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THE INFLUENCE OF USING INFORMATION TECHNOLOGY COMPETENCIES ON ENVIRONMENTAL IT PERFORMANCE IN THE HOSPITALITY AND TOURISM: THE ROLE OF GREEN HRM PRACTICES

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Abstract: This study investigates the influence of Information Technology (IT) competencies on Environmental IT Performance (EITP) within the hospitality industry. Grounded in the Resource-Based View, the research specifically examines the mediating role of Green Human Resource Management (GHRM) practices in the relationship between IT competencies and EITP. The study collected data from 496 employees at four and five-star hotels in Cairo and Sharm El Shiekh, Egypt, using a convenience sampling method. The proposed conceptual framework and hypotheses were analyzed using structural equation modeling (SEM) with AMOS. The results confirmed all four hypotheses. IT competencies (comprising IT technical infrastructure flexibility, IT personnel skills, and IT-business alignment) were found to have a significant positive effect on GHRM practices and on EITP. GHRM practices also demonstrated a significant positive impact on EITP. Critically, the findings revealed that GHRM practices significantly mediate the relationship between IT competencies and EITP. Theoretically, this study contributes by introducing a new framework that links technological competencies to environmental performance through the organizational mediator of GHRM, thereby extending the Resource-Based View into the environmental domain. The findings indicate to hotel managers that technological competencies alone are insufficient for achieving environmental goals; they must be supported by GHRM practices to effectively translate IT capabilities into improved environmental IT performance. This research fills a knowledge gap by examining the interplay between IT competencies, GHRM practices, and environmental performance, offering a novel, integrated model for the hospitality industry.

Keywords: Information Technology, Environmental IT Performance, Green Human Resource Management, Hospitality and Tourism Organizations

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INTRODUCTION

Hospitality industry considered among the most widespread and important service industries around the world (Varelas et al., 2021), as it helps create wealth and provide job opportunities for many people (Pham et al., 2020). The hospitality industry has witnessed great growth and development as it has become one of the most important service sectors at the present time (Chathoth et al., 2020). As well as, Sangeetha (2020) argued that hospitality industry has had a significant impact on the economic and social development of many countries. Environmental concerns and the need to implement environmentally, economically and socially sustainable practices have created a highly competitive business environment where balancing these factors is viewed as a difficult process (Awwad et al., 2022; Agina et al., 2025a). On the other hand, Çop et al. (2020) reported that environmental management systems in hospitality establishments helps improve their environmental and social performance and increase their economic performance, while maintaining cultural standards and integrating green behaviors into operations management (Nisar et al., 2021). From a geographical perspective, the study considers hotels as spatial units operating within major tourist cities, where

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environmental pressures and resource consumption vary according to location. Hence the importance of environmental sustainability and its role in the hospitality industry emerged (Pham et al., 2020). As a result of this interest, the term social responsibility and environmental management of hospitality establishments emerged (Singjai et al., 2018). It is important to respond to customer needs and enhance its competitive position (Ouyang et al., 2019).

On the other hand, the hospitality industry is highly dependent on natural resources, which causes environmental destruction (Irani & Kilic, 2022). Consequently, many countries have passed legislation to preserve the environment by increasing the environmental awareness of the local community and tourists (Arda et al., 2019; Agina et al., 2025b).

Going green has been one of the most fundamental ways of taking care of environmental issues. Over the past decades, sustainability policies and improving green technologies have aroused the interest of decision makers (Roscoe et al., 2019). According to Muñoz-Pascual et al. (2021) understanding the role played by human resources management and information technology requires good research and thorough knowledge of information and management technologies. This requires organizational restructuring and identifying new cognitive paths that lead to sustainable development through the participation of stakeholders such as management, employees, and customers (Shafaei et al., 2020). From this standpoint, the sustainable development approach relies on three basic pillars: social development, economic development, and sustainable development (Kraus et al., 2018).

However, there are few studies that have examined the impact of using IT on environmental performance in the hospitality industry through the role played by green HRM practices (Muñoz-Pascual et al., 2021; Agina, 2020). Many previous studies focused on environmental performance and sustainability practices without linking them to information technology (Muñoz-Pascual et al., 2019). The study conducted by Zhang et al. (2019) indicated that improving environmental performance requires linking information technology and human resources management, so human resources and information technology are considered important indicators for achieving the required environmental performance. Moreover, the study (Agina & Abuelnasr, 2021; Muñoz-Pascual et al., 2021) showed that research must be done to fully understand the interconnected relation between using information technology, human resource management, and sustainability in order to achieve environmental performance.

Additionally, the development in the hospitality industry has increased pressure on it to be responsible towards the environment and implement environmentally friendly activities (Yusoff et al., 2020). As well, it is directly responsible for issues related the environment such as water, energy, and waste (Elshaer et al., 2021). Nisar et al. (2021) mentioned that it requires more research into the field of information technology (IT) and green HRM practices and how they contribute to improving environmental performance, to provide the evidence that the use of information technology and green HRM practices to enhance environmental performance (EP) (Alreahi et al., 2022). Hence, this study seeks to fill this gap in knowledge regarding the relationship between using information technology and environmental performance through the role of green HRM in the context of hospitality industry. As mentioned earlier, the study examines (1) influence of using IT competencies on the GHRM practices in hospitality industry, (2) influence of using IT competencies on environmental performance in hospitality industry, (2) the relationship between Green Human Resource Management (GHRM) practices and the environmental IT performance in hospitality industry, and (3) the mediating roles of green HRM practices between a hotel's IT competencies and environmental IT performance in hospitality industry.

LITERATURE REVIEW

Information technologies (IT) competencies in hospitality and tourism

Today, intense competition in the business environment has led hospitality industry to develop their products and services to maintain their competitiveness (Law et al., 2009). This depends to some extent on the ability of these establishments to obtain up-to-date information and use it in management processes (Bilgihan et al., 2011; Agina et al., 2017). Hence, IT helps in information management and affects business competitiveness by helping decision makers make the right decisions (Osabutey & Jin, 2016). In addition, information technology helps meet customers' needs for timely information, and Covid-19 has increased the penetration of information technology in the hospitality industries at an unprecedented rate (Ali et al., 2020). This is because they play an important role in providing high-quality services, improving operational efficiency and cost control (Varelas et al., 2021; Ahmed et al., 2023).

Therefore, the topic of sustainable development is linked to the interconnected relationship between sustainability and information technology used within tourism and hotel enterprises (Muñoz-Pascual et al., 2019). With the increasing intensity of market competition between hospitality establishments, the use of modern technologies has become a necessary condition for the successful implementation of new environmental practices (Roig-Tierno et al., 2018).

Green HRM practices in hospitality

Today, preserving the environment, ensuring environmental sustainability, and improving environmental performance have become among the most important goals that hospitality establishments seek to achieve (Gaafar et al., 2021). Ardito & Dangelico (2018) pointed out that as the world pays great attention to the environment, tourism and hotel organizations should adopt human resource management practices. The concept of green human resource management (GHRM) refers to the systematic and planned adaptation of human resource practices to the environmental goals of the organization (Alghamdi, 2021; Alhemimah et al., 2024; Agina et al. 2023).

According to Bazrkar & Moshiripour (2021) green HRM is defined as the use of human resources management to promote environmental practices and increase employees' commitment to environmental issues within organizations. As well as, Ababneh (2021) reported that there is a positive relationship between human resource management practices and

environmental performance to reduce the organization's negative impacts on the environment or to maximize its positive environmental impacts. Moreover, green HRM helps stimulate behavior and increase employees' environmental awareness and knowledge by implementing environmentally friendly policies (Gaafar et al., 2021). The concept of green HRM refers to the set of programs and initiatives that organizations seek to achieve to solve environmental problems and reduce negative environmental impacts (Bazrkar & Moshiripour, 2021). In addition, it ensures environmental safety and achieves resource sustainability, which benefits tourism organizations, employees, and customers (Ardito & Dangelico, 2018). Not only that, green HRM practices reduce labor turnover, increase environmental and green awareness among employees, and improve their behaviors to improve green attitudes in their routine lives and workplaces (Bello et al., 2021). On the other hand, the study conducted by (Gaafar et al., 2021) indicated that green HRM practices increase customer satisfaction with the services provided by improving the quality of services and increasing their loyalty to the organization. The study conducted by (Elshaer et al., 2021) confirmed that designing human resources jobs that encourage employees to learn about the environment and providing regular training opportunities on environmental management systems increases employees' interest and motivation to engage in green, pro-environmental behaviors.Consequently, green HRM is considered a set of policies and innovations followed by organizations with the aim of reducing negative impacts and increasing positive impacts on the environment (Irani & Kilic, 2022; Alshuqaiqi et al., 2025). Therefore, selecting and hiring employees who are able to adopt environmentally friendly behaviors with the aim of achieving sustainable development (Ali et al., 2020).

Environmental IT performance in hospitality

The concept of environmental performance refers to organizations' commitment to setting operational standards that preserve the environment and are measurable (Haldorai et al., 2022; Khairy et al., 2023a). Environmental performance refers to the positive results achieved by the organization as a result of implementing environmental activities that aim to reduce the negative effects of the organization. Therefore, it can be said that reconciling the activities followed by the organization and the environment leads to achieving environmental performance (Kim et al., 2019). Currently, many organizations are developing appropriate environmental strategies to achieve competitive advantage because most customers practice and prefer green environmental activities (Gaafar et al., 2021). In addition, the value of environmental performance is represented in its ability to achieve many benefits by enhancing the awareness of management, workers, and customers about the importance of preserving the environment (Haldorai et al., 2022). As pointed out by Yusoff et al. (2020) noted that green HRM practices, represented by green recruitment, green selection, green training, green performance evaluation, and green compensation, are considered important strategies that enhance the environmental performance of the organization. On the other hand, environmental performance includes regulatory programs that are in line with international laws and legislation on environmental conservation (Arda et al., 2019). Previous studies indicated that environmental performance depends on green goods and products and technological developments that help transition to green and achieve sustainable environmental development (Pham et al., 2020; Irani & Kilic, 2022).

Conceptual framework and hypothesis development

Currently, the topic of sustainable development is linked to the interconnected relationship between sustainability and information technology used within hospitality enterprises (Muñoz-Pascual et al., 2019). As well, with the increasing intensity of market competition between hospitality establishments, the use of modern technologies has become a necessary condition for the successful implementation of new environmental practices (Roig-Tierno et al., 2018; Khairy et al., 2023b). The study of Muñoz-Pascual et al. (2021) indicated that several studies and research are needed to understand the relationship between technology, sustainability, and human resources management. The research variables will be explaining in the research conceptual See framework (Figure 1).

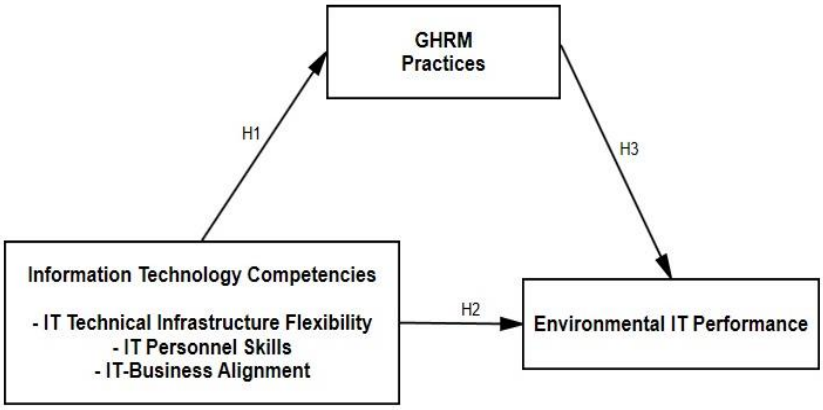

Figure 1. The research conceptual framework

IT Competencies and GHRM in hospitality

The hospitality industry increasingly recognizes the importance of integrating Information Technology (IT) with sustainable practices to promote environmental responsibility and enhance organizational performance (Pashutan et al., 2022). IT competencies, encompassing technical infrastructure, personnel skills, and strategic alignment with business

goals, are pivotal in supporting Green Human Resource Management (GHRM) practices aimed at fostering sustainability in hotels (Abdo et al., 2025). The flexibility of IT infrastructure allows hotels to rapidly adapt to evolving green practices and regulatory requirements (Elshaer et al., 2021). According to Khan et al. (2020), a flexible IT infrastructure enhances a hotel's capability to integrate new eco-friendly technologies and manage sustainable processes efficiently.

In the context of GHRM, flexible IT systems facilitate the deployment of online training modules, digital eco-awareness campaigns, and real-time monitoring of sustainability metrics, thereby promoting environmentally responsible behaviors among employees (Abdo et al., 2025; Gaafar et al., 2021). This agility enables hotels to personalize green initiatives and encourage staff engagement, resulting in more effective GHRM practices (Alghamdi, 2021; Khairy et al., 2024). Additionally, the skills of IT personnel significantly influence the hotel's ability to implement and sustain GHRM initiatives. Skilled IT staff are essential for developing, managing, and optimizing green information systems (Irani & Kilic, 2022). In terms of GHRM, competent IT personnel facilitate the integration of sustainability data into HR systems, support green training programs, and develop dashboards for monitoring environmental performance (Marchiori et al., 2023). Their expertise ensures that green HR policies are effectively communicated, implemented, and tracked, fostering a culture of sustainability within the hotel workforce (Alreahi et al., 2022; Khairy et al., 2025). Therefore, the following hypothesis is offered:

H1: IT competencies (including IT technical infrastructure flexibility; IT personnel skills; IT-business alignment) have a positive effect the GHRM practices in hotels

IT Competencies and the environmental IT performance in hotels

The integration of advanced IT competencies is crucial for hotels aiming to improve their environmental performance. Environmental IT performance refers to the effective deployment of information technology to support sustainable practices, reduce ecological footprints, and enhance resource efficiency (Marchiori et al., 2023; Afandi,2020). The study of (Muñoz-Pascual et al., 2021) indicated that more studies and research are needed to understand the relationship between technology, sustainability, and human resources management. Information technology plays an important role in implementing environmental practices, and information technology is an effective element in creating knowledge, storing it quickly, and delivering it to users with high efficiency and the highest accuracy (Song et al., 2020). On the other hand, information technology can integrate cutting-edge mechanisms and new practices that remove barriers between different departments within organizations (Muñoz-Pascual et al., 2019). It is also an essential pillar in reducing costs, especially in environmentally intensive consumption, helping in developing new sustainable mechanisms that preserve the environment and working to innovate green products that lead to creating a competitive advantage (Kraus et al., 2018).

According to, Varelas et al. (2021) reported that information technologies play a critical role in environmental sustainability. It also providing an accurate information and data related to sustainability. Muñoz-Pascual et al. (2019) highlighted that information technologies create value and enhance competitive advantage for hospitality establishments. As well as, Melián-Alzola et al. (2020) mentioned that IT help to improve social and economic sustainability through improve the relationships between organisation, the partner and customers. Also, it assists to improve the image and save time, which lead to increase business performance and improving profitability (Muñoz-Pascual et al., 2019). In addition, information technology plays an important role in achieving environmental sustainability through its use in various environmental procedures (Dao et al., 2011). Consequently, Kraus et al. (2018 (argues that smart hospitality is a great opportunity to improve the level of services provided to customers through the use of smart and sustainable applications. It also provides many benefits to both management and customer. Therefore, information technology has a significant impact on improving the environmental performance of hospitality establishments (Varelas et al., 2021).

Additionally, Flexibility within IT infrastructure enables hotels to adapt rapidly to new environmental standards and integrate innovative green technologies (Afandi, 2020). According to Pesce & Neirotti (2023), flexible IT systems facilitate dynamic resource management, real-time monitoring, and the deployment of eco-friendly solutions (Loeser et al., 2016; Marzouk et al., 2025). As well as, the skills of IT personnel significantly determine the effective deployment and utilization of green IT solutions. Skilled IT staff are better equipped to develop, manage, and maintain eco-innovative systems (Chen et al., 2014). In relation to environmental IT performance, aligned IT systems facilitate the integration of green practices into daily operations such as sustainable procurement, energy management, and waste reduction thus enhancing overall environmental efficiency (Afandi, 2020; Pesce & Neirotti, 2023). It also fosters organizational commitment and allocates resources effectively towards sustainability goals, resulting in improved environmental metrics (Song et al., 2020; Batarfi et al., 2025). Consequently, several studies have indicated that organizations with information systems strive towards achieving environmental performance because they possess the tools necessary to transform inputs into sustainable outputs and green products (Muñoz-Pascual et al., 2021). Moreover, it is necessary to recognize information technology systems as an essential element in achieving environmental performance. Therefore, the following hypothesis is offered:

H2: IT competencies (including IT technical infrastructure flexibility; IT personnel skills; IT-business alignment) have a positive effect the environmental IT performance in hotels.

Green HRM practices the environmental IT performance in hotels

As the hospitality industry strives toward sustainability, the role of Green Human Resource Management (GHRM) practices has become increasingly significant (Gaafar et al., 2021). GHRM encompasses HR policies and practices that promote environmental sustainability among employees, influencing their behaviors and attitudes toward green initiatives (Alghamdi, 2021). This review examines how GHRM practices impact the environmental IT performance in hotels, facilitating the effective deployment and management of green IT systems (Chiou et al., 2011). GHRM practices such as

green training, awareness programs, and performance incentives foster a culture of sustainability and enhance employees' environmental consciousness (Gaafar et al., 2021). Engaged employees are more likely to utilize and maintain green IT systems effectively, promoting energy savings, waste reduction, and resource conservation (Elshaer et al., 2021).

As well as, green training programs improve staff competence in managing energy-efficient appliances, smart building systems, and other eco-friendly IT solutions (Tanveer et al., 2024). Employees who understand the importance of environmental IT are better equipped to support initiatives like smart lighting, water management systems, and digital monitoring tools (Sangeetha, 2020). As well, GHRM practices encourage skill development aligned with green objectives. As noted by Dumont et al. (2017), specialized training in green IT systems enhances employees' ability to operate, troubleshoot, and innovate around eco-friendly technologies.

According to Hameed et al. (2020), when employees are recognized and rewarded for their contributions to green practices, including the use and promotion of green IT systems, their motivation to support environmental initiatives increases. Consequently, performance incentives linked to environmental IT performance such as reduced energy consumption or successful management of green IT projects drive employee commitment and participation in sustainable practices (Muñoz-Pascual et al., 2021; Ivancsóné Horváth et al., 2025). Therefore, the following hypothesis is offered:

H3: Green Human Resource Management (GHRM) practices have a positive effect on the environmental IT performance in hotels.

Green HRM practices mediate the relationship between hotels IT competencies and environmental IT performance

The human resources department is considered one of the important departments in hospitality establishments. Therefore, many companies seek to enhance environmental management policies and methods (Irani & Kilic, 2022). In this context, green human resource management activities are considered one of the effective methods followed by organizations to enhance environmental efficiency (Nisar et al., 2021; Elshaer et al., 2025). Bello et al. (2021) indicated that green human resources management practices contribute to increasing efficiency, saving time and reducing costs, in addition to enhancing employee engagement and retention by reducing the turnover rate. On the other hand, environmentally sustainable for human resources processes play a major role in reducing the carbon footprint of employees in hospitality establishments (Arda et al., 2019; Artemyev et al., 202; Chin et al., 2025). The pursuit of environmental sustainability in the hospitality industry has led to the recognition of strategic relationships among organizational capabilities, human resource practices, and environmental outcomes (Nisar et al., 2021). Specifically, IT competencies such as flexible infrastructure, skilled personnel, and strategic alignment are essential for implementing green IT initiatives (Awamleh & Ertugan, 2021; Elziny,2026). However, the effectiveness of these IT capabilities in achieving superior environmental IT performance often depends on Green Human Resource Management (GHRM) practices, which facilitate the human and organizational processes necessary to realize technological benefits (Ojo et al., 2022).

On the other hand, the literature review indicated that IT competencies directly influence a hotel's capacity to deploy, manage, and benefit from green IT systems (Ali et al., 2020). Flexibility in infrastructure allows for agile adaptation to eco-friendly technologies; skilled IT personnel ensure proper management; and alignment between IT and business strategies optimizes environmental projects (Muñoz-Pascual et al., 2021). These capabilities are vital for reducing energy consumption, improving resource management, and enhancing overall environmental performance (Elshaer et al., 2021).

As well as, Kim et al. (2019) reported that green HRM practices play an important role in raising environmental awareness among employees by providing training programs related to environmental issues. The study of (Gaafar et al., 2021; Nisar et al., 2021) confirmed that green HRM practices improve employees' competencies and skills and it considered essential for managing employees in hospitality establishments. Therefore, the interest of management and employees in environmental issues is considered an essential element in achieving environmental sustainability (Alreahi et al., 2022; Irani & Kilic, 2022).

Moreover, Irani & Kilic (2022) highlighted that green HRM is considered one of the methods and strategies that promote the improvement of environmental performance by changing employee behaviors towards green behaviors and spreading green organizational culture. In addition, it plays an important role in achieving sustainable success for organizations (Luu, 2019). According to the study conducted by (Ouyang et al., 2019; Irani & Kilic, 2022) mentioned that there is a strong relationship between green HRM practices and enhancing environmental sustainability.

The study of Ojo et al., 2022 confirmed that information technology plays a critical role in adopted green HRM and enhance the environmental performance. Also, Tanveer et al. (2024) reported that green HRM practices are significant indicators of environmental performance and information technologies). Haldorai et al. (2022) reveal that the positive impact of IT competencies on environmental IT performance is significantly mediated by GHRM practices. For instance, hotels with high IT capabilities only achieved superior environmental performance when GHRM practices effectively engaged and motivated employees to support green IT systems (Melián-Alzola et al., 2020). Therefore, the following hypothesis is formed:

H4: Green Human Resource Management (GHRM) practices mediate the relationship between a hotel's IT competencies and environmental IT performance.

METHODOLOGY

Sampling and Data Gathering

The study comprised employees from four and five-star hotels in Cairo and Sharm El Shiekh, Egypt. Cairo and Sharm el-Sheikh were chosen for a variety of reasons, the most important of which is that they are Egypt's main tourist cities and represent vital tourism centers, in addition to their diverse hotel offerings and plenty of people resources. They are also

regarded as having the most extensive tourism infrastructure, making them ideal for evaluating the relations explored in this study. Based on the previous literature, selecting locations with high operational and economic density improves the validity and realism of the results because these locations are seen as natural laboratories for the application of complex organizational techniques (Aguinis & Lawal, 2012). Convenience sampling was employed to reach employees and test the research hypotheses. Although the convenience sampling technique limits the scope of the data, the researchers used it for a variety of reasons. First, it is an effective and straightforward strategy that saves time and allows researchers to easily get the necessary information (Stratton, 2021). Second, this technique has been used extensively in hospitality research.

The researchers followed Stratton's (2021) criteria to improve the dependability of the sample approach and decrease any associated biases. For example, ambiguous and complex study objectives were avoided. In addition, a valid questionnaire survey and reliable research measures were applied. Furthermore, the researchers attempted to include as many responses as possible in the study to accurately represent the community. Another way to eliminate non-response bias was to make the questionnaire straightforward to interpret, brief, and user-friendly (Churchill & Iacobucci, 2006).

The original form of the questionnaire was written in English, then piloted with 25 participants both academics and hotel industry professionals to determine how the questions were phrased and organized. The final version of the questionnaire was presented to the officials of 15 hotel samples included in the study to clarify its scientific aim and receive their permission to distribute it to the employees. The questionnaire items have been translated into Arabic so that all hotel staff understand their intended meaning, resulting in accurate findings. Researchers used the back-translation technique to ensure linguistic equivalence between the two versions (Molina et al., 2007). Finally, it was distributed to 600 employees between October 2023 and March 2024. The researchers were able to collect 519 questionnaires, 23 of which were eliminated from analysis, leaving a total of 496 questionnaires that could be analyzed, with a ratio of 82.7%.

Measures

The measuring scales for all variables were modified from previous literature to better reflect the setting of the current research. All the items in the questionnaire were scored on a five-point Likert scale, with 1 indicating strongly disagreed and 5 indicating strongly agreed, where the variables were as follows:

- Information Technology Competence: is a second-order construct consisting of three first-order variables: i.e., IT technical infrastructure flexibility (TIF), IT personnel skills (PS) and IT-business alignment (BA). The extent to which Information Technology Competence was implemented in the hotel was assessed using various scales modified from earlier studies Bhatt et al. (2010); Tallon (2008); and Kearns & Lederer (2003), respectively, and retested by Wang et al. (2015).
- Green Human Resource Management (GHRM): Consistent with existing studies, GHRM was measured as a formative construct with six items adapted from adapted from Dumont et al. (2017) then was retested by Hameed et al. (2020).
- Environmental IT Performance (EITP): The questionnaire for studying EITP consisted of eight items adapted from Chiou et al. (2011) and Gholami et al. (2013) then retested by Ojo et al. (2022).

Data Analysis

The researchers used version 20 of "the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structure (AMOS)" to implement Anderson and Gerbing's (1988) two-step data analysis technique (first "confirmatory factor analysis (CFA)", then "structural equation model").

RESULTS

Measurement Model Assessment

The researchers used the maximum likelihood approach and a covariance matrix to perform confirmatory factor analysis on our five-component hypothesized model. Moreover, we used the maximum likelihood technique and a covariance matrix to do confirmatory factor analysis on our seven-component hypothesized model.

Items with a factor load of more than 0.6 were accepted, while items with less than that, such as (GHRM5; GHRM6), were excluded (Shrestha, 2021). After estimating the model, the overall fit indices were evaluated, indicating a satisfactory fit: $\chi 2 = 570.894$ with df = 234, $p < .0001$; $\chi 2/df = 2.44$ (<3, Hair et al., 2010). The NFI =.930, RFI =.918, IFI =.949, CFI =.949, and TLI =.940 indices are greater than the lowest allowed value of 0.90 for evaluating the model's fit (Tucker & Lewis 1973; Hu & Bentler, 1999). Another significant figure is the root mean square error of approximation (RMSEA), which is 0.07 (0.08, Arbuckle, 2011). Standard residual covariance was tested to see if it may significantly reduce model fit. As a result, just a few elements were covariates in the latent variables. BA1 and BA6; BA2 and BA3; BA4 and BA5 in BA latent variable, EITP1 and EITP2; EITP1 and EITP2; EITP1 and EITP2; EITP1 and EITP2 in EITP latent variable were covariate. We validated the scales' convergent validity and reliability by computing AVE, Cronbach's α, and CR values for each construct. According to Fornell and Larcker (1981), the convergent validity and reliability requirements are met when AVEs are more than 0.50 and CRs exceed 0.70.

According to the statistics in Table 1, the AVE and CR values were greater than 0.50 and 0.70. These findings demonstrate that the variables in our study have convergent validity and reliability (Pallant, 2020; Hair et al., 2010).

To ensure discriminant validity, Fornell and Larcker's (1981) criterion was applied, which compares the square root of the AVE to inter-correlations between the variables. According to this criterion, when the square root of the AVE exceeds the inter-correlations between the research variables, the discriminant validity condition is confirmed. The square root of the AVE was bigger than the claimed correlations between the research variables, as seen in Table 2. To summarize, the previously offered approaches provide evidence in support of the discriminant validity of our research variables.

Table 1. Factor loadings, validity analysis, and reliability test of the measurement model

Construct	Mean	SD	Factor Loading	CR	A	AVE
IT Technical Infrastructure Flexibility (TIF)				.896	.889	0.685
TIF1	3.53	.93	.841	(Wang et al., 2015; Bhatt et al., 2010)		
TIF2	3.56	1.01	.930			
TIF3	3.35	1.01	.800			
TIF4	3.63	.94	.727			
IT Personnel Skills (PS)				.893	.890	.677
PS1	3.48	1.01	.814	(Wang et al., 2015; Tallon, 2008)		
PS2	3.34	1.05	.814			
PS3	3.43	.97	.881			
PS4	3.37	1.07	.780			
IT Business Alignment (BA)				.959	.959	.797
BA1	3.39	1.03	.910	(Wang et al., 2015; Kearns & Lederer, 2003)		
BA2	3.49	1.00	.929			
BA3	3.51	1.01	.948			
BA4	3.35	1.07	.856			
BA5	3.32	1.08	.858			
BA6	3.42	1.11	.852			
Green Human Resources Management (GHRM)				.919	.912	.742
GHRM1	3.72	1.02	.913	(Hameed et al., 2020; Dumont et al., 2017)		
GHRM2	3.74	.98	.940			
GHRM3	3.71	.96	.907			
GHRM4	3.43	1.00	.655			
GHRM5 (Deleted)	---	---	---			
GHRM6 (Deleted)	---	---	---			
Environmental IT Performance (EITP)				.969	.970	.840
EITP1	3.41	1.10	.884	(Ojo et al., 2022; Gholami et al., 2013; and Chiou et al., 2011)		
EITP2	3.45	1.08	.948			
EITP3	3.47	1.08	.956			
EITP4	3.38	1.12	.914			
EITP5	3.34	1.11	.909			
EITP6	3.54	1.12	.886			
SD = standard deviation; CR = composite reliability; α = Alpha reliability; AVE = average variance extracted						

Table 2. Factor loadings, validity analysis, and reliability test of the measurement model

Variables	TIF	PS	BA	GHRM	EITP
IT Technical Infrastructure Flexibility (TIF)	0.685				
IT Personnel Skills (PS)	0.641	0.677			
IT Business Alignment (BA)	0.613	0.667	0.797		
Green Human Resources Management (GHRM)	0.476	0.501	0.443	0.742	
Environmental IT Performance (EITP)	0.442	0.401	0.349	0.231	0.840

Hypotheses Testing

Assuming the foregoing, standardized path coefficients (ß) were utilized to assess the hypothesized correlations using the structural equation model (Table 3). Most of these estimates have an absolute t-value more than 3.29, p 0.001, indicating that they are positively strong. Table 3 shows that IT competences positively affect GHRM (ß =.748, $p < 0.01$) and EITP (ß =.768, $p < 0.01$). These findings matched our predictions of the theoretical hypotheses H1 and H2. It is also important to highlight that GHRM has a positive impact on EITP (ß =.792, $p < 0.01$), which supports H3.

Table 3. Standardized Parameter Estimates of the Structural Model

H	Path			Beta coefficients (ß)	t-values	Results
H1	IT Competences	→	GHRM	.748	20.332***	Supported
H2	IT Competences	→	EITP	.768	11.692***	Supported
H3	GHRM	→	EITP	.792	21.541***	Supported

Notes: N = 496; IT = information technology, GHRM = green human resources management, EITP = environmental IT performance.
*Absolute t-value > 1.96, p< 0.05; **Absolute t-value > 2.58, p< 0.01; ***Absolute t-value > 3.29, p< 0.001

This research paper examined the lower level of confidence interval (LLCI) and upper level of confidence interval (ULCI) when examining GHRM's mediating effect on the relationships between IT skills and environmental IT performance (Table 4). Five hundred bootstrap samples were used to test standardized indirect bias-corrected bootstrap estimates with a 95% confidence interval. The mediation results show that indirect effects are statistically somewhat significant. GHRM mediated the following relationships: IT competencies → EITP (ß =.592, LLCI =.0.513, ULCI =.0.604, $p < 0.01$).

Table 4. Hypotheses test results for indirect relationships

H	Path (Indirect Effects)	Indirect	Lower Boundary	Upper Boundary	Sig
H4	IT ⟶ GHRM ⟶ EITP	.592	0.513	0.604	0.002*

Notes: N = 496; IT = information technology, GHRM = green human resources management, EITP = environmental IT performance. * P ≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.000

DISCUSSION

This study, which focuses on the hotel industry in a sample of four and five-star hotels in Sharm Elsheikh, Egypt, uses a new research model to demonstrate how information technology competences influence employees' environmental IT performance, expanding our understanding of the positive aspects of information technology. Based on Resource Based View, businesses with unique capabilities and distinct skills (IT competence) can achieve distinctive competitive performance (EITP) through effective management (GHRM) capable of leveraging these skills to achieve excellence. Thus, the authors investigated the effects of IT competencies on EITP. Furthermore, the mediating influence of perceived GHRM was assessed to determine the indirect effect on this relationship. The following key conclusions can be derived based on the findings of the hypotheses investigated in this study.

First, the findings demonstrated that there is a favorable relationship between IT competencies and GHRM. As previously stated, IT competencies refer to an organization's ability to maximize the use of modern technical advances through a set of variables known as IT Technical Infrastructure Flexibility (TIF); IT Personnel Skills (PS) and IT Business Alignment (BA). IT competency is the firm's ability to leverage its portfolio of IT skills (Chen et al., 2014; Cho et al., 2013). It is widely acknowledged that HRM function is significantly impacted by the development and competences of IT (Stone et al., 2015; Parry & Tyson, 2011). This suggests that hotels use unique technology applications through a specialized team with expertise. This team can control and manage these applications in a manner appropriate to the size and nature of the business. As well as the fact that IT has revolutionized how hotel business gathers, store, disseminate, and use employee information (Turulja & Bajgoric, 2018).

As a result, the possibility of green HR management procedures succeeding increases, as these abilities aid in the improvement of e-recruitment and e-training processes, remote work, the reduction of carbon footprint without the use of paper, and the enhancement of employee environmental performance monitoring (Parveen & Alraddadi, 2024).

Second, our findings revealed a favorable correlation between IT competencies and its environmental performance. As anticipated, we discovered that IT competencies have a direct effect on environmental IT performance. An efficiently constructed infrastructure, together with employees' technological competencies and talents, and IT business Alignment makes it easier to comply with technological environmental performance standards.

This can be explained through Dynamic Capabilities Theory. According to this theory, organizations can adapt to environmental performance and green innovation provided they have the resources to implement strategic environmental objectives, including technical infrastructure and qualified individuals in an appropriate environment.

The findings suggest that when hotel infrastructure is developed in a creative technical approach (for example, relying on energy-efficient cooling systems, as well as advanced technology to reduce dependency on paper and primitive systems, etc.), it helps to cut carbon emissions. On the other hand, this infrastructure cannot be relied on solely; qualified individuals must be present to handle all advanced software. These technological competencies help to design more environmentally mindful technical solutions. The findings are consistent with earlier research, including (Jenkin et al., 2011; Melville, 2010) studies, which discovered that Green IS has shown that IT may improve environmental changes by changing staff behaviors and capturing meta-data to optimize resources.

More specifically, leveraging IT technical infrastructure flexibility, IT people capabilities, and IT-business alignment, IT may be integrated into environmental management activities (Wang et al., 2015).

Third, the study tested the connection between GHRM practices and EITP. The results showed that GHRM practices significantly affect employees' environmental IT performance. By using GHRM practices, hotels can improve their environmental IT performance when its people make independent decisions about the creation and use of IT. These findings are in complete agreement with those that have shown a direct relationship between GHRM practices and EITP (e.g., Ojo et al., 2022; Ren et al., 2018). Our data supports the significant impact of corporate human resource management (GHRM) practices, which include hiring employees who understand environmental performance and how to deal with and exploit advanced technologies in an environmentally responsible manner.

Additionally, a selection process that asks candidates about their technological reactions and suggestions for improving environmental performance. These practices are in line with earlier research that suggests GHRM procedures are crucial in the early stages of hiring, when candidates are chosen based on their knowledge and comprehension of environmental standards (Pham et al., 2019). Moreover, our results reinforce the significance of approaches pertaining to green empowerment, performance management, technology development, and training. These results support the suggestions of several studies in this field that corporate green human resource management (GHRM) practices should be implemented later in an employee's career, allowing other practices like empowerment, training, and development to play a more significant role in encouraging IT environmental performance (Ojo et al., 2022).

Sequel to the above, researchers investigated the impact of IT competences on environmental IT performance through GHRM practices. The data supports the significant mediating effects of GHRM practices on the impacts of IT competences (i.e., IT technical infrastructure flexibility; IT personnel skills and IT business alignment) on

environmental IT performance. This suggests that a hotel's technical competence will enable human resources management to carry out its plans and accomplish its green practices, this, in turn, will enhance the hotel's environmental IT performance. In other words, the implementation of green HRM practices increases technological competences and converts them into concrete environmental practices that hotels may successfully adopt.

They also encourage staff members to use the hotel's technical capabilities in innovative ways. These findings were consistent with Molla et al. (2011) when they stressed that good environmental performance can be attained by a variety of means, including technological competences, but that these competencies necessitate organizational capacities that can utilize them in a way that is appropriate for the nature of the task. The finding emphasizes the remarkable role of perceived GHRM as a critical predictor of environmental IT performance, in addition to serving as a significant mediating factor in the relationship between IT competencies and their environmental performance.

The study makes a significant theoretical contribution to the service industry, particularly the hospitality sector, by introducing a new theoretical framework that links hotel technological competencies to an environmental concept through an organizational mediator, represented by green human resource management (GHRM) practices. Furthermore, the findings of study add to the scope of Resource Based Theory by incorporating the environmental dimension into the analysis of technological competencies, confirming that these competencies (both in terms of infrastructure and personal skills) influence not only organizational performance but also the environmental IT performance. As a result, technological competencies might be viewed as long-term strategic assets (Hart, 1995; Barney, 1991).

Moreover, the researchers hope to solve a research vacuum regarding the extent to which IT competencies are employed and translated into actual practices by promoting green human resource management.

This contribution broadens the principles of GHRM, which have traditionally been addressed in the context of production or manufacturing, to be applied in a digital and technology environment (Renwick et al., 2013; Jabbour & Jabbour, 2016). On the other hand, the research findings also support an unknown component in determining the mediation role of green human resource management practices as a link between IT competencies and environmental IT performance based on these competencies. Hence, the theoretical framework proposed in this study is a new contribution that combines three major components: technological competences, green human resource management practices, and information technology's environmental performance. This integration emphasizes the significance of assessing environmental performance through a multidimensional lens that includes not only technology but also the interaction of human resources and institutional systems (Loeser et al., 2016; Yusliza et al., 2015).

CONCLUSIONS

Our study's findings have important practical implications for hospitality organizations, potentially guiding them to improve a set of practical contributions that benefit hotel organizations as technical leaders by improving their environmental performance and integrating the personal and technological dimensions within an integrated framework. Firstly, this research helps hotel managers realize that technological competencies alone are not sufficient to achieve effective environmental performance. Rather, they must be supported by organizational policies and practices, such as green human resource management. Thus, organizations can use the findings of this research as a practical guide to developing technological sustainability strategies based on an organizational human dimension.

Previous studies have emphasized the importance of this integration of technology and human resources to achieve environmental sustainability goals (Jabbour & Jabbour, 2016; Renwick et al., 2013). Secondly, the study's findings highlight the need to develop specific training programs through hotel human resource management to assist improve green capabilities among their employees. These abilities enable employees to perform their tasks more effectively, which improves their capacity to make smart judgments that promote hotel environmental IT performance.

Furthermore, the study emphasizes the necessity of boosting employee awareness about the most effective use of environmentally friendly technical resources, such as digital recycling, rather than relying entirely on technological solutions (Yusliza et al., 2015; Molla & Cooper, 2014).

Third, the research underlines the importance of aligning hotel human resource management practices with digital transformations to assure sustainability. Green human resource management practices based on sustainability indicators are one of the most effective instruments for achieving actual, measurable results in the IT sector (Jackson et al., 2011). Finally, the study provides solid and practical evidence to assist hotel management in determining the feasibility of investing in technical infrastructure in their hotels from an environmental standpoint, supported by environmentally friendly human resource practices. As a result, our research may motivate hotel managers to adopt a sustainable investment model that takes into account not only economic returns but also the environmental and social impact of technology (Dao et al., 2011; Jenkin et al., 2011). It also creates new measuring indicators that may be used by IT and HR departments to track and assess environmental progress (Loeser et al., 2016; Molla & Cooper, 2014).

LIMITATIONS AND FURTHER RESEARCH

The study focuses solely on the hotel industry in one of the developing countries (Egypt), which may limit the study's findings' applicability to other sectors or countries to check the generality of the proposed model. The survey also focused on Egypt's two most popular tourist destinations, Cairo and Sharm El-Sheikh. Future research should study how the proposed model can be applied across multiple sectors and geographies to improve the findings' generalizability. Moreover, this study examined how green human resource management (GHRM) influences the relationship between IT competences and environmental IT performance. Future research should examine the impact of other variables, such as green leadership

as a mediating or a moderating variable, on enhancing or diminishing this relationship. Other factors, such as green competitive advantage, could be used to substitute the dependent variable, broadening the scope of understanding the strategic significance of human resources in the green transformation of hotel sector.

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