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Article

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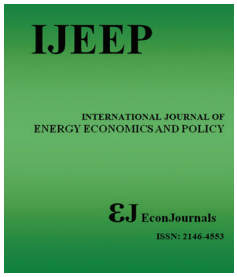

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The Role of Energy Management Practices in Sustainable Tourism Development: A Case Study of Jerash, Jordan

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ABSTRACT

This study investigates the mediating role of Top Management Commitment (TMC) on the relationship between Energy Management Practices (including Energy Awareness [EAW], Energy Efficiency [EE], and Energy Knowledge [EK]) and Sustainable Tourism Development (STD) in Jerash, Jordan. Amid growing global concerns about environmental sustainability, understanding the dynamics between energy management and sustainable tourism has become critically important. The study utilizes Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the collected data. The empirical results reveal that EAW, EE, and EK have a significant positive influence on STD, indicating the direct impact of energy management practices on the sustainability of tourism. Furthermore, the findings suggest that these energy management variables also significantly influence TMC. Intriguingly, TMC emerges as a substantial mediator, enhancing the positive effects of EAW, EE, and EK on STD. This signifies the crucial role of top management's commitment to leveraging energy management practices effectively to foster sustainable tourism development. The study, despite focusing only on the context of Jerash, Jordan, contributes valuable insights to the existing literature and informs managerial practice in the tourism sector. Future research should expand its scope to different geographical regions and consider additional dimensions of energy management practices to further enrich the understanding of sustainable tourism development.

Keywords: Energy Management Practices, Jordan, PLS-SEM, Sustainable Tourism Development
JEL Classifications: Q47, O53, B23, Z32

1. INTRODUCTION

Tourism stands as a vital economic sector worldwide, with a profound impact on economic growth, employment, and cultural exchange. However, this industry is notably linked with high energy consumption and significant carbon dioxide emissions, posing a considerable challenge to environmental sustainability and climate change mitigation efforts (Streimikiene et al., 2021). In this regard, the sustainability of tourism development, particularly concerning energy consumption, has gained considerable attention from researchers, policy-makers, and stakeholders (León-Gómez et al., 2021). Energy Management Practices (EMPs) are strategies aimed at reducing energy consumption, enhancing energy efficiency, and promoting renewable energy use (Iqbal et al., 2021). Despite the considerable interest and studies carried out in EMPs within manufacturing and other sectors, their implications and potential within the tourism sector remain less understood (Smith et al., 2021). Jerash, a city in Jordan, is known for its archaeological

significance and rich cultural heritage, making it a popular tourism hub. However, like many tourist destinations, the city is grappling with the sustainability challenges that tourism brings, particularly those associated with energy consumption (Orîndaru et al., 2021). Given the pressing need for more sustainable practices in the tourism industry, understanding how EMPs can be implemented in tourist destinations like Jerash is of paramount importance. Manufacturing firms are making energy management practises (EMPs) a key component of their strategy planning for the next 10 years in view of the rapid industrialization, rising energy consumption patterns, and anticipated economic growth (Nguyen et al., 2021).

Businesses are using EMPs as a cost-effective strategy to increase industrial energy efficiency and boost industry competitiveness, hence boosting industrial sustainability (Hasan et al., 2021). EMPs are considered to be a practical method of lowering energy usage (Ouali et al., 2021). Businesses' intentional use of EMPs in production procedures lessens negative environmental effects. (Kuo et al., 2022) and sustainable development (Shah and Soomro, 2021). The manufacturing industry is a major contributor to environmental problems due to its heavy reliance on non-renewable resources (Ibrahim and Ajide, 2021; Adekoya et al., 2022; Chien, 2022). Manufacturing accounts for 23% of the world's energy consumption. According to the resource-based concept, which is widely employed in studies on energy management practises (EMPs) (Patel et al., 2022), businesses that actively engage in EMPs create unique resources that are difficult to duplicate, securing a long-term competitive edge. Companies are urged to use coordinated efforts to address environmental issues and strategic investments in EMPs as vital resources in this context. This strategy intends to satisfy the rising demand for eco-friendly goods while securing long-term gains (Sadiq et al., 2022). Historical empirical evidence has demonstrated that EMPs increase energy efficiency by identifying inefficient or broken equipment and processes and replacing them with more environmentally friendly alternatives (Li et al., 2023). Energy efficiency, though, may play a mediating function between EMPs and environmental performance. The devotion and commitment of top management is crucial to the effective implementation of Energy Management Practises (EMPs).

The risk of failure and cessation of EMPs across a variety of industrial processes within an organisation is higher in the absence of this commitment (Mofokeng, 2022). The top leadership must foster knowledge and comprehension of the constantly changing energy-efficient technology in order to increase energy efficiency, which can subsequently be used to boost business performance. This study makes the claim that successful implementation of EMPs is more likely when top management's role is taken into account in conjunction with energy efficiency. This research is based on the behavioural theory of corporate governance, which sees top management commitment as a social construct (Filatotchev et al., 2022). When senior management has thorough knowledge of the manufacturing processes, the implementation of energy-efficient projects rises (Andrei et al., 2022). To date, studies looking at the effect of adopting EMPs on sustainable development (Lu et al., 2021; Tiwari et al., 2022) have not clearly identified the ways in which top management commitment modifies this relationship. In an effort to make meaningful contributions to this area of study, we delve into the following research question: What is the correlation between Energy Management Practices (EMPs), energy efficiency, commitment from top management, and sustainable tourism development in Jerash, Jordan? This study thus contributes in two significant ways: Firstly, it explores the connection between EMPs and sustainable tourism development in Jerash, Jordan. The findings from this investigation will enrich the emerging body of research that intertwines business strategy and environmental sustainability, examined through the perspective of a resource-based view. Secondly, the study scrutinizes the mediating role of top management commitment within the dynamics of the relationships between EMPs and sustainable tourism development in Jerash, Jordan.

2. HYPOTHESES AND LITERATURE REVIEW

2.1. Resource-Based View

The resource-based view (RBV) of a firm is a theoretical framework that posits a company's sustainable competitive advantage lies within its unique resources and capabilities (Lubis, 2022). Applied to Energy Management Practices (EMPs) within the context of sustainable tourism development, the theory provides several valuable insights. In the context of sustainable tourism development, resources could be tangible, such as physical assets (energy-efficient appliances, sustainable energy systems, etc.), or intangible, such as managerial knowledge, skills, and commitment to sustainable energy management (Varadarajan, 2023). According to the RBV, these resources should be valuable, rare, inimitable, and non-substitutable to provide a sustainable competitive advantage (Silvestri et al., 2023). The role of EMPs is seen as a strategic resource within this framework. These practices involve the efficient use of energy resources, the adoption of energy-efficient technologies, and the management commitment to energy conservation and environmental sustainability (Dion and Evans, 2023). Firms that successfully implement EMPs can achieve greater energy efficiency, which can reduce operating costs, enhance the firm's reputation, and improve its competitiveness. From the RBV perspective, if EMPs are considered a strategic resource, firms can create a sustainable competitive advantage by implementing superior energy management practices (Iqbal et al., 2022). This is particularly important in the tourism industry, where energy efficiency can also contribute to sustainable tourism development. A firm's ability to efficiently manage energy consumption can minimize its environmental footprint, meeting the increasing demand for sustainable tourism experiences (Sun and Drakeman, 2022). However, the successful implementation of EMPs requires a firm's top management to have a strong commitment to these practices. The RBV theory argues that managerial skills and commitment are crucial resources for a firm (Haldorai et al., 2022). In this context, top management's knowledge about energy efficiency, their understanding of its benefits, and their commitment to EMPs could be key drivers of sustainable tourism development (Kim et al., 2021). In conclusion, the RBV provides a theoretical lens through which we can better understand the role

of EMPs in sustainable tourism development. It underscores the importance of unique resources - in this case, EMPs and managerial commitment - in creating a sustainable competitive advantage and contributing to sustainable tourism development.

2.2. Energy Management Practices

Corporations are gradually adopting practises that reduce the negative environmental effects of their operations as knowledge of environmental sustainability rises on a worldwide scale. The determination to reduce energy waste while maintaining unaltered production volumes and quality is a crucial element of this shift (Aliero et al., 2021). Companies that take this action are tackling a significant issue with environmental degradation, advancing more general objectives of sustainable development, and exemplifying corporate social responsibility. The incorporation of cutting-edge "energy-efficient technologies" has made it easier to manage energy effectively (Li et al., 2021). These technological developments have had a significant impact on enterprises' capacity to reduce their energy use, resulting in more sustainable practises and operations. Such technology has value that goes beyond its ability to reduce energy waste alone; it also helps businesses maintain their production efficiency, assuring business continuity and continuous profitability. Businesses have started implementing "technology optimisation processes" to further improve these energy-efficient devices. These procedures are intended to guarantee that the current energy and technology systems are utilised to their greatest potential and that any modifications or improvements are performed right away. This entails performing routine maintenance on the systems to prevent energy inefficiencies that can develop due to wear and tear, as well as changing current systems to keep up with developments in energy-efficient technologies. Focusing on energy conservation through enhanced maintenance procedures and lowering the energy load during non-productive times is another crucial aspect of Energy Management Practises (EMPs), according to Royston et al. (2021). Effective maintenance procedures guarantee that all systems are running at their highest levels of energy efficiency and that any defects that potentially increase energy usage are quickly identified and fixed. Another useful strategy for energy conservation is to lower the energy demand when no work is being done. This reduces unused energy usage by turning off or running energy-intensive systems and processes at low levels when they are not needed. Despite the growing use of EMPs and their shown advantages, there is a dearth of scholarly literature that offers reliable advice on EMPs (Moosa and He, 2021). This is explained by the complexity of industrial processes, which can differ greatly across various sectors, environments, and nations. It is challenging to create "one-size-fits-all" guidelines for EMPs since these distinctions call for a customised strategy to energy management. The adoption and successful implementation of EMPs necessitate a thorough knowledge of the unique business processes, energy consumption trends, and resource capacities. The senior management must also be committed to making investments in energy-efficient technologies and caring for them properly. The significance of EMPs and the necessity for more research in this area cannot be emphasised as businesses continue to struggle with the problem of striking a balance between productivity and sustainability. EMPs have the potential to greatly contribute to a company's sustainability goals while also ensuring operational effectiveness and competitiveness with the right direction and dedication.

2.3. Sustainable Tourism Development

Sustainable Tourism Development refers to the management of all resources involved in tourism in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems (Ngoc et al., 2021). It is a concept born out of the recognition of the significant impacts-both positive and negative-that tourism can have on destinations and communities. Economic sustainability is one of the key pillars of Sustainable Tourism Development (Grilli et al., 2021). It ensures that tourism activities contribute to the overall economic prosperity of a destination, providing income and employment opportunities to the local community. Social sustainability is another essential component, focusing on the impacts of tourism on communities (Achmad and Yulianah, 2022). The aim is to ensure that tourism development increases the quality of life of the local population, respects the host community and its cultural heritage, and leads to a fair distribution of benefits. Environmental sustainability is a crucial aspect as well. It deals with managing tourism's impact on the natural environment, ensuring that development is compatible with the conservation of essential ecological processes, biological diversity, and biological resources (Mateoc-Sîrb et al., 2022). The role of stakeholders in sustainable tourism development is of paramount importance. It includes the participation of local communities, tourists, tourism businesses, governments, and non-governmental organizations (Katemliadis and Markatos, 2021). Each group has different roles and responsibilities in achieving sustainability. Adopting Sustainable Tourism Development practices can lead to various benefits (Walker and Lee, 2021). These include the protection and conservation of natural and cultural resources, which form the basis of tourism, improved quality of life for residents, a better experience for tourists through the maintenance of a healthy environment and vibrant communities, and economic benefits through sustainable use of resources, which can contribute to job creation and income generation.

2.4. Top Management Commitment

Top Management Commitment refers to the extent to which high-level executives and leaders within an organization are engaged in, supportive of, and driving a particular initiative, policy, or strategic goal (Kitsis and Chen, 2021). This commitment is often seen as a key factor in the success or failure of various organizational initiatives, whether they are related to operations, human resources, technology, or sustainability (Alkhawaldeh et al., 2023). When top management is committed to an initiative, they often demonstrate it by allocating necessary resources, setting strategic goals aligned with the initiative, regularly communicating about it, and embedding it within the organization's culture and practices (Wei et al., 2023). This commitment can also be shown through personal involvement and leadership, which can help to motivate employees and signal the importance of the initiative within the organization (Adusei et al., 2023). In the context of energy management practices or sustainable tourism development, top management commitment is crucial. It is often the driving force behind the adoption of sustainability policies, investment

in energy-efficient technologies, and the fostering of a corporate culture that values environmental responsibility (Haldorai et al., 2022). This commitment signals to employees, stakeholders, and customers that sustainability is a strategic priority for the organization. It can enhance employee engagement, improve stakeholder relations, and contribute to the company's reputation and competitiveness (Arayakarnkul et al., 2022). It can also lead to more tangible outcomes, such as energy savings, cost reductions, and increased market share, all of which can contribute to the overall success and sustainability of the organization.

2.5. Energy Management Practices and Sustainable Tourism Development

Energy Management Practices (EMPs) have become a cornerstone of corporate sustainability strategies, serving as a vital link to the objective of achieving Sustainable Tourism Development. A wealth of literature exists on this nexus, underscoring the significant impacts that conscientious energy management can exert on the tourism sector. Alfnes et al. (2023) underscore the role of EMPs in improving energy efficiency. They argue that through regular equipment maintenance, load reduction in non-productive phases, and the adoption of energy-efficient technologies, firms can minimize energy waste without compromising output quality. This, in turn, enhances the sustainability of tourism-related activities by reducing their environmental footprint. Afum et al., (2020), Alkhawaldeh and Mahmood (2021), and Rahuma and Fethi (2022) provide insights into how companies have integrated EMPs into their strategies, working to reduce the negative environmental impact of their operations. This supports sustainable tourism development by ensuring that tourism activities contribute to economic prosperity while maintaining ecological balance and cultural integrity. The importance of top management commitment to the successful implementation of EMPs is highlighted by Hamadamin and Atan (2019) and Yusliza et al., (2019). Their research suggests that without high-level commitment, the adoption of EMPs might face resistance, reducing their effectiveness and potentially limiting their contribution to sustainable tourism development. Research has also begun to highlight the potential of EMPs in specific contexts (Alkhawaldeh et al., 2022). For instance, Keles et al., (2023) explore how EMPs are applied within the tourism sector, and how they contribute to sustainable tourism development. They emphasize that EMPs can contribute to both the economic prosperity and environmental sustainability of tourist destinations, enhancing the quality of life of local communities and conserving cultural and natural resources. In addition, Gómez-Rico et al., (2023) delve into how strategic investments in EMPs can lead to long-term benefits, including meeting the rising demand for green products and services in the tourism sector. This perspective reveals the potential of EMPs as a competitive advantage for tourism businesses. Despite the growing evidence of the benefits of EMPs, Shahzad et al., (2020) note the lack of authoritative guidance due to the complexity and variety of industrial processes. They call for further research to develop comprehensive, adaptable guidelines for the application of EMPs across different contexts and industries.

H_1: There is significant and positive effect of energy management practices on sustainable tourism development

H_{1a}: There is significant and positive effect of energy awareness on sustainable tourism development

H_{1b}: There is significant and positive effect of energy efficiency on sustainable tourism development

H_{1c}: There is significant and positive effect of energy knowledge on sustainable tourism development

2.6. Energy Management Practices and Top Management Commitment

Energy Management Practices (EMPs) and the involvement of top management in their implementation have been extensively examined within the literature, highlighting the importance of managerial commitment in driving energy efficiency and overall corporate sustainability. Turner and Doty (2007) underscore that the success of EMPs largely depends on the commitment of top management. Without this commitment, they argue, the risk of EMPs' failure and discontinuance across different processes within a firm is increased. Top management's role in instilling awareness and knowledge about achieving higher energy efficiency is crucial in shaping a firm's performance. This sentiment is further echoed by Sola and Mota (2020), who posit that the adoption of energy-efficient initiatives increases when top management has comprehensive knowledge about production processes. They suggest that successful integration of EMPs requires a commitment from leadership not only in the form of verbal support but also active involvement and resource allocation. Aguilera et al., (2021) delve deeper into the theoretical implications of top management's commitment in their study based on the behavioral theory of corporate governance. They argue that this commitment can be viewed as a socially situated and socially constituted agency, underlying the success of EMPs implementation. El-Kassar and Singh (2019) contribute to this narrative by emphasizing that firms proactively engaged in EMPs build inherent resources that offer a sustainable competitive advantage, primarily when these efforts are backed by top management. They suggest that firms are expected to leverage strategic investments in EMPs as key resources to meet increasing demands for green products and gain long-term benefits. Patel et al., (2022) and Gonzalez-Torres et al., (2023) demonstrate how EMPs, when combined with top management commitment, lead to higher energy efficiency by identifying inefficient or malfunctioning equipment and processes and replacing or repairing them with more environmental-friendly alternatives. However, Fernando et al. (2018) and Yusliza et al. (2019) emphasize that there's a gap in understanding the moderating effect of top management commitment on the success of adopting EMPs and its impact on firm performance.

H_2: There is significant and positive effect of energy management practices on sustainable tourism development

H_{2a}: There is significant and positive effect of Energy Awareness on top management commitment

H_{2b}: There is significant and positive effect of Energy Efficiency on top management commitment

H_{2c}: There is significant and positive effect of Energy Knowledge on top management commitment

2.7. Top Management Commitment and Sustainable Tourism Development

The significance of top management commitment in promoting Sustainable Tourism Development (STD) has been a topic of keen interest within the existing literature. Numerous researchers

argue that leadership engagement is crucial in driving sustainable practices within the tourism industry. Sola and Mota (2020) underline the impact of top management's understanding of the production process on the adoption of sustainable initiatives. They suggest that an informed top management team is more likely to back energy-efficient initiatives, thus enhancing STD. El-Kassar and Singh (2019) examine this notion from a strategic perspective, explaining that top management's support for strategic investments in sustainable practices can deliver long-term benefits. They argue that proactive engagement in sustainability builds a competitive advantage, meeting the rising demand for eco-friendly tourism. Turner and Doty (2007) emphasize that without the commitment of top management, the implementation of sustainability initiatives is prone to failure. They believe that leadership plays a critical role in instilling awareness and leveraging this capability to fuel STD. Westphal and Zajac (2013), building on the behavioral theory of corporate governance, propose that top management commitment can be viewed as a socially situated and socially constituted agency. Their study supports the notion that the successful implementation of sustainability practices and, consequently, STD hinges upon the role of top management commitment. Yusliza et al. (2019) provide insight into the application of these principles within the tourism sector. They argue that top management commitment can enhance both the economic and environmental sustainability of tourist destinations, which improves the quality of life for local communities and conserves cultural and natural resources. However, Fernando et al. (2018) suggest that there's ambiguity regarding the moderating effect of top management commitment on the success of sustainable practices within the tourism industry. They call for further research to elucidate this relationship and its implications for STD.

H_3: There is significant and positive effect of Top Management Commitment on sustainable tourism development

2.8. Top Management Commitment as Mediator

The role of top management commitment as a mediator in various organizational dynamics has been a subject of extensive study in recent years. The current literature points to the vital role that top management plays in implementing various strategic initiatives, from sustainability to innovation. El-Kassar and Singh (2019) emphasize that firms can gain long-term benefits from strategic investments in sustainable practices when these efforts are backed by top management. They argue that the success of such initiatives hinges upon the proactive engagement of top leadership, acting as a mediator between the firm's resources and its strategic objectives. Turner and Doty (2007) underscore the crucial role of top management commitment in the implementation of Energy Management Practices (EMPs). They assert that without leadership commitment, the adoption of EMPs faces higher risk of failure, signifying the mediating role that top management plays between EMPs and successful organizational performance. Westphal and Zajac (2013) draw upon the behavioral theory of corporate governance to depict top management commitment as a socially situated and socially constituted agency. They argue that top management acts as a mediator between the internal organizational environment and the external corporate governance environment, which influences the success of organizational practices. Fernando et al. (2018) and Yusliza et al. (2019) explore the mediating role of top management commitment in the context of EMPs and their impact on firm performance. They highlight the need for further research to understand the specific moderating effects that top management commitment can have on the success of implementing EMPs and other strategic initiatives. Sola and Mota (2020) demonstrate the pivotal role of top management commitment as a mediator in the adoption of energy-efficient initiatives. They contend that the full understanding and commitment of top management towards production processes influence the extent to which these initiatives are adopted. However, despite the substantial attention given to the mediating role of top management commitment, gaps still remain. As noted by Fernando et al. (2018), there is a need for further research to better understand the specific conditions under which top management commitment acts as a mediator and the mechanisms through which it influences organizational outcomes.

H_4: Top Management Commitment mediate the effect of energy management practices (Energy Awareness, Energy Efficiency, and Energy Knowledge) on sustainable tourism development

The discussion above highlights an existing research gap concerning the mediating influences of top management commitment on the link between energy management practices (Energy Awareness, Energy Efficiency, and Energy Knowledge) and sustainable tourism development. To address these gaps, this study introduces a proposed research framework, depicted in Figure 1.

3. RESEARCH METHOD

3.1. Research Design

This study used a quantitative approach and a positivist philosophical framework. Data were compiled using a cross-sectional approach using a deductive research method, which involved gathering information from several individuals at a particular time period. It was crucial to select a representative sample among a sizable population for the results to be applicable to a wider context, which is commonly accomplished by using quantitative closed-ended surveys.

3.2. Data Collection

In order to encourage open, honest responses from the participants, data collection took place at various times, mostly on weekends. It was collected between January and April 2023. We contacted participants by phone and email to check on their availability, give them a quick rundown of the study, and estimate the time it would take them to complete the questionnaire, which was roughly 10 min. We received 400 completed questionnaires out of the 558 that were delivered. A total of 387 questionnaires that were completed and acceptable for analysis remained after our initial screening for inaccurate and biased responses, which resulted in the exclusion of 13 surveys.

3.3. Measurements

The scales used to measure the study components were modified from earlier studies. These included six questions for Energy Awareness (EAW), seven items for energy efficiency (EE), eight items for energy knowledge (EK), six items for top management commitment (TMC),

five items for sustainable tourism development (STD). All the items were adapted and modified from Patel et al. (2022).

3.4. Data Analysis

For the quantitative analysis of data, we employed the structural equation modeling (SEM) method, specifically the partial least square SEM (PLS-SEM), which has proven to provide more dependable structural model estimations than the covariance-based SEM (CB-SEM). This method is a robust multivariate statistical technique that integrates factor analysis and multiple regression to examine the structural relationships between an array of measurable and latent variables.

4. RESULTS

4.1. Common-method Variance

We used Harman's single-factor method to assess the presence of common-method variance (CMV) in the acquired data. This statistical technique included using SPSS 27 to do a principal component analysis using a varimax rotation, as advised by Bozionelos and Simmering (2022). The findings, as shown in Table 1, showed that there was just one component responsible for 22.169% of the covariance. This rate is significantly lower than the typical 50%, indicating that there were no substantial CMV problems with the data.

4.2. Measurement Model Analysis

In order to improve and evaluate the latent construct items and the constructs themselves within the model, we used the partial least square-structural equation modelling (PLS-SEM) measurement approach. First, using PLS-SEM, we evaluated the measurement model to carefully examine the importance of a construct's indicator loadings. Validity confirms an instrument's ability to measure the construct it claims to, whereas reliability ensures an instrument's consistency in assessing a particular construct (Guenther et al., 2023). After that, we established a link between latent and observable constructs in the outer model. Three criteria were examined during this phase: (1) convergent validity, which assesses how closely a construct correlates with other constructs that it should theoretically be related to; (2) internal consistency reliability, which assesses the consistency of results across items on a test; and (3) discriminant validity, which guarantees that a construct is clearly distinct from other constructs (Purwanto, 2021).

4.3. Internal Consistency Reliability and Convergent Validity

We used Cronbach's alpha (CA) scores to assess the internal consistency among each construct's constituent parts. As shown in Table 2, all of the alpha values varied between 0.794 and 0.899 and all of them were higher than the Nunnally standard of 0.7 (Tzivinikou et al., 2021). Additionally, all CR values above the recommended threshold of 0.7 (Kono and Sato, 2023), with composite reliability (CR) scores for all components ranging from 0.861 to 0.919. These assessments verified the internal consistency of these constructs, as indicated in Table 2. The degree of correlation between two measurements that are theoretically considered to be connected is related to the idea of convergent

Figure 1: Research framework

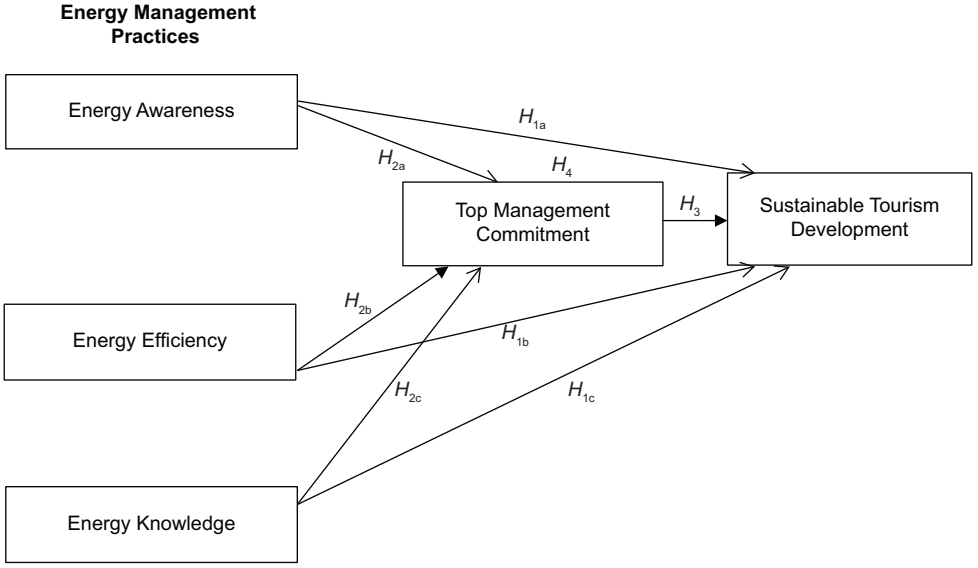


Table 1: Common-method variance results

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	21.428	46.583	46.583	21.428	46.583	46.583	10.198	22.169	22.169
2	3.461	7.523	54.106	3.461	7.523	54.106	8.196	17.817	39.986
3	2.494	5.421	59.527	2.494	5.421	59.527	7.331	15.937	55.923
4	1.519	3.302	62.829	1.519	3.302	62.829	2.382	5.179	61.102
5	1.315	2.858	65.687	1.315	2.858	65.687	2.109	4.585	65.687

validity. In order to assess convergent validity, Setyowati and Chung (2021) recommend using the average variance extracted (AVE), which defining AVE as the common variance shared among the indicators of a latent variable. An AVE of >0.50 is suggested to be deemed satisfactory in research investigations by Fornell and Larcker (1981). The AVE values in this investigation, which were reported in Table 2 and varied from 0.566 to 0.609, satisfied the minimally acceptable standards, confirming convergent validity. We also considered item loadings. For these, 0.70 or higher is regarded as an acceptable level for reasonable loadings (Fornell and Larcker, 1981). Table 2 shows that we recorded values >0.70 for every item.

4.4. Discriminant Validity

To determine how much a construct differs from other constructs within its constituent parts, Fornell and Larcker's (1981) criterion is utilised (Hidayat and Wulandari, 2022). When compared to the correlation values of other variables in this situation, the square root of the average variance extracted (AVE) for each construct produced the highest value, indicating a relationship with these other factors. Furthermore, as determined by construct correlations, it was discovered that the variance shared among the constructs was lower than the variance shared between a construct and its indicators. We also used additional measures, such as the heterotrait-monotrait (HTMT) ratio of correlations, to confirm discriminant validity. The Rasoolimanesh, (2022) recommended HTMT technique was utilised to assess discriminant validity. According to the HTMT results, the ratios between the constructs were 0.85, and a value of 1.0 was not included in the confidence intervals (Amora, 2021). All of the latent constructs met the necessary criteria for discriminant validity, as shown in Tables 3 and 4.

4.5. Model Fit

These approaches are used in this work to verify that the structural model is collinearity-free, allowing for a detailed analysis of the relationships between the key variables. We employed the standardised root mean square residual (SRMR), the squared Euclidean distance (d-ULS), and the geodesic distance (d-G) to assess the model's normed fit index (NFI). With SRMR = 0.065, d-ULS = 0.789, d-G = 0.432, and NFI = 0.919, the results shown in Table 5 demonstrated that the recommended structural model suited the data well. The NFI value exceeded the suggested value of 0.8 and the SRMR value fell below the cutoff of 0.08 (Dash and Paul, 2021). These results show that the structural model met the fit requirement.

Table 2: Measurement model

Constructs	Factor loading	CA	CR (rho_a)	CR (rho_c)	AVE	VIF
Energy awareness		0.871	0.871	0.903	0.609	
EAW1	0.789					2.084
EAW2	0.803					1.026
EAW3	0.830					1.063
EAW4	0.764					1.816
EAW5	0.759					1.870
EAW6	0.735					1.705
Energy efficiency		0.885	0.889	0.911	0.595	
EE1	0.816					2.893
EE2	0.793					2.639
EE3	0.730					1.757
EE4	0.834					1.166
EE5	0.779					2.717
EE6	0.797					2.076
EE7	0.730					1.360
Energy knowledge		0.899	0.9	0.919	0.588	
EK1	0.813					2.584
EK2	0.768					2.576
EK3	0.812					1.097
EK4	0.828					2.766
EK5	0.615					1.352
EK6	0.758					2.146
EK7	0.751					1.975
EK8	0.771					2.312
Sustainable tourism development		0.794	0.814	0.861	0.558	
STD1	0.824					2.621
STD2	0.891					2.430
STD3	0.599					1.383
STD4	0.742					1.496
STD5	0.637					1.267
Top management commitment		0.847	0.848	0.887	0.566	
TMC1	0.738					1.963
TMC2	0.736					1.985
TMC3	0.799					2.130
TMC4	0.741					1.906
TMC5	0.770					2.051
TMC6	0.728					1.551

4.6. Predictive Capability Assessment

Examining the predictive relevance of a research model is a crucial component of Structural Equation Modelling (SEM) evaluation. We used the coefficient of determination (R2 value) as a measure of predictive accuracy since it signifies the proportion of variance in each endogenous variable explained by the model (Hair 2020). As per Hair (2020), an R2 value ranging from 0 to 1 suggests a commendable level of predictive accuracy, with higher R2 values indicating greater predictive precision. The R2 value for STD was 0.825, denoting a high level of predictive accuracy. Meanwhile, the R2 values for the other latent variables - EK - was 0.854, indicating superior levels of predictive accuracy (Memon et al., 2021). However, to assess predictive relevance, we employed the blindfolding technique to ascertain the Q2 value, utilizing Smart PLS 4.0. As per Hair et al. (2021), a Q2 value >0 verifies the predictive significance of the endogenous variables in the model. The statistical outcomes showed that all the Q2 values derived for each construct were positive, which suggests that the proposed model possesses adequate predictive significance, as reflected in Table 6.

4.7. Path Relationship Evaluations

The results presented in Table 7 and Figure 2 depict a significant and positive relationship between three key variables-Energy Awareness (EAW), Energy Efficiency (EE), and Energy Knowledge (EK)-and Sustainable Tourism Development (STD). In statistical terms, all these variables demonstrate a positive Beta value, indicating a direct relationship with STD. The P-values for all variables are <0.05, suggesting that these relationships are statistically significant. EAW has a Beta value of 0.253, a t = 3.877, and a P = 0.000, suggesting a significant and positive influence on STD. Similarly, EE also shows a positive effect on STD with a Beta value of 0.182, a t = 2.130, and a P = 0.033. The strongest relationship with STD is exhibited by EK, having a Beta value of 0.273, a t = 3.381, and a P = 0.001. Moreover, the results suggest that EAW, EE, and EK also exert a significant and positive impact on Top Management Commitment (TMC). EAW shows a Beta value of 0.327, t = 6.223, and a P = 0.000. EE, with a Beta value of 0.241, t = 3.535, and P = 0.000, and EK, with a Beta value of 0.394, t = 6.058, and P = 0.001, both contribute positively and significantly to TMC. Additionally, the results indicate a positive relationship between TMC and STD, with a Beta value of 0.242, t = 2.177, and a P = 0.030. This suggests that TMC has a statistically significant influence on STD. The effect size, denoted by f2, is a measure of the magnitude of an effect, not contingent upon the sample size. Principal measures of f2 are often employed in Partial Least Squares-Structural Equation Modeling (PLS-SEM). One prevalent measure utilized in PLS-SEM is Cohen's f2 coefficient (Brydges, 2019), which is calculated as $\Delta R2/(1–R2)$. Here, ΔR2 represents the incremental contribution of a predictor latent variable to the R2 of the criterion latent variable it is pointing towards. Another measurement in PLS-SEM is the total contribution of the predictor latent variable, which is the numerator ΔR2 in Cohen's f2 equation. This measurement, however, results in smaller computations, yielding a more conservative f2. As per convention, f2 values of 0.02, 0.15, and 0.35 are categorized as small, medium, and large, respectively. The calculations revealed that all exogenous variables have effect sizes relative to endogenous variables, as displayed in Table 7.

Table 3: Fornell-Larcker

Constructs	EAW	EE	EK	STD	TMC
EAW	0.781				
EE	0.554	0.771			
EK	0.690	0.595	0.767		
STD	0.665	0.654	0.679	0.747	
TMC	0.583	0.673	0.600	0.570	0.752

Table 4: Hetromonotrait

Constructs	EAW	EE	EK	STD	TMC
EAW					
EE	0.669				
EK	0.701	0.603			
STD	0.728	0.508	0.729		
TMC	0.625	0.503	0.723	0.646	

Table 5: Model fit

SRMR	0.065
d_ULS	0.789
d_G	0.432
NFI	0.919

Table 6: Predictive capability assessment results

Constructs	R-square	Q^2
STD	0.825	0.446
TMC	0.854	0.474

This study followed guidelines suggested by Preacher et al., (2007) to test the mediating role of Top Management Commitment (TMC) in the relationship between Energy Awareness (EAW), Energy Efficiency (EE), Energy Knowledge (EK), and Sustainable Tourism Development (STD). A bootstrapping method was employed, observing the indirect effects to determine the mediating relationship. According to Preacher et al., (2007), an indirect effect is considered significant when the 95% bootstrap confidence interval (CI: LL- UL) does not contain a "0" between variables. Table 8, which presents the results of the mediation analysis, revealed the bootstrap results showing the indirect effect for each variable (EAW, EE, EK) through TMC on STD. For instance, the indirect effect of EAW through TMC on STD (β = 0.079, t = 2.081) was found to be significant at P < 0.05. The confidence interval for this indirect effect did not straddle 0, which supports the mediating role of TMC. Similarly, the indirect effects of EE and EK on STD, via TMC, were also found to be significant (EE: β = 0.088, t = 2.200; EK: β = 0.041, t = 2.355, both at P < 0.05). The confidence intervals for these indirect effects also did not straddle 0, providing further evidence of TMC's mediation. These results suggest TMC plays a significant mediating role between the energy management practices (EAW, EE, and EK) and sustainable tourism development in Jerash, Jordan. Therefore, the study concludes that the commitment of top management positively mediates the relationship between energy management practices and sustainable tourism development in this region.

5. DISCUSSION

Amid escalating environmental concerns and increasing demands for sustainability, 15 manufacturing businesses have begun to

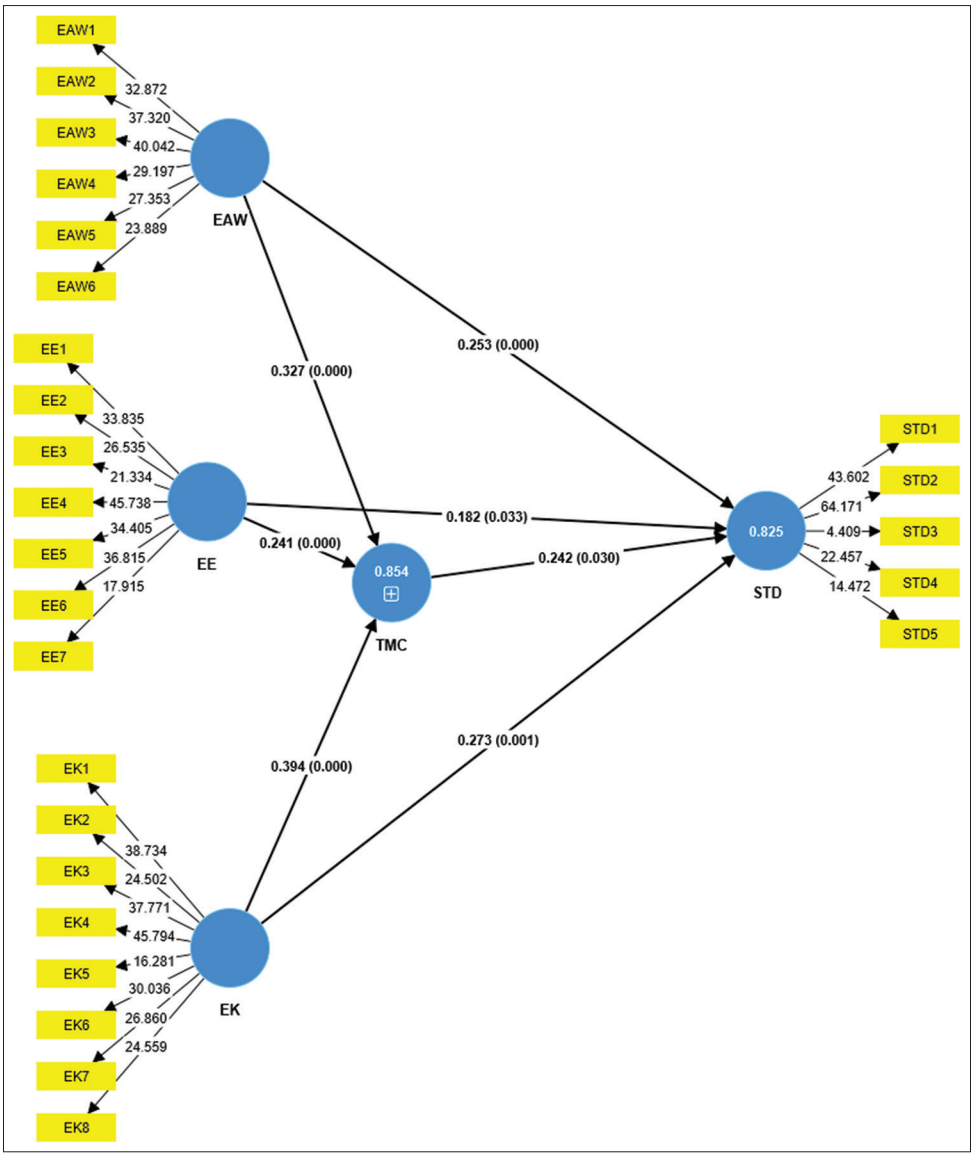
Table 7: Path analysis

Path analysis	Beta	STDEV	T statistics	P-values	Decision	f^2
EAW -> STD	0.253	0.065	3.877	0.000	Supported	0.261
EE -> STD	0.182	0.085	2.130	0.033	Supported	0.332
EK -> STD	0.273	0.081	3.381	0.001	Supported	0.252
EAW -> TMC	0.327	0.053	6.223	0.000	Supported	0.140
EE -> TMC	0.241	0.068	3.535	0.000	Supported	0.172
EK -> TMC	0.394	0.065	6.058	0.000	Supported	0.148
TMC -> STD	0.242	0.111	2.177	0.030	Supported	0.149

Table 8: Indirect effect

Path analysis	Beta	STDEV	T-statistics	P-values	Decision
EAW -> TMC -> STD	0.079	0.038	2.081	0.038	Supported
EE -> TMC -> STD	0.088	0.040	2.200	0.014	Supported
EK -> TMC -> STD	0.095	0.041	2.355	0.019	Supported

Figure 2: Path analysis



prioritize investment in Energy Management Practices (EMPs) and energy-efficient technologies. This study delves into the impact of such practices on Sustainable Tourism Development, using the backdrop of Jerash, Jordan, to illuminate the role of energy management in shaping sustainable tourism. The statistical data provides a clear insight into the role of Energy Awareness (EAW), Energy Efficiency (EE), and Energy Knowledge (EK) in relation to Sustainable Tourism Development (STD) within the specific

context of Jerash, Jordan. Each of these three variables-EAW, EE, and EK-displays a positive Beta value. In statistical terms, a positive Beta value signifies that there is a direct relationship between these variables and STD. This means that as the value or strength of EAW, EE, or EK increases, the level of STD also increases, and vice versa. EAW's positive Beta value indicates that heightened awareness regarding energy usage, conservation, and sustainable practices directly contributes to the development of sustainable tourism (Mahmood et al., 2022). In other words, the more cognizant individuals, organizations, and institutions in Jerash become about energy issues, the more likely they are to engage in practices that contribute to STD. Similarly, EE's positive Beta value reveals that improvements in energy efficiency, such as optimizing energy use and investing in energy-efficient technologies, directly support STD (Jahanger et al., 2023). This implies that as manufacturing firms in Jerash continue to optimize their energy usage, they are simultaneously contributing to STD. Lastly, EK's positive Beta value suggests that an increase in energy-related knowledge and expertise leads to an improvement in STD. This underlines the importance of educational initiatives and training programs aimed at enhancing understanding of energy conservation and sustainable practices.

The analysis of the statistical data provides a comprehensive understanding of the relationship between Energy Awareness (EAW), Energy Efficiency (EE), Energy Knowledge (EK), and Top Management Commitment (TMC) within the particular setting of Jerash, Jordan. Each of these three factors-EAW, EE, and EK-shows a positive Beta value in relation to TMC. This positive Beta value is indicative of a direct relationship between these variables and TMC. This means that an increase in EAW, EE, or EK corresponds to an increase in TMC, suggesting that as companies become more energy-aware, efficient, and knowledgeable, their top management's commitment to these practices also strengthens (Alkhawaldeh et al., 2023). EAW's positive Beta value implies that as awareness around energy use and sustainability grows among staff and management, there is a corresponding increase in TMC. This highlights the role of awareness in driving management commitment to sustainable energy practices. Similarly, EE's positive Beta value suggests that as companies become more efficient in their energy use, possibly by implementing energy-saving technologies or optimizing existing processes, top management's commitment to these efforts also intensifies (Haldorai et al., 2022). This implies that efforts to improve energy efficiency can be influential in securing stronger commitment from top management. Finally, the positive Beta value for EK indicates that an increase in knowledge related to energy usage, conservation, and sustainability practices aligns with a rise in TMC. This finding underscores the role of education and training in not only improving energy knowledge but also in securing top management's commitment to sustainable practices. Finally, the results also show a significant, positive relationship between TMC and STD. This finding suggests that top management's commitment plays a crucial role in influencing sustainable tourism development. The strong relationship between TMC and STD implies that successful sustainable tourism development may hinge on the level of commitment from an organization's top management towards energy management practices.

The findings of the study highlight the crucial role that Top Management Commitment (TMC) plays as a mediator between Energy Management Practices (comprising of Energy Awareness [EAW], Energy Efficiency [EE], and Energy Knowledge [EK]) and Sustainable Tourism Development (STD) in Jerash, Jordan. In this context, a mediating role implies that the influence of EAW, EE, and EK on STD is not direct but instead is channeled through TMC. Thus, while these energy management practices are vital for STD, their impact is significantly determined by the extent of TMC. For instance, increased EAW, EE, and EK within a tourism organization could lead to heightened sustainable practices, but this is largely contingent on the level of commitment demonstrated by the organization's top management. This commitment often materializes as strategic decisions, allocation of resources, policy formulation, and creating a company culture that values sustainable energy practices. The significant mediation role of TMC underlines the importance of leadership in operationalizing energy management practices towards achieving sustainable tourism development. A high level of commitment from top management could amplify the positive effects of EAW, EE, and EK on STD. Conversely, a lack of management commitment could hinder the potential impact of these energy management practices on achieving sustainability in tourism. Therefore, it is critical for top management in tourism organizations to demonstrate a robust commitment to integrating EAW, EE, and EK in their strategic planning and day-to-day operations. By doing so, they could significantly enhance the positive influence of these energy management practices on sustainable tourism development in Jerash, Jordan. This finding could be instrumental in informing policy-making and strategic decision-making within the tourism sector.

6. CONCLUSION

This study conclusively highlights the critical role of Top Management Commitment (TMC) as a mediator in the relationship between Energy Management Practices (Energy Awareness [EAW], Energy Efficiency [EE], and Energy Knowledge [EK]) and Sustainable Tourism Development (STD) in Jerash, Jordan. The empirical findings illuminate the significant influence of top management's commitment towards integrating energy management practices in fostering sustainable tourism. Without active participation and a clear strategy from top management, the impact of EAW, EE, and EK on STD could be limited. Therefore, the management's proactive role is key to realizing the potential of energy management practices in enhancing sustainable tourism development. While providing valuable insights, this study is not without its limitations. The focus is limited to Jerash, Jordan, and consequently, its findings may not apply universally to different cultural, economic, or geographical contexts. In addition, the study encompasses only three aspects of Energy Management Practices, possibly excluding other factors that might significantly contribute to STD.

Future research in this area should aim to validate and build upon these findings in a wider geographical scope, including other countries and different types of tourism. This would enhance the generalizability and validity of the results. Furthermore,

investigations could delve into other potential mediating or moderating variables that might influence the relationship between Energy Management Practices and STD. Such research could provide a deeper understanding of the mechanisms at play. Moreover, studies could also explore additional dimensions of Energy Management Practices beyond EAW, EE, and EK. This could lead to a more comprehensive understanding of the influences on sustainable tourism development. This field offers ample scope for further research, with potential for considerable impact on policy and practice within the tourism industry and beyond.

The findings of this research, underlining the mediating role of Top Management Commitment (TMC) on Energy Management Practices (Energy Awareness [EAW], Energy Efficiency [EE], and Energy Knowledge [EK]) and Sustainable Tourism Development (STD) in Jerash, Jordan, provide significant insights for both managerial decision-making and practical applications. Top management plays an integral role in driving sustainability in the tourism sector. Leaders must exhibit a commitment to sustainability, promoting energy-efficient practices and creating an organizational culture that values environmental responsibility. Demonstrating commitment and taking responsibility for sustainable practices, top managers can inspire employees at all levels, fostering an organization-wide culture of sustainability. Formulation and implementation of robust policies to encourage EAW, EE, and EK are also critical. These could include guidelines for energy use, initiatives for promoting energy conservation, and provisions for regular auditing and monitoring of energy practices. Policies could also involve setting tangible, achievable goals for energy efficiency, which can motivate employees and guide the organization's strategic direction. Incorporating energy management practices into strategic planning is another crucial managerial implication. This approach involves considering EAW, EE, and EK in setting long-term organizational goals, resource allocation, and performance evaluation. In doing so, top management can ensure that sustainable practices are integrated into the organization's core operations, enhancing its contribution to STD. On a practical level, organizations must invest in the professional development of their staff. This could entail implementing training programs aimed at enhancing EK and promoting EE.

By educating employees about energy conservation and sustainability, organizations can empower them to contribute meaningfully to STD. Launching awareness campaigns can also be a powerful tool for increasing EAW among both employees and the broader community. These campaigns can educate about the importance of sustainable energy practices and encourage behaviors that contribute to STD. Moreover, organizations should consider practical investments in energy-efficient technology and infrastructure. Such investments can lead to significant improvements in EE, contributing directly to STD and often resulting in cost savings over time. In summary, the mediating role of TMC between energy management practices and STD underscores the importance of both strategic leadership and practical initiatives. By actively promoting EAW, EE, and EK, top management can significantly enhance the impact of these practices on sustainable tourism development in Jerash, Jordan. These insights provide valuable guidance for tourism organizations seeking to enhance their sustainability performance and contribute to the broader goal of sustainable development.

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