a mutually beneficial

symbiosis, so efforts such as sustainable environmental conservation are needed (Khrisnamurti et al., 2016). To preserve the environment in tourism development, it is necessary to utilize green innovations and technologies to support sustainable tourism. The utilization aims to maintain environmental conditions to provide tourist attraction in ensuring the sustainability of economic and social aspects in the context of TCC in sustainable tourism. Thus, strategies that can be carried out in increasing TCC through the DPSIR framework in the context of sustainable tourism are:

1. Development of supply chain management (repairing and restoring natural resources, the environment, and ecosystems).
2. Integrated planning in land use, economic growth, socio-demographic strengthening, and environmental sustainability.
3. Demand management among tourists (changing tourist attitudes, behavior, and ethics) and stakeholders in sustainable tourism.

The three strategies must be aligned with various tourism development programs to balance nature, economy, society, and environment.

CONCLUSIONS

The role of TCC in developing sustainable tourism destinations should follow the objectives of Minister of Tourism and Creative Economy Regulation No. 9 of 2021, namely minimizing the negative impacts that may arise from tourism activities. The results of the elaboration of five dimensions (territorial, governance, economic, social, and environmental) that emphasize the causal relationship between tourism destination governance policies provide a perspective of strategic implications related to the application of tourism carrying capacity. Based on the elaboration and analysis, this study obtained 3 (three) framework findings and strategic analysis implications: First, the recovery of natural resources, environment, and ecosystems is needed. Second, implementing integrated planning in land use, economic growth, socio-demographic strengthening, and environmental sustainability. Third, educate tourists to change their attitudes, behaviors, and ethics.

Some strategic policy program initiatives that can be recommended include restoring the function of the environment (nature and ecosystems) as it should be, conducting holistic, integrated planning, and providing awareness to tourists to behave environmentally friendly in tourism destinations. In addition, the theoretical implication of these findings for future research is to explore empirical practices in the field further using mixed methods (quantitative and qualitative), which aims to obtain more in-depth findings regarding the practice of activities in tourism destinations to efforts to implement the concept of sustainable tourism.

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