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The impact of sustainability practices on environmental performance: A Study of the Restaurant Industry in Jordan

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Keywords

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Abstract

This study aims to evaluate the impact of environmental practices on the environmental performance of restaurants. The focus is on three key practices: energy management, water efficiency, and waste reduction. These practices are examined to determine their role in enhancing sustainability within the restaurant sector. A quantitative approach was adopted. Data were collected using a structured questionnaire distributed to restaurant managers and decision-makers. The sample included a variety of restaurant types, primarily from urban and semi-urban areas. The collected data reached 123 questioners were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results indicate that energy management have a significant positive impact on environmental performance. However, waste reduction and water efficiency showed no statistically significant relationship. These findings highlight implementation barriers that may affect the success of certain sustainability initiatives. This research contributes to the literature by offering an integrated framework for assessing environmental practices in restaurants. It also provides practical recommendations for stakeholders, including policymakers, restaurant Owners and Operators, NGOS, and academic and training institutions. Finally, the study identifies several limitations and offers directions for future research. These include exploring long-term sustainability effects, addressing potential response bias, and examining the role of managerial commitment.

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1. Introduction

As sustainability becomes a more important concern for companies, customers, and legislators alike, the restaurant sector has seen a dramatic change in recent years. Food production, distribution, and waste management have a significant environmental effect, and the global food system is responsible for around one-third of all greenhouse gas emissions (FAO, 2021). Restaurants are being urged to embrace more sustainable methods that lessen their environmental impact while still satisfying customer expectations for quality and service as a result of growing public awareness of climate change, resource scarcity, and ecological deterioration. In the restaurant industry, sustainability refers to a wide variety of actions meant to reduce environmental damage and encourage social responsibility (Sustainable Restaurant Association, 2020). These include of obtaining organic and locally grown products, cutting down on food waste, saving water and energy, doing away with single-use plastics, and making sure that fair labor standards are followed throughout the supply chain (Filimonau et al. 2019). Additionally, as diners—especially *Millennials and Gen Z consumers** are more inclined to support businesses that share their ethical and environmental values, restaurants are under greater pressure to be transparent about their sustainability initiatives (Talukder and Afchar 2025).

There are obstacles in the way of the food service industry's shift to sustainable operations. Restaurant owners have to deal with intricate supply networks, changing customer preferences, and often greater upfront expenses related to infrastructure improvements and sustainable sourcing. (Filimonau and Matute, 2020). Nevertheless, these challenges may be outweighed by the long-term advantages, which include operational effectiveness, brand loyalty, and adherence to new environmental laws (Lu et al., 2022). Additionally, the COVID-19 pandemic has highlighted the value of flexibility and resilience in the restaurant industry, leading to a renewed focus on sustainable packaging and local sourcing (Asim et al. 2022).

2. Problem Statement:

Understanding the existing practices, factors that encourage and hinder sustainability in restaurants is crucial as sustainability continues to transform from a niche issue to a corporate need (Rajput and Singh, 2022). The purpose of this article is to examine the many sustainability projects that restaurants have taken on, assess their efficacy, and pinpoint the variables that affect the industry's adoption of sustainable practices. Because of the large amounts of food waste, energy and water consumption, and the use of non-sustainable packaging materials, the restaurant business contributes significantly to environmental deterioration. Many restaurants either lack complete sustainability policies or find it difficult to execute them successfully, despite growing customer demand and knowledge for ecologically responsible activities. Although a few prominent businesses have implemented zero-waste and green certifications, industry-wide acceptance is still uneven and dispersed. (Filimonau, 2021; Principato et al., 2022; Borrello et al., 2023). A methodical comprehension of how sustainable practices are seen, applied, and evaluated in the restaurant industry is required. Additionally, little is known about how these practices affect environmental performance, particularly for small and medium-sized businesses (SMEs), which account for a significant share of the sector (Martínez et al., 2021).

*(A Millennial to be someone born between 1980 and 1997 and a Gen Z to be someone born between 1998 and 2012.)

Additionally, this study intends to address a number of gaps, such as the lack of empirical research examining the actual implementation of these practices in restaurants, especially in diverse geographic or cultural contexts, and the lack of knowledge regarding how independent small and mid-sized restaurants manage sustainability despite its widespread use and cumulative impact (Dissanayake and Weerasinghe, 2023). The operational difficulties and financial ramifications of implementing sustainable practices are often ignored in the literature. The adaption of business models to sustainability requires more research (Choudhury et al., 2022).

3. Aims and research questions

This research intends to uncover important drivers, obstacles, and outcomes linked to environmental performance by examining the adoption, implementation, and effect of sustainability practices in the restaurant business, with a focus on restaurants in Jordan.

3.1. Research Questions:

1. What types of sustainability practices are currently adopted by restaurants, particularly in Jordan?
2. What are the main barriers influencing the adoption of sustainable practices in the restaurant sector in Jordan?
3. How do sustainability practices impact environmental performance in restaurants?

4. Significance of the Study

The restaurant business is vital to the sustainability of the environment and the global economy. But it also plays a significant role in environmental problems including greenhouse gas emissions, wasteful energy and water usage, and food waste. This research intends to make a significant contribution to the expanding conversation on sustainable development in the restaurant business and is important from an academic, practical standpoint.

4.1. Academic Significance

By analyzing how sustainable practices differ across various restaurant types especially small and medium-sized companies (SMEs), which are often underrepresented in academic studies, this research fills a glaring vacuum in the literature. Additionally, it advances theory development in sustainable business and operations management by offering a contextual study of motivations, obstacles, and results related to sustainability practices.

4.2. Practical Significance

For restaurant managers and owners, the research offers practical advice on how to use sustainable practices that are appropriate for their size, kind of business, and location. The research may help direct operational decision-making, cost-benefit analysis, and long-term planning by identifying the most difficult obstacles. In order to enable sustainable change, it may assist industry stakeholders in creating more specialized training, toolkits, and support systems.

5. Literature Review

Research on environmental sustainability in the restaurant industry has been done all over the world (Yasir and Alam 2025) ,and the main focus of these studies is customer behavior rather than environmental issues related to employees and operations. This indicates a gap in the literature. Restaurant owners have to contend with social challenges, environmental regulations, and consumer demand (Testa et al., 2020). As a result of these demands, a number of companies are implementing green practices and educating corporate leaders to promote sustainable

building, energy efficiency, purchasing practices, waste reduction, and water efficiency (Jones et al., 2022). Some examples of sustainable restaurant industry practices are discussed in the sections that follow:

5.1. Energy Efficiency

Energy management is important in the hotel industry as any other managerial duty, and employees should be involved in energy management practices. Recent studies emphasize that engaging employees in energy-saving initiatives not only enhances sustainability but also improves operational efficiency and employee motivation. For instance, the Radisson Hotel Group's "Own Your Energy" campaign actively involved staff in energy efficiency practices, leading to projected energy savings of 5–10%. Similarly, research highlights that fostering a culture of continuous improvement and involving all employees in energy management can significantly contribute to achieving sustainability goals in the hospitality sector (Optimal Monitoring, 2024). According to Gunasegaran et al. (2023), restaurants are the commercial sector's most energy-intensive enterprises. Therefore, restaurant owners need to find environmentally friendly alternatives to using natural resources to meet their energy demands (Salim et al., 2025). To reduce resource consumption in the hospitality industry, restaurant owners may use the tactics suggested by (Önüt and Soner 2006) ,which include Prioritizing sustainability actions based on multiple criteria, including environmental impact, cost, and operational feasibility, engaging stakeholders in evaluating trade-offs between economic and ecological goals, and applying structured frameworks to improve decision quality and transparency in sustainability efforts .The most energy-efficient settings may be set on water heaters, air conditioners, heating, and ventilation thermostats (Băltescu et al. 2022). Additional tactics include insulating pipelines and tanks, using as much natural light as possible, and planning routine maintenance for all of these systems (Huang & Wu, 2021). Other strategies for reducing the consumption of gas and propane are also mentioned (Önüt and Soner 2006), including cleaning all kitchen appliances, fixing any broken ones, and installing solar energy systems. For restaurant operators, these simple strategies lead to cost savings. Nadel (2023) estimates that utility prices decrease by around $100 for every 1,000 kilowatt-hours of energy saved. Making use of energy-saving devices such as air conditioners, fryers, burners, steamers, and insulated holding cabinets, larger financial investments are required for other energy-saving methods (Molina-Azorín et al., 2020). Installing motion sensors and other equipment that decreases the water temperature in toilets and handwashing basins may also help reduce energy use (Oluokun et al. 2025). In addition to reducing their energy use, restaurant operators can search for alternative energy sources (Jones et al., 2021).

5.2. Waste Reduction

Since most of the food waste produced by restaurant operations is still edible, green waste management techniques are necessary (Morkunas et al., 2025). Waste must be decreased by source reduction or diversion in order to feed those who lack access to adequate food, minimize operational costs, and reduce greenhouse gas emissions (Jawabreh et al. ,2022). By reducing container size restrictions and collection frequency, garbage diverted from landfills may decrease monthly waste disposal rates by about one-third (Baisey et al. ,2025). In addition to lowering the quantity of garbage that has to be disposed of, this also lessens the effect on the environment. Recycling programs may reduce the amount of waste that ends up in landfills, reduce the number of purchases, and even increase sales (Dalimunthe et al. ,2024). Items such as cardboard, metal, plastic, glass, mixed paper, ink cartridges, and grease are better off being recycled than thrown

away (Silva and de Almeida ,2024). Selling discarded restaurant grease and converting it into biodiesel might provide revenue for the company (Lee ,2023). Composting, selling or donating food scraps for animal feed, and donating or delivering food items to shelters are other waste reduction strategies (Urugo et al. ,2024).

5.3. Water Efficiency

According to Bhuiyan and Man (2025), environmental practices often improve organizational performance in terms of operations, composition savings, competitiveness, stakeholder satisfaction, business image, and financial performance of services. Howard (2020) states that the average amount of water needed for food production is six to nine liters each meal. Irrigating using water-efficient landscaping methods and filtering and reusing water with water filtration equipment are strategies to save water and reduce sewage costs include utilizing water-efficient equipment (Howard et al. ,2020). Among other water-efficient fixtures, restaurants may utilize dual flush toilets, water restriction systems, connectionless steamers, door-style dishwashers, smart ice makers, and premises spray valves(Abu-Bakaret al.,2021) . Another water-saving solution that might save restaurant owners 40,000 gallons of water a year is waterless urinals (Wijesinghe and Higgins-Desbiolles ,2024). Another strategy to save money is to monitor water consumption. Changes in water bills or excessive water usage may alert operators to problems like leaks (Sánchez et al. 2022). Simply replacing a slow, leaking faucet may save an operator over $1,200 year (Knapik 2022).

5.4. Restaurants and environmental performance

As a result, protecting the environment and encouraging public acceptance of this protection have become corporate strategic goals, especially in the center of their operations (Bhat, Makkar and Gupta 2024). "Environmental management" refers to the methods a company use to reduce or control the environmental impact of its activities (González-Benito & González-Benito, 2021). The term's emphasis is on the measures and processes that are intended to lessen the environmental effect that the company's operations generate, as noted by (Hart & Milstein, 2020). The phrase refers to the actions the business takes to protect the environment and how these actions are incorporated into its management practices. The benefits and drawbacks that an organization's activities have on the environment—including the wildlife, plants, landscape, human life, and the components that are necessary for life, such the air, water, and land—are referred to as environmental performance (Azeem et al. 2024). From a business standpoint, environmental performance may also refer to how a company is affected by its interactions with the environment (Hosain and Mustafi 2025). Therefore, monitoring environmental management would assist to detect the amount to which environmental protection measures are applied, even though environmental performance would show how well environmental objectives have been reached (González-Benito & González-Benito, 2021). Without necessarily and/or immediately attaining enhanced environmental performance, a firm may decide to use environmental management techniques that show its concern about the problem (Costa and Opare, 2025).

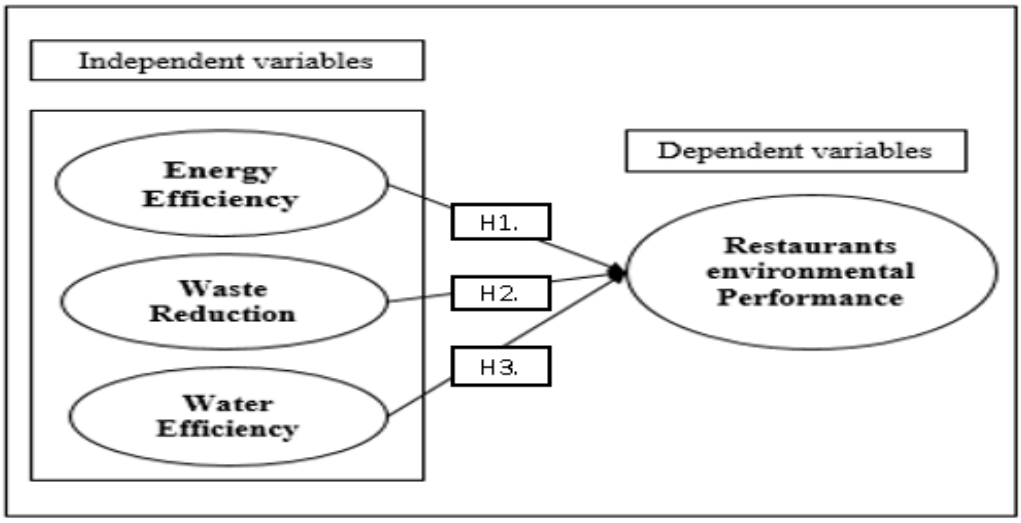
Each company's environmental success may be measured and tracked in a variety of ways (Costa and Opare ,2025). Each of these approaches to environmental performance evaluation has advantages and disadvantages, making it challenging to choose a plan that works for all types of businesses (Pescetelli et al. 2022). One of the most important challenges in any case is figuring out which measurement method would best suit the particular needs of each firm (Dani et al., 2021). Environmental performance is evaluated using a few criteria or techniques. Ten metrics

are proposed for assessing a company's environmental performance after a thorough review of the literature (Costa ,2025; Salim ,2025). These metrics include the firm's environmental effect (impact), the likelihood and significance of environmental damage resulting from the company's operations (risk), the amount or weight of contaminated garbage created (pollution), the adopted efforts (actions) for environmental preservation, and the use of resources like water, electricity, and so forth.

6. The Development of the Conceptual Framework and Hypotheses

To ascertain the effect of their business actions, restaurants must evaluate their performance. Restaurants may evaluate their success using a variety of factors. Several financial indicators, including as return on equity, return on investment, return on assets, profit margin, cost management ratio, and sales enhancement ratio, are often used by restaurants to assess their success. Metrics including return on investment, return on capital, return on assets, return on sales, and economic performance were used by a different team of researchers. Financial measurements have been the subject of many previous research on restaurant performance, but their inconsistent results fall short of capturing the whole picture of restaurant success (Golicic and Smith 2013; Hua etal., 2013; Kukanjaet al., 2023). These researchers concluded that a thorough validation of the sustainability connection hypothesis requires the inclusion of new performance indicators that take into consideration both environmental and economic results.

The primary objective of this study is to analyze the environmental sustainability techniques used by Jordanian restaurants and the impact that these practices have on restaurant performance. The operational actions that Jordanian restaurants have made to manage the impact of their environmental practices on their performance will be included in the data that will be examined. As seen in Figure 1, the study suggests a model that incorporates direct linkages that need more empirical research in order to fill in the gaps in earlier studies.



(Fig. 1): Model of Sustainability Practices Impact On Environmental Restaurant Performance

6.1. Hypotheses

H1. Energy Efficiency has a significant impact on restaurant environmental performance.
H2. Waste Reduction has a significant impact on restaurant environmental performance.
H3. Water Efficiency has a significant impact on restaurant environmental performance.

7. Methodology

Information was gathered, hypotheses were examined, and research issues on the current status of the study problem were addressed using a descriptive and analytical technique. The target population was investigated using the analytical descriptive technique, with particular focus paid to the methodologies, circumstances, demographic data, attitudes, and opinions. This approach aimed to clarify certain features of the phenomena being studied. Additionally, hypothesis testing was done to evaluate the impact of the suggested parameters. The goal of this study was to improve understanding and knowledge of the related phenomena by using techniques to problem-solving. The research questions were shaped in part by the study's goal of determining how information sharing influences the connection between environmental restaurant performance and sustainability practices.

7.1. The Study Population and Sample

Notably, 1,269 restaurants in Jordan are categorized as tourist eateries. The 2024 population figures are provided by the Jordanian Ministry of Tourism and Antiquities (MOTA). Amman, Irbid, and Aqaba are the only three major cities in Jordan that were examined in this research. This is because by selecting and analyzing the performance of restaurants that implement sustainable practices, the sample can achieve the objectives of the research. In 2024, the study's target locations will include 1,074 categorized tourist eateries, according to the Jordanian Ministry of Tourism and Antiquities (MOTA). The following is a breakdown of these restaurants' distribution: There are 64 eateries in Irbid, 82 in Aqaba, and 933 in Amman. These governorates were picked because they have a lot of restaurants—more than 90% of all restaurants in Jordan are located in these cities. Table 1 lists Jordan's total number of classified tourist eateries.

Table 1 Number of the classified tourist restaurants by Location

Location	Tourist Restaurants
Amman	**933**
Aqaba	**82**
Petra	10
Irbid	**64**
Dead Sea	12
Madaba	33
Mafraq and Zarqa	46
Al Azraq and Karak	9
Ajlun and Jarash	23
Balqa	24
Fuhais	33
Total	**1,269**

7.2. Survey Questionnaire

The questionnaire for the research aims to collect data on restaurants' usage of technical sustainability approaches as well as their environmental performance. The questionnaire is divided into four main sections: demographic profile, sustainability practices, environmental restaurant performance and main barriers to Sustainable practice adoption in restaurants. The independent variables in the model have been approved as factors that affect the performance of restaurants, referring to many studies such as (Al-Aomar and Hussain 2017; Alonso-Almeida et al. 2018; Jang et al. 2015; Abu-Bakar et al. 2021; Zhang et al. 2009). As well as the dependent variables have been confirmed in many studies, for example (Kozmal and El-Monem 2018, Legrand et al. 2010; Gupta 2012; Băltescu et al. 2022). The Likert scale was used in this research to evaluate the subject. According to Likert (1932), 5-point Likert scales are appropriate for assessing respondents' opinions and attitudes on a given topic. Therefore, 5-point Likert scales were used in the present study to gauge the desire to adopt sustainable practices in Jordanian restaurants. The format of the questionnaire is explained in Table 2.

Table (2): The structure of the questionnaire ***S****ource: The researchers*

Part 1	Measurement	Scale	references
Part 1	Demographic Profile	Nominal scale "Tick" Choose One or fill space.	
Part 2	Implementing sustainability practices related to energy, water, and waste practices.	5-point Likert Scale "1" Never – "5" Always.	Al-Aomar and Hussain 2017; Alonso-Almeida et al. 2018; Jang et al. 2015; Abu-Bakar et al. 2021; Zhang et al. 2009
Part 3	Environmental restaurant performance	5-point Likert Scale "1" Never – "5" Always.	Kozmal and El-Monem 2018, Legrand et al. 2010; Gupta 2012; Băltescu et al. 2022
Part 4	Main Barriers to Sustainable Practice Adoption in Restaurants	The answer is open from the respondent's point of view.	(Filimonau & De Coteau, 2020).

8. Result

Table 3, which summarizes several aspects of restaurant ownership, location, and kind, displays the descriptive data of the 123 respondents. Chain restaurants rank second (28.5%), with individual restaurants making up the bulk (49.6%). The percentage of chain-independent enterprises in the sample is only 3.3%. Geographically, Aqaba and Amman account for 41.5% of the sample, whereas Irbid has a smaller percentage (17.1%). The sample is evenly split between fast food (50.4%) and fine dining establishments (49.6%) in terms of restaurant categories, indicating that a range of dining experiences is well covered.

Table (3) Descriptive statistics of the Respondents

	Frequency	Percent
Restaurant ownership		
Franchise	23	18.7
Chain	35	28.5
Chain, independent	4	3.3
independent	61	49.6
Restaurant location		
Irbid	21	17.1
Aqaba	51	41.5
Amman	51	41.5
Restaurant type		
fast food	62	50.4
fine dining	61	49.6
Total	123	100.0

9. Validity and Reliability

Using PLS-SEM (Smart PLS v.3), the researcher confirmed the validity and reliability of the model. Partial Least Squares Structural Equation Modeling (PLS-SEM) was chosen over Covariance-Based SEM (CB-SEM) due to the exploratory nature of the current study, the complexity of the model, and the sample size limitations. PLS-SEM is more suitable when the research objective is predictive rather than confirmatory, particularly when the model includes multiple latent constructs and formative indicators. Moreover, PLS-SEM has been shown to perform better with smaller samples and does not require multivariate normality, which aligns with the data characteristics in this study (Hair et al., 2017; Sarstedt et al., 2019). Therefore, PLS-SEM was deemed the most appropriate method for testing the proposed hypotheses and analyzing the structural relationships among the constructs. The study ensured the reliability of both individual items and constructs and validated the measures' discriminant, convergent, and content validity. First, reliability was verified using construct and item dependability (internal consistency). All of the item loadings, which varied from 0.812 to 0.952 and were significant with a t-value larger than 1.96, met the necessary score of 0.7 for reflective models. The reliability of the model's indications was thus confirmed. Cronbach's alpha (α) and composite reliability (CR), which measure internal consistency, were both greater than the 0.7 threshold, indicating that the model was deemed trustworthy. To confirm content validity, measurement items from previous studies that had been shown to be valid in relevant contexts were altered. Convergent validity was confirmed when the average variance extracted (AVE) for each latent variable exceeded the recommended value of 0.50 (Fornell and Larcker 1981; Henseler et al. 2009), indicating that the constructs explained more than half of their indicator variance. Every AVE value was more than 0.5. Table 4 findings indicated that concept validity was measured at an acceptable level (Barclay et al. 1995).

Table (4) Results of Measurement Model Assessment

Construct	Items	Factor Loading > 0.6	Cronbach's Alpha >0.7	CR (> 0.6)	Average Variance Extracted (AVE) (> 0.5)
Energy Efficiency			0.960	0.967	0.832
	EM1	0.896			
	EM2	0.916			
	EM3	0.909			
	EM4	0.882			
	EM5	0.930			
	EM6	0.940			
Environmental Performance			0.923	0.945	0.812
	EP1	0.918			
	EP2	0.929			
	EP3	0.846			
	EP4	0.909			
Water Efficiency			0.964	0.972	0.874
	WR1	0.929			
	WR2	0.856			
	WR3	0.913			
	WR4	0.931			
	WR5	0.920			
Waste Reduction			0.948	0.960	0.829
	WT1	0.936			
	WT2	0.926			
	WT3	0.947			
	WT4	0.931			
	WT5	0.935			

10. Hypothesis Testing

The results presented in Table 5 outline the outcomes of hypothesis testing. Hypothesis 1, which evaluated the effect of energy efficiency on environmental performance, was supported. as supported by studies that demonstrate how energy-efficient practices reduce carbon footprints and improve sustainability performance in the hospitality sector (e.g., Önüt and Soner, 2006; Alcorn and Curtis, 2016; Gunasegaran et al., 2023). The path coefficient was 0.636, with a t-value of 3.631 and a p-value of 0.000, indicating a statistically significant and positive relationship. In contrast, Hypothesis 2, assessing the impact of waste reduction on environmental performance, was not supported (t = 1.286, p = 0.198), which contradicted with the results of the hypotheses in studies of (Ma and Ghiselli,2016; Morkunas et al. ,2025). Similarly, Hypothesis 3, which examined the relationship between water efficiency and environmental performance, was also not supported, with a low t-value of 0.570 and a p-value of 0.568. which also contradicted with the results of the hypotheses in studies of (Jeong et al. ,2014; Abu-Bakar et al.,2021). The

non-significant relationships observed for waste reduction (H2) and water efficiency (H3) in relation to environmental performance may be attributed to the practical challenges associated with implementing these measures in the restaurant sector. Many restaurants, particularly small and medium-sized enterprises (SMEs), face infrastructural, financial, and knowledge-based barriers that hinder the adoption of systematic waste management or advanced water-saving technologies. Additionally, unlike energy management, which often yields immediate cost savings waste and water practices may not present visible or short-term benefits, reducing the incentive for consistent implementation. Furthermore, the lack of regulatory enforcement and public pressure regarding these aspects might also contribute to their underdevelopment, ultimately explaining their weaker impact on perceived environmental performance. These findings suggest that for such practices to become more impactful, there must be stronger policy incentives, stakeholder training, and investment in supportive technologies.

Table (5) The Test Result of Hypotheses

Hypotheses	Hypotheses number	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
Energy efficiency -> Environmental Performance	1	0.636	0.675	0.175	3.631	**0.000**	**support**
Waste reduction -> Environmental Performance	2	0.153	0.144	0.119	1.286	**0.198**	**reject**
Water efficiency -> Environmental Performance	3	-0.090	-0.054	0.158	0.570	**0.568**	**reject**

The R-square value as shown in table 6 for the model was 0.548, suggesting that approximately 54.8% of the variance in environmental performance can be explained by the independent variables included in the model—energy efficiency, waste reduction, and water efficiency. This indicates a moderate level of explanatory power.

Table (6) The R-square value

Metric	Value	Interpretation
R-squared (R^2)	0.548	54.8% of the variance in environmental performance is explained by the model.
Explanatory Power	Moderate	Indicates a moderate level of model fit.
Independent Variables	Energy Efficiency, Waste Reduction, Water Efficiency	These are the predictors used in the model.

To ensure the reliability of these regression results, Variance Inflation Factor (VIF) values were analyzed to detect multicollinearity among the independent variables. As shown in table 7 all VIF values were found to be below the acceptable threshold of 5, indicating that multicollinearity was not a concern in this model and that the predictors were sufficiently independent of one another.

Table (7) Variance Inflation Factor (VIF)

Independent Variable	VIF Value	Interpretation
Energy Efficiency	< 5	No significant multicollinearity
Waste Reduction	< 5	No significant multicollinearity
Water Efficiency	< 5	No significant multicollinearity
Threshold Reference	< 5	Values below 5 indicate acceptable multicollinearity levels

11. Finding and Discussion

The findings demonstrated that energy efficiency measures have a positive effect on environmental performance. Future conversations on the wider effects of energy policy are made possible by this groundbreaking study. Finarolakis (2018) asserts that energy efficiency incentive schemes are crucial for motivating consumers and companies to purchase energy-efficient equipment and procedures. In the previously stated study, the researcher examines a number of energy efficiency programs and demonstrates how they quickly reduce energy consumption and promote a change in market dynamics in favor of renewable energy sources. This adjustment is especially important given the urgent need to mitigate the adverse consequences of climate change. According to Serrano and Zaveri (2020), energy systems need to be assessed using a multi-criteria framework that considers technical, economic, environmental, and social issues. Serrano and Zaveri (2020) reinforced the need for better energy policy and the encouragement of ambitious targets for the use of renewable energy and increases in energy efficiency. The authors emphasize the importance of stakeholder participation in pollution reduction and environmental quality improvement by proposing an inverse link between the use of renewable energy sources and environmental pollutants. In conclusion, the combined findings of this study demonstrate that reducing carbon emissions and enhancing environmental performance need energy efficiency improvements and renewable energy sources.

Additionally, the results demonstrate that waste reduction strategies might not significantly impact environmental performance. Restaurants may find it difficult to implement effective waste management practices that reduce their environmental impact. Furthermore, some restaurants might use waste management techniques without committing to sustainability. The results of this research, which highlight the vital role that public engagement plays in improving the efficacy of waste management systems, go counter to this (Morkunas 2025). By emphasizing the link between environmental performance and the quality of waste management services offered by municipalities, this article illustrates how citizen engagement with public authorities may enhance governance and service delivery. The research suggests that community members' active participation in waste management initiatives may boost their feeling of responsibility and satisfaction. Public policy is heavily emphasized by Wachira (2023), who contends that solid waste management is a crucial determinant of sustainability and living quality. By analyzing a number of national efforts targeted at improving waste management practices, the essay connects efficient waste management to more general environmental and public health results. This article emphasizes the need for governments to establish comprehensive legislation that deals with waste management and shields people from environmental threats.

Additionally, the results demonstrate that there is no appreciable impact of water efficiency measures on environmental performance. The notion that restaurants might modify their water consumption without significantly harming the environment could account for this

conclusion, in which case water conservation techniques are not as important. However, some studies show that water conservation efforts mostly impact environmental and economic aspects rather than directly influencing social performance. For example, Lakhiar, et al. (2024) discovered that although water conservation methods significantly improve environmental sustainability and economic efficiency, they have less direct impact on social performance indicators including community well-being and employee happiness. Restaurants may prioritize other aspects like food quality and service above water saving when it comes to environmental performance. In light of this, I believe that we should reconsider how we create and assess water-saving initiatives and emphasize the significance of integrated resource management, in which water efficiency is a component of a larger sustainability plan. It should be mentioned that more comprehensive measures and improved monitoring are required for environmental performance. However, the non-significant results related to waste reduction (H2) and water efficiency (H3) raise important questions, particularly when compared to prior research. For example, Morkunas (2025) reported a strong positive relationship between waste management and environmental performance, while Lakhiar et al. (2024) supported the role of water efficiency practices in enhancing operational sustainability.

This discrepancy can be explained by differences in the local context. In many developed countries, where previous studies were conducted, the implementation of waste and water practices is supported by strict regulations, advanced technologies, and high public environmental awareness, factors that may not be equally present in the context of this study.

Finally, the results of the inquiry into the primary obstacles to the implementation of sustainable practices in restaurants from the perspective of the respondents highlighted: The perception that sustainability is costlier than traditional operations or thin profit margins make it difficult to allocate funds for sustainability initiatives without immediate financial returns. High initial costs are caused by the upfront investment for sustainable equipment, technology, or certification. 2. Lack of knowledge and experience, which is in line with Kasim and Ismail (2011), is caused by a lack of awareness or comprehension of sustainable practices and their advantages as well as the challenge of locating trustworthy sources of sustainable goods. 3. Customers' limited desire to pay more is a result of their potential interest in sustainability and price sensitivity, which may discourage them from selecting more expensive sustainable solutions. This conclusion is also in line with Chevallier-Chantepie and Batt's (2021) findings. 4. Supply chain issues: they arise from the inability to regularly get components that are locally, organically, or sustainably produced, as well as the difficulties of monitoring and confirming the supply chain's sustainability.

12. Recommendations

12.1. Study recommendations

The results of the research suggest that management should take into account a number of suggestions about the evaluation of sustainability practices, such as the number of related activities and the appropriate ways to submit data. This offers a collection of tactics to assist restaurant managers in going above and beyond. A framework for assessing employee relations in service firms is provided by techniques for quantifying green employee-related behaviors.

First, a list of successful green initiatives that the restaurant may implement should be included in recommendations for evaluating and tracking the quality of green practices. The whole crew should have access to this list.

Second, decision-makers in the restaurant industry should set up reporting systems to manage and address stakeholder requests, get financing, and provide strategic guidance to overcome technological and practical limitations. Instead of only reacting to the current situation, this operational shift should foresee long-term changes and planned adaptations. To do better in the Jordanian market, these eateries required to raise understanding of sustainable practices and how they affect environmental performance.

Third, by using less energy, the restaurant may save operating expenses and increase funds for philanthropic causes and community service. Restaurants may significantly lessen their environmental effect by using ethical procurement practices and resource optimization, such as the utilization of renewable resources and energy-efficient equipment.

Fourth, the results show that the success of restaurants is significantly impacted by the adoption of sustainable practices. The link between primary practices and overall performance is disrupted by the hospitality and tourist industry's embrace of green practices and the dissemination of knowledge about the resources accessible in restaurants. Management should take into account a variety of recommendations for gauging sustainability initiatives, including the quantity of related practices and the information submission techniques.

Finally, by putting these recommendations into practice, restaurant managers will be able to exceed compliance requirements. Green practice measurement is essential for assessing the service sector's performance. Furthermore, this research makes a noteworthy theoretical contribution by proposing and testing an integrated model that links three domains of environmental behavior (energy, water, and waste) with environmental performance in the restaurant industry. This comprehensive approach is rarely found in previous literature. The study also highlights that direct economic incentives and implementation feasibility are key determinants of the effectiveness of environmental practices, redirecting scholarly attention toward the practical and contextual factors influencing sustainability in developing economies.

In doing so, this study not only confirms or challenges existing hypotheses but also opens new avenues for understanding how institutional and regional conditions shape the success of environmental initiatives in the hospitality sector.

12.2. Actionable Recommendations

For Policymakers and Government Agencies

1. Offer fiscal incentives, such as tax breaks or subsidies, to restaurants that adopt energy-efficient appliances or transition to solar-powered systems.
2. Develop localized environmental certification programs specifically for the restaurant industry, recognizing compliance with standards for energy use, water conservation, and waste management.
3. Implement and enforce regulations that require proper waste segregation and environmentally responsible disposal, especially in densely populated hospitality zones.

For Restaurant Owners and Operators

1. Create internal sustainability teams or designate "green champions" to track resource consumption and identify areas for improvement.
2. Invest in comprehensive staff training focused on sustainable practices, particularly in minimizing waste and conserving water.
3. Partner with technology providers to install smart meters, leak detection systems, and energy monitoring tools for real-time resource management.

For Industry Associations and NGOs

1. Build collaborative initiatives with restaurants to deliver hands-on workshops covering waste management, composting, and recycling techniques.
2. Develop accessible digital toolkits and e-learning courses tailored for small and medium-sized restaurants lacking in-house environmental expertise.
3. Run consumer-facing awareness campaigns promoting sustainable dining habits, encouraging public demand for eco-friendly restaurant practices.

For Academic and Training Institutions

1. Embed sustainability education into culinary and hospitality training programs, focusing on real-world applications of energy, water, and waste efficiency.
2. Promote applied research and support student-led projects that design, pilot, and evaluate sustainability solutions in local foodservice settings.

13.Limitations and Scope for Future Research

Despite providing valuable insights into sustainability practices in the restaurant industry, this study has several limitations that should be acknowledged: First, the research is geographically limited, which may restrict the generalizability of the findings to other regions or countries with different cultural, regulatory, and economic contexts. Future studies could expand the geographic scope to include cross-national comparisons and explore how local environmental policies influence sustainable practices. Second, this study primarily relies on self-reported data from restaurant managers and owners, which may be subject to bias or social desirability effects. Incorporating observational or third-party audits in future research could improve the accuracy of sustainability performance assessments. Third, the focus of this study was limited to three sustainability dimensions: energy efficiency, waste reduction, and water conservation. However, sustainability in restaurants is a multifaceted concept that also includes sourcing of ingredients, employee welfare, customer engagement, and community impact. Future research could explore a broader range of sustainability indicators and examine how these elements interact.

Fourth, this study is the geographic focus on urban and semi-urban areas, primarily within the capital and major cities. Rural regions and remote localities were excluded from the sampling frame, which may introduce a location-based bias. This exclusion limits the generalizability of the findings, particularly since rural restaurants may operate under different constraints and practices, especially in terms of access to sustainability resources, regulatory pressures, and

customer expectations. Future research should aim to include rural establishments to provide a more comprehensive understanding of environmental practices across the full spectrum of the hospitality sector. Fifth, the data collection relied on self-reported survey responses, which may be subject to social desirability bias. Respondents might have overstated their environmental practices or downplayed challenges to present their establishments in a more favorable light. Sixth, the study captures a cross-sectional snapshot, making it difficult to assess the long-term effects of sustainability practices. Some benefits, particularly from water and waste efficiency, may require longer periods to become evident in performance metrics. Seventh, factors such as managerial commitment, organizational culture, employee engagement, and customer pressure were not directly measured, though they likely influence the successful implementation of environmental practices. Their absence may limit the explanatory power of the model. Finally, small and medium-sized enterprises (SMEs) were underrepresented in this study. Given the critical role SMEs play in the food service sector, future studies should focus more on understanding the unique challenges and innovations faced by independent and smaller restaurants in adopting sustainable practices.

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أثر ممارسات الاستدامة على الأداء البيئي: دراسة قطاع المطاعم في الأردن

المستخلص

هدفت هذه الدراسة إلى تقييم أثر ممارسات الاستدامة البيئية على الأداء البيئي للمطاعم. حيث ينصب التركيز على ثلاث ممارسات رئيسية: إدارة الطاقة، وكفاءة المياه، والحد من النفايات. وقد تم فحص هذه الممارسات لتحديد دورها في تعزيز الاستدامة داخل قطاع المطاعم. وقد تم اعتماد النهج الكمي. وجُمعت البيانات باستخدام استبيان مُنظم وُزّع على مديري المطاعم وصناع القرا والمالكين. وشملت عينة الدراسة على مجموعة متنوعة من أنواع المطاعم، معظمها من المناطق الحضرية وشبه الحضرية. حيث بلغت عينة الدراسة التي تم جمعها إلى 123 استبيانًا صالحا للتحليل الاحصائي , وتم تحليل البيانات باستخدام نمذجة المعادلات الهيكلية للمربعات الصغرى الجزئية (PLS-SEM). واشارت النتائج إلى أن إدارة الطاقة لها تأثير إيجابي كبير على الأداء البيئي. ومع ذلك، لم يُظهر الحد من النفايات وكفاءة المياه أي علاقة ذات دلالة إحصائية. وتُسلط هذه النتائج الضوء على عوائق التنفيذ التي قد تؤثر على نجاح بعض مبادرات الاستدامة. ويساهم هذا البحث في الأدبيات من خلال تقديم إطار عمل متكامل لتقييم الممارسات البيئية في المطاعم. كما يقدم توصيات عملية لأصحاب المصلحة، بما في ذلك صانعي السياسات، وأصحاب المطاعم ومشغليها، والمنظمات غير الحكومية، والمؤسسات الأكاديمية والتدريبية. وأخيرًا، قامت الدراسة بتحديد عدة قيود واجهاتها وقدمت توصيات للبحوث المستقبلية بحيث كان من اهم هذه التوصيات, ضرورة استكشاف آثار الاستدامة طويلة المدى على الأداء البيئي للمطاعم ،وكذلك ضرورة معالجة التحيز المحتمل في الاستجابة، ودراسة دور الالتزام الإداري على ممارسات الاستدامة واثرها.

الكلمات المفتاحية: الاستدامة , الأداء البيئي, صناعة المطاعم , الأردن.