





# Technological, organisational and environmental drivers of sustainability in hotels



## Authors:

María Martín Lucas<sup>1</sup>   
 Libertad Moreno-Luna<sup>1</sup>   
 Aloysius O.S.B. Roets<sup>2</sup>   
 Sarmad Al-Jaberi<sup>3</sup> 

## Affiliations:

<sup>1</sup>Department of Business Management and Sociology, Faculty of Business, Finance and Tourism, University of Extremadura, Cáceres, Spain

<sup>2</sup>Roman Catholic Dioceses of Keimoes, Keimoes, Upington, South Africa

<sup>3</sup>University of Extremadura, Cáceres, Spain

## Corresponding author:

María Martín Lucas,  
 mmartinha@alumnos.unex.es

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**Purpose:** This study aims to analyse the position of 155 hotel managers in Africa and Asia about implementing sustainability practices (SP) focussing their competitive advantage (CA). Sustainability practices and CA are explained through the technology-organisation-environment (TOE) framework within the hospitality, tourism and travel industries.

**Design/methodology/approach:** The Structural Equation Model based on Partial Least Squares (SEM-PLS) methodology was applied to hotels in African countries, including South Africa, as well as Asia. Six variables were analysed in order to study the impact of SP in CA.

**Findings/results:** Findings imply that technological advancements, organisational commitments and environmental considerations collectively foster robust SP in emerging economies. The adoption of eco-friendly technologies (TS), the integration of sustainable policies (OS) and adherence to environmental regulations (ES) collectively contribute to the sustainability goals of hotels.

**Practical implications:** The study reveals that hotels in emerging markets should strategically emphasise the TOE framework to enhance SP and CA. Investing in advanced technologies, implementing effective organisational practices and adhering to environmental standards significantly improve sustainability performance.

**Originality/value:** While the TOE model has been extensively studied across various industries, limited research has explored its application in tourism. This study uniquely investigates how SP can enhance CA in the tourism sector through comparative analysis.

**Keywords:** managerial practices; tourism industry; sustainability practices (SP); Technology-Organisation-Environment (TOE) framework; emerging and developed economies.

## Introduction

The critical importance of sustainability in modern tourism is undeniable, driving socio-economic growth (Njoroge et al., 2019; Pope Francis, 2015). Cocks (2023) highlighted that sustainability practices (SP) are rapidly advancing in the tourism industry especially in developed countries, with many leading corporations excelling in this area. Consequently, sustainability research has become increasingly important.

Recent studies indicate rising demand for sustainable tourism not only in developed countries but in less advance economies as well (Aini, 2024; Gao et al., 2024; Kapoor & Jain, 2024; Koščak & O'Rourke, 2024; Robina-Ramírez & Pulido Fernández, 2018; Robina-Ramírez et al., 2021a; Robina-Ramírez et al., 2021b). To meet this demand, firms in developing countries are adopting eco-friendly strategies. Tourists seek affordable and innovative services, making sustainability a key marketing tool to stand out in the competitive tourism sector.

As widely explored, sustainability in tourism is crucial for competitive advantage (CA) in advanced economies (Hussein et al., 2024; Wu et al., 2024b). Firms that embrace sustainability gain new opportunities and enhance long-term performance (Crompton et al., 2001). These practices improve tourist satisfaction, revenue, employee productivity and overall competitiveness. Embracing sustainable practices helps firms maintain their market position and boosts visitor satisfaction, industry ranking and brand image (Pratono et al., 2019).

Emerging economies in Africa and Asia face challenges in adopting sustainability because of socio-economic instability and lack of resources. A sustainable approach is essential to overcome these challenges. However, many tourism firms struggle to implement sustainability practices

**Note:** Special collection: Managerial practices.

(SP). Lim et al. (2024) found that SP depend on the behaviour of organisations and tourists because of their interdependent nature.

Organisations shape the tourism landscape through their operational decisions, infrastructure development and service offerings. The installation of SP in hotels is intricately linked to their operational decisions, infrastructure development and service offerings, as highlighted by Buhalis et al. (2019). This dependency stems from the fact that these three elements form the core of a hotel's functionality and impact. Operational decisions, such as waste management protocols and energy consumption policies, directly affect a hotel's daily environmental footprint. Infrastructure development, including the implementation of energy-efficient systems and sustainable building materials, sets the long-term foundation for eco-friendly practices. Service offerings, such as locally sourced food options or eco-tourism activities, shape the guest experience and can promote sustainability awareness. Furthermore, as Li et al. (2024) point out, when hotels adopt eco-friendly policies, implement effective resource management and engage meaningfully with local communities, they significantly influence the overall sustainability of their destinations.

Simultaneously, tourist behaviour also plays a crucial role. Tourists' choices in transportation, accommodation, activities and consumption patterns significantly influence the environmental and socio-economic impacts of tourism (Gomes & Lopes, 2023). Their awareness, preferences and willingness to engage in sustainable practices can drive demand for eco-friendly options and encourage organisations to adopt more sustainable approaches.

The synergy between organisational practices in the tourism industry and tourist behaviour differs significantly in developing and developed countries because of a complex interplay of economic, cultural and infrastructural factors. As Wu et al. (2024a) suggest, in developed countries, there's often a more established sustainable tourism infrastructure, stricter environmental regulations and a higher level of environmental awareness among tourists. This leads to a more seamless alignment between sustainable organisational practices and tourist expectations. In contrast, developing countries may face challenges such as limited resources for implementing sustainable practices, less stringent environmental policies and varying levels of environmental consciousness among tourists. Additionally, the economic priorities in developing nations might favour immediate economic gains over long-term sustainability, potentially creating a disconnect between organisational practices and tourist behaviour.

This study aims to analyse the position of 155 hotels managers in Africa and Asia about implementing SP focussing on their CA. Sustainability practices and CA are explained through the Technology-Organisation-Environment (TOE) framework within the hospitality, tourism and travel industry. The TOE framework complements this by considering the technological,

organisational and environmental factors that influence a firm's adoption of innovations – in this case, SP.

The article comprises an introduction, literature review on sustainability adoption and CA, theoretical framework and hypothesis development, methodology, results, discussions and conclusions. It also highlights theoretical and practical contributions, limitations and future research directions.

## Literature review

### Sustainability practices

Sustainability is a strategic approach for creating enduring firm value by integrating ecological, social and economic factors into operations (Alkaraan et al., 2024; Robina-Ramírez & Medina-Merodio, 2019). This practice has become crucial across industries in developed countries, especially tourism, for socio-economic advancement and CA.

This holistic strategy recognises that in emerged economies long-term success depends on balancing profitability with environmental stewardship and social responsibility (Ramírez & Palos-Sánchez, 2018). By adopting sustainable practices, tourism firms can reduce operational costs through efficient resource use, enhancing their brand image, and appealing to the growing market of environmentally conscious travellers (Aragon-Correa et al., 2015). Sustainability also helps mitigate risks associated with climate change, resource scarcity and changing regulations (Abbass et al., 2022).

In the tourism context, it ensures the preservation of natural and cultural assets that are crucial for the industry's longevity (Guerra et al., 2024). Sustainability-oriented corporations typically adopt a holistic approach, considering the entire lifecycle of their products or services and their impact on various stakeholders (Nguyen & Kanbach, 2024). They often set ambitious sustainability goals, measure and report on their progress transparently and continuously improve their practices. By aligning their operations with broader sustainability principles, these firms aim to create value not only for shareholders but also for society and the environment, positioning themselves as responsible corporate citizens in an increasingly conscious global market (Sulkowski et al., 2018).

These organisations go beyond mere compliance with regulations, actively seeking to minimise their ecological footprint, enhance social well-being and ensure long-term economic viability. They recognise that sustainability is not just an add-on but a fundamental aspect of their business model, driving innovation, efficiency and CA (Hristov et al., 2022).

### Sustainability in the tourism and hospitality sector

Sustainability has become essential for firm performance, particularly in the rapidly growing hospitality, tourism and travel industry (HTTI), because of its unique reliance on natural and cultural resources, as well as its significant environmental and social impacts (Ozturkoglu et al., 2021).

The HTTI's success in developed economies relies on the attractiveness and integrity of natural and cultural resources to draw visitors (Uyar et al., 2023). Unsustainable practices can lead to environmental degradation, cultural erosion and social disruption by depleting natural resources, causing pollution and overwhelming local infrastructure (Atisa & Shah, 2022). Overexploitation of resources and overcrowding can irreversibly damage ecosystems and degrade the beauty and functionality of destinations, while pollution undermines their health and attractiveness. Additionally, these practices can erode cultural heritage and disrupt local communities, leading to a loss of authenticity and increased social tensions.

Sustainable practices, on the other hand, help maintain the quality and authenticity of destinations, ensuring their long-term appeal (Boley, 2023). They also contribute to positive relationships with local communities, enhancing the visitor experience (Ramkissoon, 2022). Moreover, as travellers become increasingly environmentally conscious, sustainable operations become a CA (Alsheref et al., 2024). By preserving the environmental, cultural and social integrity of destinations, the HTTI not only secures its resource base but also enhances its reputation, customer loyalty and long-term profitability, thus ensuring its viability in an ever-changing global landscape.

Ruhanen et al. (2019) showed that significant progress in sustainable tourism development over recent decades is crucial in emerging economies because it balances the needs of cultural preservation, job creation, financial growth and socio-economic advancement (Hussain et al., 2024). By prioritising eco-friendly practices and community engagement, sustainable tourism helps protect and celebrate local cultures, while also generating employment opportunities and boosting local economies through responsible visitor spending.

According to the World Travel and Tourism Council (WTTC), travel and tourism contributed 7.1% to South Africa's gross domestic product (GDP) in 2022. This is projected to rise to 7.9% of GDP by 2032. The sector accounted for 1.5 million jobs in 2022, which was 9.1% of total employment. By 2032, travel and tourism are expected to support 1.9 million jobs.

#### **Adoption and competitive advantage of sustainability practices**

Existing literature highlights a lack of research on adoption of SP in the HTTI in developing countries. Current studies reveal a gap in research concerning the adoption of SP within the HTTI, particularly among hotels in developing nations (Akel & Noyan, 2024; Bihari Singh et al., 2024; Chong, 2023).

Some studies have examined adoption of SP in larger industries. Gürlek and Tuna (2018) describe CA as creating value through high and unique innovation focussed on market competition. Adopting sustainable practices is crucial for achieving performance benefits and gaining sustainable CA (Aziz et al., 2024). There is a strong link between a firm's sustainable orientation and its CA (Guerra-Lombardi et al., 2024).

## **Theoretical background**

### **Technology-Organisation-Environment framework**

The TOE framework explains the relationship between SP and CA in the HTTI. Technology-Organisation-Environment is a theoretical model that explains how firms adopt and implement technological innovations (Awa et al., 2017; Badghish & Soomro, 2024; Li et al., 2023; Lin & Chen 2023). The TOE framework complements this by considering the technological, organisational, and environmental factors that influence a firm's adoption of innovations – in this case, SP.

The TOE framework provides the structure for understanding the three contexts in which sustainability is implemented in tourism: (1). Technological Sustainability Context: Involves sustainable technologies and innovations in HTTI. (2). Organisational Sustainability Context: Refers to internal factors such as firm size, structure and resources that influence sustainability adoption (Badghish & Soomro, 2024). (3). Environmental Sustainability Context: Encompasses external pressures and opportunities for sustainability (Awa et al., 2017; Badghish & Soomro, 2024; Li et al., 2023; Lin & Chen 2023).

The arguments provide valuable perspectives for understanding how firms can leverage resources, capabilities, and contextual factors to adopt innovative practices (such as sustainability initiatives) and gain CA in their respective industries. These contexts collectively influence the CA context.

### **Technological sustainability framework**

The technological landscape in tourism has undergone a dramatic transformation both in emerged or emerging economies, driven by innovations such as online booking systems and digital travel advisory platforms (Singh, 2024). These advancements have fundamentally altered how tourists plan, book and experience their trips. For tourism businesses, integrating cutting-edge technology into their operations is no longer optional but a critical necessity to remain competitive.

In this rapidly evolving digital era, CA increasingly hinges on a company's ability to harness technology for innovation and service enhancement (Hussein et al., 2024). Tourism firms that successfully leverage technological tools can redefine traditional services, offering unprecedented levels of personalisation, efficiency and convenience to their customers.

Data analytics can help businesses understand customer preferences and tailor their offerings accordingly. Mobile apps can streamline the travel experience, from check-in to local recommendations (Amajuoyi et al. 2024).

By focussing on technological innovation, tourism companies can differentiate themselves in a crowded market. They can create unique, technology-enhanced experiences that are difficult for competitors to replicate. This focus on tech-driven innovation not only improves existing services but also opens up possibilities for entirely new types of tourism

products and experiences (Pasquinelli & Trunfio, 2023). Given these considerations, it is logical to hypothesise that a strong emphasis on technological integration and innovation in tourism management processes will lead to significant CAs:

**H1:** TOE influences Technological Sustainability (TS).

### Organisational sustainability framework

Top management support is a cornerstone for the successful integration of SP in tourism. When senior leaders champion these initiatives, they set the tone for the entire organisation, allocating necessary resources and aligning corporate strategy with sustainability goals (D'Annunzio-Green, 2018).

Effective business regulations and guidelines established by top management create a framework for financial success through sustainable practices (Rubio-Mozos et al., 2020). These directives ensure that sustainability efforts are not just ethical considerations but integral components of the business model. Organisations embracing sustainability often experience a culture of continuous innovation and quality improvement. This mindset drives enhanced performance across various operational aspects, from resource efficiency to customer satisfaction.

Employees are vital catalysts in the adoption of SP (Suliman et al., 2023). Their on-the-ground insights and ideas can lead to practical, innovative solutions. Collaboration among staff members fosters a collective approach to sustainability, while open communication with management ensures that sustainability performance and outcomes are regularly assessed and improved.

This holistic approach, involving leadership, policy, innovation and employee engagement, creates a robust foundation for implementing effective SP in tourism organisations. Therefore, the following hypothesis is formulated:

**H2:** TOE influences Organisational Sustainability (OS).

### Environmental sustainability framework

The adoption of sustainable practices in the tourism and hospitality industry has transitioned from a voluntary initiative to a competitive imperative (Papallou et al., 2024). As environmental concerns grow and consumer preferences shift, businesses that fail to embrace sustainability risk fall behind their more eco-conscious competitors.

Government policies and planning play a crucial role in shaping the sustainability landscape within the industry (Jones et al., 2014). These regulations often set standards and provide incentives for sustainable operations, effectively guiding businesses towards more environmentally and socially responsible practices.

Comprehending and complying with these policies can serve as a catalyst for innovation. Companies that proactively adapt to regulatory requirements often discover opportunities

to implement new technologies and processes that not only meet sustainability goals but also enhance operational efficiency.

Tourism intermediaries, such as tour operators and travel agencies, can gain a significant competitive edge by integrating sustainable practices into their offerings (Islam, 2024). This approach appeals to the growing segment of environmentally conscious travellers and can lead to improved brand reputation and customer loyalty. This goodwill can translate into increased patronage and community support, further strengthening a business's competitive position in the market. Based on these insights, the following hypothesis is proposed:

**H3:** TOE influences Environmental Sustainability (ES).

### Resource and capabilities view of sustainability framework

Collaborative innovation through design in tourism is a dynamic and fruitful process that brings together diverse perspectives from industry professionals, local residents and tourists (Chandran et al., 2024). This inclusive approach allows for the creation of more holistic and well-rounded solutions to tourism challenges and opportunities.

By involving multiple stakeholders, tourism firms can tap into a wealth of knowledge and experiences that they might not have access to otherwise (Birendra et al., 2021). Residents provide invaluable insights into local culture, traditions and concerns, while tourists offer fresh perspectives on what attracts them to a destination and what could enhance their experience.

These collaborative networks foster value-driven relationships that extend beyond traditional business transactions (Kompella, 2024). They create a sense of shared ownership and responsibility for the tourism product, leading to more sustainable and community-oriented outcomes.

The synergy created through such collaborations often leads to innovative ideas and practices that can set a destination apart from its competitors, ultimately enhancing its appeal and sustainability. Consequently, the following hypothesis is formulated:

**H4:** TOE influences Resource and Capabilities View (RCV).

### Competitive advantage framework

The adoption of SP in tourism is closely linked to learning from organisations that have already achieved CAs through such initiatives (Rubio-Mozos et al., 2020). This knowledge transfer allows businesses to implement proven strategies, avoiding potential pitfalls and accelerating their own sustainability efforts.

Sustainable tourism management yields significant economic benefits for destinations. It can lead to increased local income



as tourists often prefer eco-friendly options and are willing to pay a premium for sustainable experiences (Buhalis et al., 2023). This preference can result in higher visitor numbers, as sustainability becomes a key factor in travel decisions for many consumers.

Furthermore, the implementation of sustainable practices often creates new job opportunities within the local community (Leal Filho et al., 2019). These roles may range from eco-tour guides to sustainability coordinators, contributing to overall employment growth in the area.

Adoption of SP serves as a crucial differentiator in the competitive tourism landscape. It can enhance a firm's reputation, attract environmentally conscious customers and lead to cost savings through efficient resource use. These factors collectively contribute to improved firm performance, both financially and in terms of market position.

By embracing SP adoption, tourism businesses can create a virtuous cycle of economic growth, environmental preservation and social responsibility, ultimately strengthening their CA in the long term. Thus, the following hypotheses are proposed:

**H5:** TS influences CA.

**H6:** OS influences CA.

**H7:** ES influences CA.

**H8:** RCV influences CA.

## Methodology

### Sample and population

Ecostars, an esteemed member of the Global Sustainable Tourism Council (GSTC) and recipient of accolades from the United Nations World Tourism Organization (UNWTO), stands as a globally recognised and credible sustainability certification institution for hotels. Its mission is to democratise and catalyse the shift towards enhanced SP, making them accessible to hospitality establishments worldwide (UNWTO, 2023).

For this comprehensive study, we leveraged the Ecoinvent version v3 database, Zürich, Switzerland from 27 March 2023, which encompassed 400 hotels situated in developing nations across Africa and Asia. The research team-initiated contact with 205 hotels in African countries, including South Africa, Nigeria, Kenya, Uganda, Somalia and Zimbabwe, as well as 195 hotels in Asian nations such as India, Pakistan, Uzbekistan, Lebanon, Syria, Iraq, Jordan and Kazakhstan, which were selected randomly.

An introductory email detailing the study's objectives and scope was dispatched to these establishments. The communication also outlined the key variables and indicators to be examined. Following this initial outreach, 155 hotels expressed their willingness to participate in the research.

To ensure the efficacy and clarity of the survey instrument, the research team conducted two pre-test phases whose

information was useful to improve and clarify the survey. A second communication was disseminated to the participating hotels, inviting their management to engage in online meetings. In all, 26 managing directors, comprising 15 from African countries and 11 from Asian nations, committed to these virtual sessions which lasted 3 months.

Subsequently, two focus groups were organised to refine the research methodology. The inaugural meeting delved into the conceptual framework of each construct, with particular emphasis on the TOE framework. Discussions centred on elucidating the intricate relationships between the TOE framework and the study's key variables: Technological Sustainability (TS) framework, Organisational Sustainability (OS) framework, Environmental Sustainability (ES) framework, and Resource and Capabilities View (RCV) of sustainability framework.

Moreover, the focus group explored how these variables could potentially impact the CA of the participating hotels. This in-depth dialogue allowed for a nuanced understanding of the interplay between SP and competitive edge in the hospitality sector.

The second focus group session built upon the insights gained from the first focus group, further refining the survey questions and ensuring their relevance and comprehensibility across diverse cultural contexts. This iterative process of consultation and refinement was crucial in developing a robust research instrument capable of capturing the complexities of sustainability implementation in the global hotel industry.

### Indicators

The model indicators include the TOE framework, OS, RCV, CA, and ES, assessing sustainability and competitive outcomes in hotels (Table 1).

### Hypotheses and model

Figure 1 presents the hypotheses development based on the eight proposed hypotheses of the study:

**H1:** TOE influences TS.

**H2:** TOE influences OS.

**H3:** TOE influences ES.

**H4:** TOE influences RCV.

**H5:** TS influences CA.

**H6:** OS influences CA.

**H7:** ES influences CA.

**H8:** RCV influences CA.

### Ethical considerations

Ethical approval to conduct this study was obtained from the University of Extremadura Ethical Committee. (Ref. No. 19/2024)

TABLE 1: Indicators.

Construct	Indicators	Authors
<b>Technology-Organisation-Environment (TOE) framework</b>		
TOE	What role do technological advancements play in enhancing the hotel's sustainability efforts?	Awa et al. (2017); Badghish and Soomro (2024); Li et al. (2023); Lin and Chen (2023)
TOE	How do internal factors such as firm size, structure, and resources influence the adoption of sustainability practices in the hotel?	
TOE	Do local regulations and global environmental trends affect the hotel's sustainability strategies?	
<b>Technological Sustainability (TS) Framework</b>		
TS	To what extent do you agree that in this rapidly evolving digital era, competitive advantage increasingly hinges on a company's ability to harness technology for innovation and service enhancement?	Hussein et al. (2024)
TS	How much do you agree that data analytics can help businesses understand customer preferences and tailor their offerings accordingly?	Amajuoyi et al. (2024)
TS	How strongly do you agree that focussing on tech-driven innovation not only improves existing services but also opens up possibilities for entirely new types of tourism products and experiences?	Pasquinelli and Trunfio (2023)
<b>Organisational Sustainability (OS) Framework</b>		
OS	To what extent do you agree that when senior leaders champion sustainability initiatives, they set the tone for the entire organisation by allocating necessary resources and aligning corporate strategy with sustainability goals?	D'Annunzio-Green (2018)
OS	How much do you agree that effective business regulations and guidelines established by top management create a framework for financial success through sustainable practices?	Rubio-Mozos et al. (2020)
OS	To what degree do you agree that employees are vital catalysts in the adoption of sustainability practices?	Suliman et al. (2023)
<b>Environmental Sustainability (ES) Framework</b>		
ES	How strongly do you agree that the adoption of sustainable practices in the tourism and hospitality industry has transitioned from a voluntary initiative to a competitive imperative?	Papallou et al. (2024)
ES	To what extent do you agree that government policies and planning play a crucial role in shaping the sustainability landscape within the industry?	Jones et al. (2014)
ES	How much do you agree that tourism intermediaries, such as tour operators and travel agencies, can gain a significant competitive edge by integrating sustainable practices into their offerings?	Islam (2024)
<b>Resource and Capabilities View (RCV) of Sustainability Framework</b>		
RCV	How strongly do you agree that collaborative innovation through design in tourism is a dynamic and fruitful process that brings together diverse perspectives from industry professionals, local residents, and tourists?	Chandran et al. (2024)
RCV	To what degree do you agree that by involving multiple stakeholders, tourism firms can tap into a wealth of knowledge and experiences they might not have access to otherwise?	Birendra et al. (2021)
RCV	How much do you agree that these collaborative networks foster value-driven relationships that extend beyond traditional business transactions?	Kompella (2024)
<b>Competitive Advantage (CA) Framework</b>		
CA	To what extent do you agree that the adoption of sustainability practices in tourism is closely linked to learning from organisations that have already achieved competitive advantages through such initiatives?	Rubio-Mozos et al. (2020)
CA	How strongly do you agree that sustainable tourism management yields significant economic benefits for destinations, such as increased local income from tourists preferring eco-friendly options and willing to pay a premium for sustainable experiences?	Buhalis et al. (2023)
CA	To what degree do you agree that the implementation of sustainable practices often creates new job opportunities within the local community?	Leal Filho et al. (2019)

Note: Please see full reference list of this article: <https://doi.org/10.4102/sajbm.v55i1.4815> for more information.

## Results

### External model

Outer loadings indicate the strength of the relationship between indicators and constructs. Values above 0.7 are considered acceptable, indicating a significant influence on the construct (Carmines & Zeller, 1979). Some indicators were not taken into consideration since their values were < 0.7 such as OS3 (Table 2).

The reliability and validity of the constructs are assessed using Cronbach's alpha, composite reliability ( $\rho_a$ ), composite reliability ( $\rho_c$ ) and average variance extracted (AVE). Cronbach's alpha measures internal consistency, while the two forms of composite reliability and AVE assess reliability and shared variance, respectively. Accepted values vary, but generally values above 0.7 are sought for Cronbach's alpha and composite reliability, and above 0.5 for AVE (Table 3) (Afthanorhan et al., 2020).

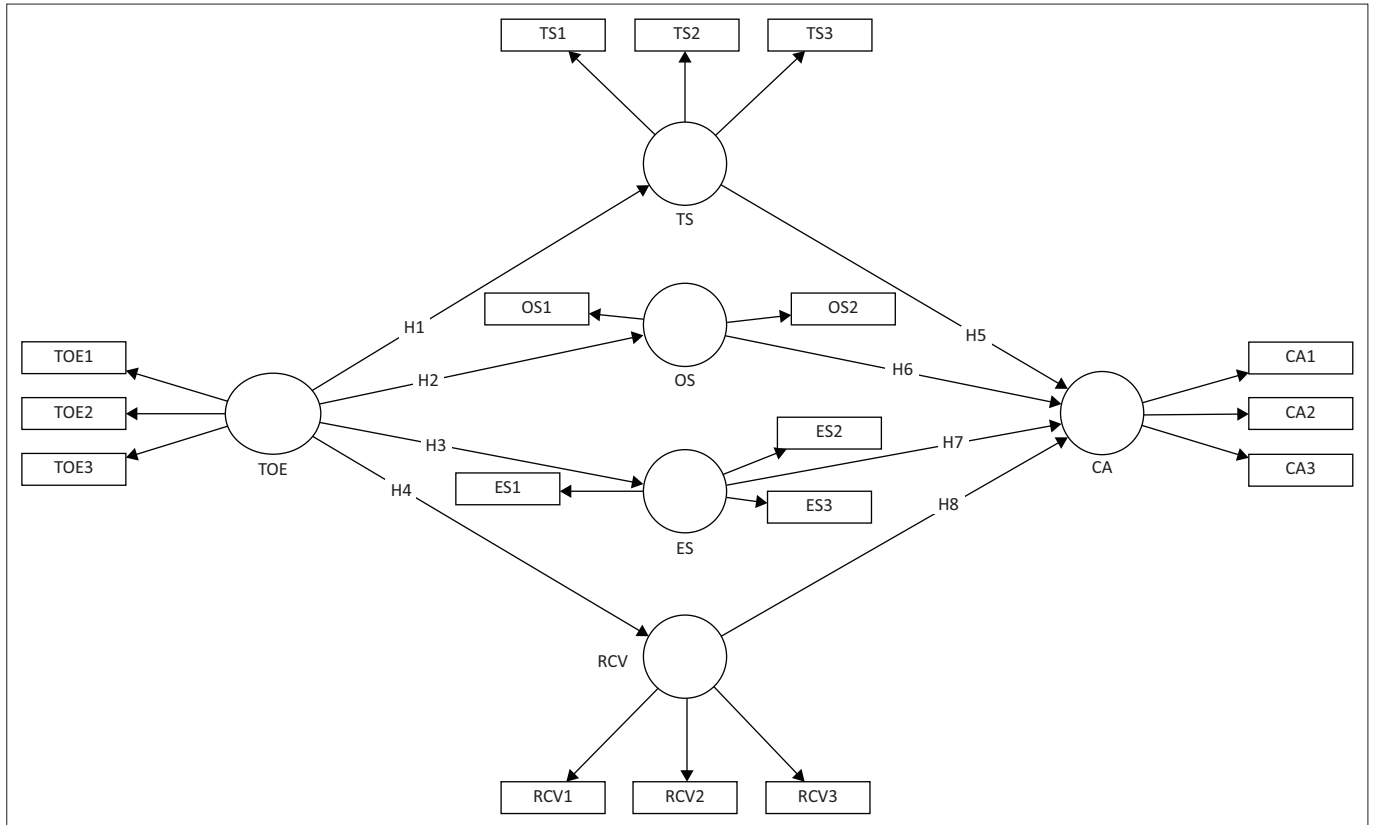
The discriminant validity Heterotrait-Monotrait (HTMT) measures the distinctiveness between constructs. It is calculated by comparing the correlations between constructs with confidence intervals. It is considered acceptable if values are

below 0.9, indicating adequate discrimination between constructs (Table 4) (Yusoff et al., 2020).

### Inner model

The coefficient of determination ( $R^2$ ) is a key metric in linear regression analysis, measuring how well the model explains the variability in the dependent variable. Ranging from 0 to 1, a higher  $R^2$  indicates a better fit between the model and the data. Considering  $R^2$  values, as per Chin's (1998) interpretative thresholds, provide insight into the explanatory power of the models used. An  $R^2$  value above 0.67 is deemed substantial, indicating a strong relationship between the predictors and the outcome. In this study, the  $R^2$  value for the CA framework is 0.713, signifying that the model explains a substantial portion of the variance in CA among hotels, highlighting the strong impact of SP.

Conversely, the  $R^2$  value for the OS framework is 0.332, which falls within the moderate range (0.33–0.67). This suggests that the model moderately explains the variance in OS, underscoring the influence that sustainability frameworks have on CA and organisational practices in the context of emerging market hotels.



CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

FIGURE 1: Model.

TABLE 2: Outer loadings.

Construct	CA	ES	OS	RCV	TOE	TS
CA1	0.906	-	-	-	-	-
CA2	0.866	-	-	-	-	-
CA3	0.897	-	-	-	-	-
ES1	-	0.825	-	-	-	-
ES2	-	0.840	-	-	-	-
ES3	-	0.801	-	-	-	-
OS1	-	-	0.925	-	-	-
OS2	-	-	0.919	-	-	-
RCV1	-	-	-	0.877	-	-
RCV2	-	-	-	0.879	-	-
RCV3	-	-	-	0.615	-	-
TOE1	-	-	-	-	0.874	-
TOE2	-	-	-	-	0.833	-
TOE3	-	-	-	-	0.803	-
TS1	-	-	-	-	-	0.876
TS2	-	-	-	-	-	0.822
TS3	-	-	-	-	-	0.881

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

In evaluating the implementation of sustainable tourism, all hypotheses within the study are confirmed, revealing insightful outcomes. The TOE framework, a critical analytical tool, positively influences the TS framework, the OS framework, the ES framework (ES), and the RCV of sustainability framework. This indicates that the interplay of technology, organisational practices, and environmental context significantly enhances various dimensions of sustainability within hotels in emerging markets.

TABLE 3: Reliability and validity.

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CA	0.868	0.869	0.919	0.792
ES	0.760	0.761	0.862	0.676
OS	0.824	0.824	0.919	0.850
RCV	0.707	0.750	0.839	0.640
TOE	0.786	0.792	0.875	0.701
TS	0.824	0.823	0.895	0.740

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

TABLE 4: Discriminant validity Heterotrait-Monotrait.

Construct	CA	ES	OS	RCV	TOE	TS
CA	-	-	-	-	-	-
ES	0.879	-	-	-	-	-
OS	0.671	0.484	-	-	-	-
RCV	0.538	0.554	0.560	-	-	-
TOE	0.677	0.639	0.715	0.741	-	-
TS	0.824	0.602	0.560	0.581	0.584	-

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

The positive influence of the TOE framework on TS, OS and ES implies that technological advancements, organisational commitments, and environmental considerations collectively foster robust sustainable practices in emerging economies. For instance, the adoption of eco-friendly technologies (TS), the integration of sustainable policies (OS) and adherence to environmental regulations (ES) collectively contribute to the sustainability goals of hotels.

Furthermore, these sustainability frameworks (TS, OS and ES) positively impact the CA framework in hotels. This means that hotels in emerging economies that invest in technological, organisational and environmental sustainability are better positioned to achieve a competitive edge. For example, environmentally conscious operations can attract eco-sensitive travellers, while efficient organisational practices can enhance service quality and operational efficiency.

However, the study reveals no significant relationship between the RCV of sustainability framework and achieving the CA framework. This discrepancy could stem from several factors. It is possible that resource-based capabilities, such as internal competencies and assets, are not directly aligned with external competitive outcomes in the context of emerging markets. These resources might be insufficiently leveraged or not as critical in establishing CA compared to technological, organisational and environmental strategies. Hence, while RCV contributes to sustainability, its direct impact on CA might be less pronounced, highlighting a potential area for strategic development (Table 5).

The  $f$ -square ( $f^2$ ) statistic is a valuable tool for quantifying the effect size of specific variables, shedding light on their practical significance within a model. The generally accepted thresholds for interpreting  $f^2$  values are 0.02 for a small effect, 0.15 for a medium effect and 0.35 for a large effect. According to Purwanto (2021), a higher  $f^2$  value signifies a greater contribution of the predictor to explaining the variance of the construct.

In the current study, three predictors exhibit exceptionally strong effects: ES-CA ( $f^2 = 0.509$ ), TOE-OS ( $f^2 = 0.498$ ) and TOE-RCV ( $f^2 = 0.448$ ). These values far surpass the 0.35 threshold, indicating large effects. The substantial  $f^2$  values for these predictors imply that the ES framework significantly enhances the CA framework, suggesting that environmental SP are crucial for achieving a competitive edge. Similarly, the high  $f^2$  for the TOE framework's influence on OS and RCV highlights the pivotal role of integrated technological and organisational strategies in driving sustainability.

The significant  $f^2$  values indicate that these predictors are highly influential in the context of sustainable tourism, underscoring their essential roles in shaping CA and sustainability outcomes. This highlights the practical importance of these frameworks in guiding hotels in emerging markets towards achieving their sustainability and competitive goals (Table 6).

The  $Q^2$  predict statistic specifically measures the predictive relevance of a model, reflecting its capacity to predict outcomes for endogenous constructs. Essentially, it evaluates how well the model forecasts data points. Positive  $Q^2$  predict values denote good predictive relevance, while non-positive values suggest poor predictive ability. According to Hair et al. (2011),

a model is considered to have predictive relevance if  $Q^2$  predict is greater than 0 and lacks it if  $Q^2$  predict is less than 0.

In the context of the study, the CA framework has a  $Q^2$  value of 0.303, and the OS framework has a  $Q^2$  value of 0.324. These values significantly exceed the 0.30 threshold, indicating strong predictive relevance. This suggests that the model is highly effective in predicting the performance and sustainability outcomes of hotels.

The substantial  $Q^2$  values for CA and OS imply that the model reliably forecasts how these frameworks contribute to the overall CA and organisational sustainability of hotels. In practical terms, these high  $Q^2$  values underscore the robustness of the model in capturing the essential factors that drive CA and sustainability. This predictive strength highlights the importance of integrating comprehensive SP, such as environmental, technological, and organisational strategies, to achieve superior performance in the hospitality sector. The findings reinforce the notion that sustainable tourism practices not only benefit the environment but also enhance a hotel's competitive edge and operational success (Table 7).

## Discussion

As the coefficient of determination,  $R^2$  indicates the proportion of variance in the dependent variable that can be

**TABLE 5:** Path coefficients and hypotheses.

Hypothesis	$\beta$	2.5%	97.5%	T statistics	p
H1: TOE -> TS	0.471	0.334	0.606	6.773	0.000
H2: TOE -> OS	0.576	0.446	0.691	9.301	0.000
H3: TOE -> ES	0.495	0.351	0.641	6.551	0.000
H4: TOE -> RCV	0.556	0.434	0.674	9.040	0.000
H5: TS -> CA	0.393	0.272	0.550	5.509	0.000
H6: OS -> CA	0.224	0.090	0.359	3.254	0.001
H7: ES -> CA	0.453	0.268	0.603	5.271	0.000
H8: RCV -> CA	-0.030	-0.151	0.094	0.475	0.635

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

**TABLE 6:** The  $f$ -square.

Construct	CA	ES	OS	RCV	TOE	TS
CA	-	-	-	-	-	-
ES	0.509	-	-	-	-	-
OS	0.122	-	-	-	-	-
RCV	0.002	-	-	-	-	-
TOE	-	0.325	0.498	0.448	-	0.285
TS	0.346	-	-	-	-	-

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TOE, technology-organisation-environment; TS, technological sustainability.

**TABLE 7:**  $Q^2$  predict.

Construct	$Q^2$ predict
CA	0.303
ES	0.225
OS	0.324
RCV	0.292
TS	0.201

CA, competitive advantage; ES, environmental sustainability; OS, organisational sustainability; RCV, resource and capabilities view; TS, technological sustainability.



explained by the independent variables in the model with an  $R^2$  value of 0.713 which is highly significant for the dependent variable CA framework. It means that 71.3% of the variance in CA is accounted for by the independent variables: TS framework, OS framework, ES framework, and the RCV of sustainability framework.

The high  $R^2$  value signifies that the variables under consideration collectively offer a robust explanation for the changes and variations observed in the CA framework. This means that a significant portion of the variance in CA among hotels can be accounted for by these variables.

Specifically, factors such as the ES framework have a direct impact on the CA framework. Hotels that implement strong environmental SP can differentiate themselves in the market, attract environmentally conscious customers, and reduce operational costs through efficient resource use, thus gaining a competitive edge.

Similarly, the TOE framework significantly influences the OS framework. The TOE framework integrates technological advancements, organisational practices and environmental contexts, creating a comprehensive approach to sustainability. For instance, adopting advanced technologies (such as energy-efficient systems), fostering a culture of sustainability within the organisation and aligning with environmental regulations collectively enhance organisational sustainability. This, in turn, supports the hotel's overall performance and competitive positioning.

In essence, the high  $R^2$  value indicates that these frameworks – ES impacting CA and TOE influencing OS – are crucial determinants of CA and OS. Their strong explanatory power highlights the importance of a multifaceted approach to sustainability, incorporating technological, organisational, and environmental dimensions to achieve superior performance in the hospitality industry.

According to the results, H2 and H4 are the most significant among the eight accepted hypotheses because of their high path coefficients ( $\beta$ ),  $t$ -values, and  $p$ -values. Specifically, H2 (TOE  $\rightarrow$  OS) has a path coefficient of 0.576, a  $t$ -value of 9.301 and a  $p$ -value of 0.000, while H4 (TOE  $\rightarrow$  RCV) has a path coefficient of 0.566, a  $t$ -value of 9.301 and a  $p$ -value of 0.000. These values indicate strong relationships and high statistical significance, suggesting that the TOE framework has a substantial impact on both the OS framework and the RCV of sustainability framework. The large  $\beta$  values demonstrate that changes in TOE significantly influence OS and RCV, while the high  $t$ -values and low  $p$ -values confirm the robustness and reliability of these findings.

The TOE framework encompasses the integration of technological advancements, organisational practices and environmental contexts, which collectively drive sustainability efforts within hotels. The high  $\beta$  values suggest that improvements in TOE elements, such as adopting advanced

technologies, implementing effective organisational strategies and aligning with environmental standards, significantly enhance OS and optimise the use of RCV.

The robust  $t$ -values and the statistically significant  $p$ -values underscore the critical role of a holistic approach to sustainability, where technological innovation, organisational commitment and environmental stewardship are integrated to achieve superior sustainability performance. These findings emphasise that focussing on TOE elements is essential for hotels aiming to enhance their SP and CA in the market.

## Conclusions

Theoretical and practical conclusions can be drawn from this study, offering valuable insights for both academia and industry. The findings contribute to the existing body of knowledge on sustainability in tourism and provide actionable recommendations for hotel managers and policymakers to enhance sustainable practices and CA in diverse global contexts.

### Theoretical Conclusions

1. Integration of TOE framework: The study underscores the significant impact of the TOE framework on sustainability outcomes, particularly OS and the RCV of sustainability. This theoretical insight highlights the necessity of a multifaceted approach to sustainability that incorporates technological advancements, organisational practices, and environmental contexts. The strong relationships (H2:  $\beta = 0.576$ , H4:  $\beta = 0.566$ ) validate the TOE framework as a comprehensive model for understanding how different elements interplay to enhance sustainability in the hospitality sector.
2. Differentiation of Sustainability Impacts: The theoretical distinction between the influences on OS and the RCV of sustainability frameworks in emerging economies provides a nuanced understanding of how SP affects different aspects of hotel operations. The substantial path coefficients indicate that while technological and organisational strategies are crucial for overall sustainability as it is in developed countries, their impacts vary, necessitating tailored approaches. This differentiation supports the development of more precise theoretical models that account for varied sustainability impacts across organisational dimensions.
3. Predictive Power of Sustainability Frameworks: The significant  $R^2$  values for CA (0.713) and OS (0.332) reveal the strong explanatory power of sustainability frameworks in predicting CA and organisational outcomes. This theoretical conclusion emphasises the importance of integrating sustainability into core strategic frameworks, reinforcing theories that posit sustainability as a critical driver of competitive differentiation and operational excellence. The high predictive relevance ( $Q^2$  values) further supports this, suggesting that sustainability frameworks are not only theoretically sound but also practically predictive.

## Practical Conclusions

1. Strategic Emphasis on TOE Elements: Practically, the findings suggest that hotels in emerging markets should strategically emphasise the elements of the TOE framework to enhance sustainability. By investing in advanced technologies, implementing effective organisational practices, and adhering to environmental standards, hotels can significantly improve their sustainability performance. The robust statistical significance ( $p$ -value = 0.000) of these elements provides a clear directive for hotel management to prioritise these areas to achieve superior sustainability outcomes.
2. Holistic Approach to CA: The positive impact of the TS framework, OS framework, and ES framework on achieving the CA framework indicates that a holistic approach to sustainability is essential. Hotels should integrate these frameworks into their strategic planning to attract environmentally conscious customers, enhance operational efficiencies, and differentiate themselves in the market. This practical conclusion reinforces the necessity of a comprehensive sustainability strategy that addresses multiple facets of operations.
3. Focussed Resource and Capabilities Development: Despite the strong impact of TOE on RCV, the lack of a direct relationship between RCV and CA suggests that resource and capabilities development alone may not suffice for achieving CA. This practical insight advises hotel managers to ensure that resource-based strategies are effectively integrated with broader technological and organisational initiatives. Developing capabilities must be part of a cohesive strategy that leverages technological innovations and organisational improvements to translate into competitive gains.

The study's limitations stem from challenges in obtaining information from hotel managers and directors. Initially, many were sceptical about participating, which necessitated considerable additional effort to engage with them and secure their responses. This reluctance posed a significant hurdle, impacting the ease of data collection.

Future research could explore several promising directions. One key area is comparing the perspectives and practices of hotel managers in developing versus developed countries. This comparative analysis could reveal differences in sustainability approaches, resource management and competitive strategies, offering valuable insights into how contextual factors influence hotel operations and sustainability outcomes. Such research would enhance our understanding of global variations in sustainable tourism practices and contribute to more tailored strategies for different market contexts.

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The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

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M.M.L., L.M.-L., A.O.S.B.R. and S.A.-J. contributed equally to this work.

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## Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

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