European Journal of Sustainable Development (2024), **13**, 4, 379-398 ISSN: 2239-5938
Doi: 10.14207/ejsd.2024.v13n4p379

The impact of Sustainability Practices on Healthcare Institutions: Evidence from Public Healthcare Institutions in Saudi Arabia

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ABSTRACT:
This article aims to investigate sustainable development practices in hospitals, for three primary reasons: preserving the surrounding environment, impacting sustainability through service provision, and ensuring a safe and environmentally friendly atmosphere. The study addresses the gap in understanding the dimensions and implementation of green practices, offering insights into the green hospitals model. The study figured out eight practices that reflected sustainability activities in the Saudi public hospitals, with their significant impact on sustainable development. The study used descriptive methodology with quantitative technique to collect data pertaining to the impact of green practices on sustainable development in the Saudi public hospitals. A questionnaire survey with valid responses was distributed to 118 members working in the hospitals as (doctors, nurses, and administrators) in April 2024. The PLS-SEM statistical method was used for data analysis. The results of this study revealed a positive relationship between four green transition practices and Sustainable development.

Keywords: Green practices in hospitals, sustainability, Sustainable development, public hospitals, healthcare institutions.

1. Introduction

Several studies have been conducted on the subject of sustainable development which refers to how to meet the needs of current generations without eliminating available resources, or harming the environment, or threatening the ability of future generations to secure the resources they need (Sahoo, 2024) . In 1987, the Brundtland Report introduced the concept of sustainability, describing it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It was also identified when presenting the 2030 Agenda, which aims to achieve 17 sustainable development goals that motivate societies, organizations and countries towards the concept of sustainability (Hajian, 2021). This topic has been addressed from various perspectives, reflecting the entities and institutions that implement it, and consequently, the specific practices of each entity or institution, whether educational, industrial, commercial, or healthcare. This includes the impacts associated with these practices,

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whether economic, environmental, or social. (Vardopoulos, 2021). Out of these 17 sustainable development goals, goal 3 draw attention towards the importance of healthcare sector which includes the increase in budget in healthcare sector, recruitment, training, development and retention of healthcare staff in developing countries to reduce environmental risks, better hospital performance and managing global health risks (Phillips, 2023) . The core aim of the sustainable development goals 2018 is to put efforts in reducing waste generated from the heath sector and to enhance the sustainability performance of the hospitals. The environmental initiatives now cover a vast range of business operations like green marketing, green accounting, green supply chain but all this begins with firms HR who engage hire, select and develop people in relation to green initiatives, therefore green HRM arise as a leading novel concept(Khan, 2024). The originality and value of this study is derived from the fact that it addresses the impact of green transition practices on sustainable development. Moreover, it is considered as the first study to be conducted in Saudi public hospitals. According to best knowledge of the authors. Furthermore, the findings of the study will support sustainability and green practices in healthcare institutions in Saudi Arabia.

2. Literature review

The last few decades have witnessed extensive debate on the sustainable development and environmental sustainability issues. The terms sustainable development SD and environment are used interchangeably in a way that one can say people and organizations are concerned about how can development be sustained? And how can sustainable be achieved? Sustainable development means "development that can be continued either indefinitely or for the implicit time period of concern" (Lélé,1991). Indeed meeting the present needs without compromising the rights and ability of future generations to meet their own needs.In this article some practices of sustainable development in the healthcare sector is examined as crucial aspect of promoting environmental and social responsibility within the healthcare community. By integrating sustainable practices into hospital operations, healthcare facilities one can expect that there should be a reduction in the negative environmental impact, promotion of public health, and ensuring of long-term viability. (Griffiths, 2006). The authors conducted this study in Saudi Arabia, with the focus on sustainable development issues in hospitals as the government and healthcare providers recognize the importance of reducing energy consumption, minimizing waste, and promoting public health seriously. Through the implementation of green building practices, adoption of renewable energy sources and the development of efficient waste management systems, the hospitals in Saudi Arabia have seen significant progresses towards sustainable development (Alshuwaikhat, 2017). Huge efforts are being made to incorporate sustainable healthcare practices in regard to the patient care, employee well-being, community involvement, preserving infrastructure of Saudi hospitals, supporting the general health and welfare of the populace by applying preventative care, encouraging healthy lifestyles, and investing in the well-being of healthcare professionals (Cruz, 2018) (Albathi, 2023). In this study some relevant literature pertaining to the sustainability practices such as waste management, energy efficiency,

rationalization of water use, environmental design, cost and resource management, quality of services provision, community interaction and participation, sustainable recruitment, and training may explained and as follows:

2.1 Waste Management (WM)

This study highlighted several important issues such as improving the waste management, and as it has been seen from the results of this study there is a significant relationship between sustainable development and Waste Management and this finding is consistent with the study of Karani (2007) on waste management and sustainable development in South Africa. The findings of the study asserted that the waste management is considered as one of the emerging key factor for sustainable development in South Africa. Moreover, sustainability in healthcare sector involves the concept of 'greening' with special attention to energy.

2.2 Energy Efficiency (EE)

A significant relationship between energy efficiency and sustainable development was found positive in our present study and this result is a lined with the study of Feng etal; (2019) which showed an average overall efficiencies of energy and non-energy in European Union (EU) countries were higher than in non-EU countries, however an overall efficiency of 1 in all four years (2010 to 2014) was achieved by Malta which is EU country and Saudi Arabia, Brunei, Japan, Iceland, Singapore, and United States which are non-EU countries.

2.3 Rationalization of Water Use

It is indicated that the practices related to rationalization of water use do not have significant association with sustainable development hence, this result is compatible with the study of Rasul (2016) that revealed that the free water and subsidized electricity have not only encouraged misused of resources, but also led to under-investment and underdevelopment in water and energy-saving technologies and approaches.

2.4 Environmental design (ED)

Designing and constructing hospitals to achieve sustainable development has gained increasing attention worldwide, including in Saudi Arabia (Rahman, 2021). Green hospital design focuses on various aspects related to hospital design, such as the use of energy-efficient systems, renewable energy sources, and sustainable materials (Silva, 2023), which are increasingly prevalent in the construction and operation of hospitals in the country. Additionally, integrating natural elements, such as green spaces and abundant natural light, not only contributes to providing a healthier environment for patients and staff but also helps reduce the overall energy consumption of the facility (de Oliveira, 2021). Moreover, integrating advanced waste management systems and water conservation measures is a key focus in the development of green hospitals, aligning with the country's commitment to environmental sustainability (Chisholm, 2021).

In Saudi Arabia, the healthcare sector is striving to reduce its environmental impact while improving patient care (Amran, 2020). The emphasis on and consideration of these aspects are often seen as a positive step towards environmental sustainability, although some critics argue that implementing these sustainable practices can significantly increase the initial construction and operational costs of hospitals (Klaic, 2022). They point out that using energy-efficient systems, renewable energy sources, and sustainable materials often requires a higher upfront investment, which may not be financially feasible for many healthcare institutions, especially in countries where significant financial constraints exist in the healthcare sector. However, the benefits of designing green hospitals in Saudi Arabia outweigh the challenges (AlBrakat, 2023). This paper aims to explore sustainable recruitment practices in hospitals in the Kingdom of Saudi Arabia. To achieve this, a set of questions was formulated in the survey directed to healthcare workers in the Saudi sector, addressing the sustainability related to the Environmental design.

2.5 Cost and resources Management (CRM)

In healthcare management, managing costs and resources within hospitals is vital to ensuring high-quality patient care while maintaining financial sustainability (Dion, 2023). This involves allocating resources effectively. From financial planning and budgeting to purchasing and use of medical supplies and equipment, contributing to the overall success and viability of hospitals in fulfilling their mission of providing high-quality healthcare services (Hussain, 2023). Managing costs and resources in hospitals and providing self-sufficient resources is a key challenge facing healthcare institutions worldwide, playing a vital role in achieving financial sustainability and delivering quality healthcare to patients. Managing costs and resources in hospitals requires attention to several important aspects (Ravaghi, 2018).

Managing costs and resources in hospitals requires attention to several basic aspects that must be considered accurately and effectively, especially since health organizations face pressure to reduce costs and improve the quality of performance (Hussain, 2023). First, officials in this field must estimate the financial costs associated with providing health care services, including wage costs, medical and operational equipment costs, as well as the costs of drugs and other medical supplies. In addition, the costs of maintenance and continuous modernization of medical infrastructure and equipment must be taken into account (Ravaghi, 2018). Second, resources should be directed efficiently and effectively according to the hospital's actual needs, by developing resource allocation strategies based on current demand and clinical priorities (Roth, 1995). Third, inventory management processes must be improved to meet demand while limiting overstocking or shortages (Abu Zwaida, 2021). Fourth, technology must be invested in managing costs and resources, through developing health information management systems and using analytics to improve operational efficiency and identify areas for improvement. Finally, providing self-sufficiency resources for hospitals requires developing thoughtful strategies to achieve financial sustainability, by providing health care services at affordable prices, diversifying sources of income such as establishing partnerships with the private sector, in addition to investing in renewable energy technology to achieve self-sufficiency, reduce energy costs, and enhance environmental sustainability (Chaudhry, 2006).

In general, managing costs and resources in hospitals requires estimating financial expenditures, improving resource allocation, improving inventory management, and developing strategies to achieve financial sustainability. This paper aims to explore sustainable Cost and resources Management practices in hospitals in the Kingdom of Saudi Arabia. To achieve this, a set of questions was formulated in the survey directed to healthcare workers in the Saudi sector, addressing the sustainability related to Cost and resources Management.

2.6 Quality of Services Provision: (QOSP)

Although the results of the study confirmed the existence of significant relationship between quality of services provision and sustainable development in healthcare institutions in Saudi Arabia, the study of Rahman abs Al-Borie (2021) concluded that there is a need to improve service delivery by building cooperation and coordination among different services providers and other stakeholders in Saudi Arabia.

2.7 Community interaction and participations (CIP)

Community interaction and participation in hospitals is a topic that addresses the importance of local community engagement with contemporary healthcare institutions and their involvement in their operations and decisions (Chauhan, 2021), and also can serve as an excellent source of ideas and measures in a timely manner. This interaction is an essential part of developing and improving healthcare services, as the local community can effectively contribute to identifying their needs and guiding local health policies. This greatly depends on what programs and activities the hospital offers to encourage community participation and whether there are educational or awareness programs provided by the hospital to enhance communication with the local community (Tambo, 2021).

Forms of community interaction and participation in hospitals include participating in decision-making processes, engaging in health awareness programs, volunteering in healthcare activities, and providing community support for patients and their families (Meagher-Stewart, 2012). For example, the local public can participate in hospital board meetings or advisory committees to provide their opinions and guide local health policies in line with their needs, or even through hospital electronic platforms that allow the community to provide feedback or suggestions regarding hospital services and also to assess the hospital's response to this feedback (Djalante, 2020). Also Community interaction and participation in hospitals are considered effective mechanisms for building trust between the community and healthcare institutions, as well as improving the quality of services provided and increasing transparency and accountability (Gilson, 2003) (Vian, 2020). Therefore, promoting this interaction can lead to improvements in public health and enhance local healthcare. To achieve this, a set of questions was formulated in the survey directed to healthcare workers in the Saudi sector, addressing the sustainability aspect in the Community interaction and participations.

2.8 Sustainable recruitment and training (SRT)

In recent years, the concept of sustainability has gained significant attention across various industries, including healthcare. Consequently, sustainable recruitment practices in hospitals have emerged as a crucial aspect in promoting long-term viability and environmental awareness within the healthcare sector. The recruitment process and procedures in hospitals are characterized by a set of factors related to safety from infectious diseases and risks due to the unique nature of work in the healthcare field. Among the distinguishing factors of recruitment in hospitals in this regard is the need for special training in occupational safety and health, handling techniques of hazardous materials, infection prevention, and control of infectious diseases, so that employees are better prepared to face health risks and infection control (Mousa, 2020). Hospitals are considered sensitive environments for the transmission of infections, hence strict measures are implemented to control infections and prevent the spread of infectious diseases, making the work environment safer for employees (Haque, 2020). Additionally, proper use of protective equipment such as masks, gloves, and protective clothing is emphasized in hospitals, enhancing the personal safety of employees and protecting them from health risks. green recruitment includes the process of recruiting new candidates who are aware of sustainable process, environmental system and familiar with terms of conservation and sustainable environment (Bangwal, 2015) Green recruitment and selection is process of attracting and selecting candidates that have an interest in environmental concerns and are committed to resolving the issues related to the environment including workplace environment (Saeed, 2020). The study of Guerci et al., confirmed that the good green position is in the organization is positively associated with the attraction of candidates for the job (Guerci, 2015). The function of green training is centered on the idea of developing skills, knowledge and attitudes of employees who are environmentally friendly. In other words it refers to a system of environmental protection activities and putting in consideration the environmental problems while achieving the organization's environmental goals (Jabbour, 2015).This paper aims to explore sustainable recruitment practices in hospitals in the Kingdom of Saudi Arabia. To achieve this, a set of questions was formulated in the survey directed to healthcare workers in the Saudi sector, addressing the sustainability aspect in the recruitment and training process.

3. Hypotheses of the study

To fulfill the main purpose, of this study at Saudi hospitals the following hypotheses are formulated:

H1: There is a significant effect of green sustainable practices on sustainable development at Saudi hospitals.

This hypothesis is divided into eight sub-hypotheses based on of green transition practices and as follow:

H1-A: Waste Management (WM) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-B: Energy Efficiency (EE) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-C: Rationalization of Water Use (RWU) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-D: Environmental Design (ED) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-E: Cost and Resource Management: (CRM) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-F: Quality of Services Provision: (QOSP) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-G: Community Interaction and Participation: (CIP) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

H1-H: Sustainable recruitment and Training: (SRT) is one of green sustainable practices that have an impact on the sustainable development at Saudi hospitals.

4. Methodology

The study used Descriptive, methodology to investigate the basic knowledge of sustainable practices, and sustainable development that are related to the problem and variables of this study. This study employed the quantitative technique, questionnaire tool, to collect data about the influence of green practices of sustainable development in Saudi public hospitals. The questionnaire was adopted as a result of extensive review of relevant literature. Finally, Partial Least Squares tool (PLS-SEM) was used to analyze the data resulted from the survey.

5. Study Population and Sample

According to (Hair, Black, Babin, & Anderson, 2010), choosing the appropriate sample size requires careful evaluation of the nature of the data analysis. There is a direction in this study to use PLS-SEM, notably from a procedural and empirical point view. PLS-SEM is fit to be used as it is thought to be able to handle lesser sample sizes (Marcoulides& Saunders, 2006). The study questionnaire targeted Saudi public hospitals sample (doctors, nurses and the managerial positions). It measured the relationship between eight independent variables, green sustainable practices (Waste Management, Energy Efficiency, Rationalization of Water Use, Environmental Design, Cost and Resource Management, Quality of Services Provision, Community Interaction and Participation, Sustainable recruitment and Training) and the dependent variable, which is sustainable development. There is a maximum of eight arrows pointing at a single variable, to realize a Statistical Power of 80% for R2 values at least 0.25 (with a 5%Probability of Error.

6. Data collection

A survey comprising of a structured questionnaire was utilized for data collection as it is the optimum method available to investigate the perceptions of Saudi hospitals employees in regards to green transition practices within the Saudi public hospitals. The

questionnaire was launched on first of Jan, 2024 for two months. To assess validity of content, the items of questionnaire were reviewed by experts and pre-test was conducted. Their suggestions have been taken in consideration to modify the items. All constructs were measured using multi-item, 5-point Likert-type scales anchored from '1'= strongly disagree to '5'= strongly agree.

7. Data analysis and Findings

Initially, the Descriptive Statistics were performed in order to expose the main feature of the data in this study. At that point, the data were explored for missing values, Outliers, Normality Distribution, and Data Errors. It is obvious from this analysis that the distribution of data might be non-normal, but there no missing or Duplicate Cases were found, and also, there is no sharp deviations between mean and trimmed mean for all variables in this study. In this study, all questionnaires were distributed handle and electronically. Moreover, respondents were shortly informed about the objectives of the study by attaching a letter to the questionnaire to explain the objectives of the study, According to (Field, 2009), the researcher did not assume a big effect of Outliers in advance.

Otherwise, PLS-SEM is robust for Non-normal Distributions, so the researchers did not make any attempt to transform data to meet the Normality assumption. On another hand, the researcher runs the Bootstrapping technique at Smart PLS, by generating 5000 samples to approximate the Normality of data. This procedure will be illustrated in detail at the next section to meet the requirement of assessing the Structural Model at PLS-SEM. (Hair J. J., Hult, Ringle, &Sarstedt, 2014)

Following the guidelines of (Hair, Black, Babin, & Anderson, 2010), the initially proposed model was evaluated through Measurement and Structural Model Analysis.

7.1 Assessment of the Measurement Model

It refers to the systematic approach to validate the measurement model by evaluating its Reliability and Validity as follows:

7.2 Evaluating the Reliability of Measurement Model

In this study three iterations were made to assess the Reliability of Measurement Model to achieve satisfactory measurement values for Cronbach alpha's, Composite Reliability, and AVE. PLS Algorithm should be performed again by discarding weak indicators RWU11, CRM16, QOSP18, QOSP21, and SD33 to reach to 0.707 thresholds of Factor Loading as shown in Table 1, and Figure 1.

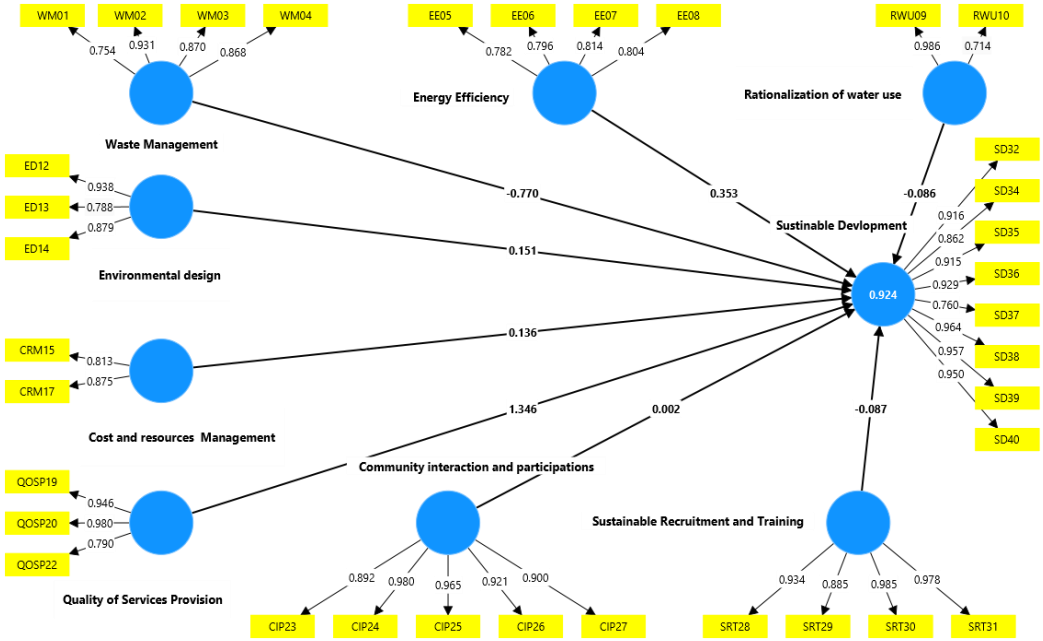

Figure 1: The Measurement Model
Source :Outputs of Smart PLS 4.0

Table 1: Validity and reliability of measurement model

Var.	Ind.	Loadings	Cronbach's alpha	Composite Reliability (rho-c)	(AVE)
Waste Management	WM01	0.931	0.878	0.917	0.736
	WM02	0.870			
	WM03	0.868			
	WM04	0.754			
Energy Efficiency	EE05	0.782	0.821	0.876	0.638
	EE06	0.796			
	EE07	0.814			
	EE08	0.804			
Rationalization of Water Use	RWU09	0.986	0.739	0.848	0.741
	RWU10	0.714			
Environmental Design	ED12	0.938	0.837	0.903	0.758
	ED13	0.788			
	ED14	0.879			
Cost and Resource Management	CRM15	0.931	0.600	0.832	0.713
	CRM17	0.970			
Quality of Services Provision	QOSP19	0.946	0.893	0.934	0.826
	QOSP20	0.980			

Var.	Ind.	Loadings	Cronbach's alpha	Composite Reliability (rho-c)	(AVE)
	QOSP22	0.790			
Community Interaction and Participation	CIP23	0.892	0.970	0.971	0.869
	CIP24	0.980			
	CIP25	0.965			
	CIP26	0.921			
	CIP27	0.900			
Sustainable recruitment and Training	SRT28	0.934	0.961	0.972	0.895
	SRT29	0.885			
	SRT30	0.985			
	SRT31	0.978			
Sustainable Development	SD32	0.916	0.969	0.974	0.826
	SD34	0.862			
	SD36	0.915			
	SD37	0.929			
	SD38	0.760			
	SD39	0.964			
	SD40	0.957			
	SD40	0.950			

Source: Outputs of Smart PLS 4.0

The data of Table 1, and Figure 1show that all AVE values of the variables and indicators are exceeded the required value 0.5, all variables have the Composite Reliability values, and Cronbach's Alpha above 0.7, and indicator loadings are above 0.707 thresholds. Subsequently, the Indicator Reliability, Composite Reliability, and Convergent Validity of the Measurement Model are approved. Once the iteration process completed, the final Measurement Model should be checked for Discriminant Validity based on Fornell-Larcker Criterion, and Cross Loading values generated from the Third Iteration.

7.3 Evaluating the Validity of Measurement Model

The Discriminant Validity means that the indicators forming up a variable should be distinguished from indicators of another variable. According to (Hair J. J., Hult, Ringle, & Sarstedt, 2014), it is calculated by using Fornell-Larcker Criterion which is based on the square root of AVE should be much larger than the correlations of the variable to all the other variables.

Table 2: Test result of Fornell-Larcker Criterion

	IP	RM	E	D	OSP	WU	RT	D	M
IP	.932								
RM	.434	.865							

E	.491	.770	.799						
D	.166	.671	.648	.870					
OSP	.275	.819	.560	.770	.909				
WU	.803	.434	.354	.079	.231	.861			
RT	.217	.389	.611	.839	.865	.127	.946		
D	.289	.756	.580	.736	.919	.151	.831	.909	
M	.329	.803	.810	.821	.871	.298	.797	.764	.858

Source: Outputs of Smart PLS 4.0

Table 2 shows the correlations among variables and the square root of AVE value for each variable on the diagonal and BLUE cells. The square root of AVE value for each variable is greater than the correlation between a selected variable and all others. Accordingly, the Discriminant Validity of the Measurement Model is confirmed

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7.4 Assessment of the Structural Model

The Structural Model applies structural theory by specifying which variables are related to each other and the nature of the relationship. These relationships can be expressed as regression coefficients. The results of this model fit allow us to contrast theory against reality in terms of the data collected from the target population. For testing the structural theory, structural parameter estimates should be statistically significant in the predicted direction. The next stages of validating the Structural Model were performed in the following order: (Hair, Black, Babin, & Anderson, 2010).

7.5 Assessing the significance and relevance of the model relationships

The Path Coefficients test was conducted to test the hypothesized relationships. As suggested by (Kwong & Wong, 2013), and (Hair J. J., Hult, Ringle, &Sarstedt, 2014),in this study, the Bootstrapping generated 5000 samples and these samples are used to compute t-values at significance level= 5% with test type two-tailed. InTable3, and Figure 2 below, the Path Coefficients, as well as their respective t-values, are provided.

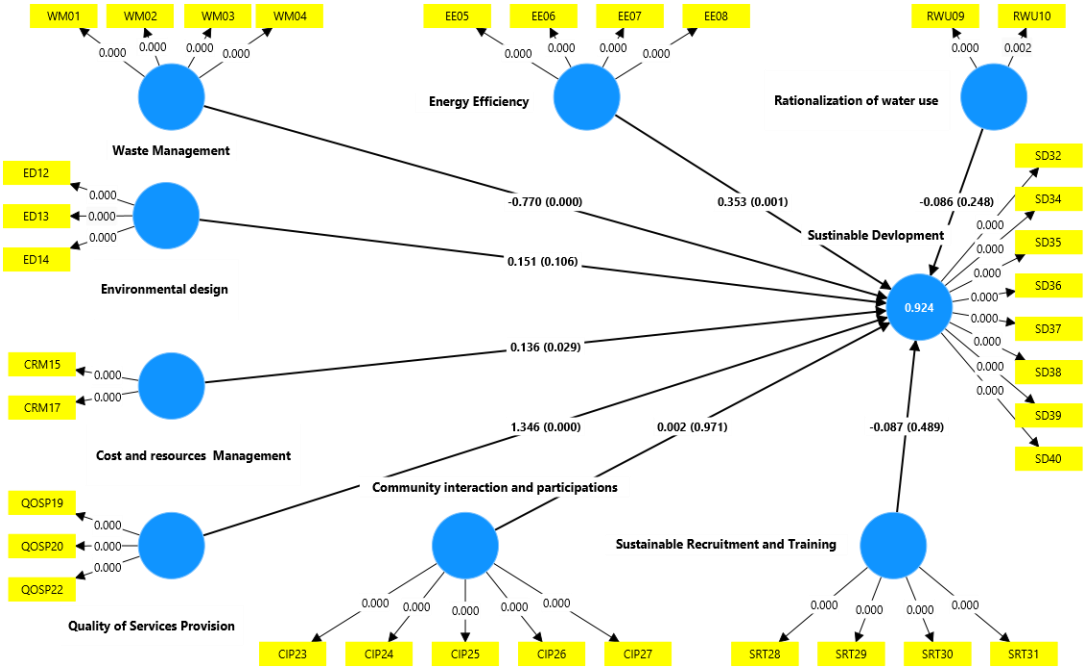

Figure 2: PLS Bootstrapping (t-values) for the study model
Source :Outputs of Smart PLS 4.0

Table 3: Hypothesis Testing

Path	Hypothesis	Direct Effect				
		Confidence Interval 95% 2.5%	97.5%	t	P Value	Hypothesis Supported
WM→SD	$H_{1\text{-}A}$	-1.012	-0.378	4.728	0.000	Supported
EE→SD	$H_{1\text{-}B}$	0.107	0.531	3.264	0.001	Supported
RWU→SD	$H_{1\text{-}C}$	-0.265	0.041	1.155	0.248	Not Supported
ED→SD	$H_{1\text{-}D}$	0.001	0.373	1.619	0.106	Not Supported
CRM→SD	$H_{1\text{-}E}$	0.033	0.279	2.188	0.029	Supported
QOSP→SD	$H_{1\text{-}F}$	1.140	1.572	12.273	0.000	Supported
CIP→SD	$H_{1\text{-}G}$	-0.126	0.131	0.037	0.971	Not Supported
SRT→SD	$H_{1\text{-}H}$	-0.418	0.085	0.692	0.489	Not Supported

Source: Outputs of Smart PLS 4.0

As shown in Table 3, and Figure 2, all Path Coefficients of the sample of this study are significant except path of H1-C, H1-D, H1-G, and H1-H, the Bootstrapping results confirmed that all Path Coefficients are significant; the t-statistics for each path are larger than 1.96 at 5% significance level. As presented in Table 3 and Fig. 2, a positive relationship among Sustainable development and green transition practices with four of its components is concluded. In H1-A, results revealed that the proposed relationship between Sustainable development and sub-hypotheses of green transition practices (Waste Management) H1-A was supported (t-Statistics = 4.728, p=0.000) because t-statistic is greater than 1.96 and P-Value is less than 0.05. Furthermore, we observed a significant relationship between Sustainable development and sub-hypotheses of green transition practices (Energy Efficiency).H1-B was supported (t-Statistics = 3.264, p=0.000) because t-statistic is greater than 1.96 and P-Value is less than 0.05. Moreover, when testing Hypothesis H1-C, this study found there is no significant association between Sustainable development and Renewable Energy (t-Statistics = 1.155, p = 0.248) because t-statistic is equal to 1.155. It indicates that the practice, related to Rationalization of Water Use does not have significant association with Sustainable development. Therefore, hypothesis H1-C is not supported. As was the case in the previous hypothesis, this hypothesis was also not supported also, this study found there is no significant association between Sustainable development and Environmental Design (t-Statistics = 1.619, p = 0.106) because t-statistic is equal to 1.106. It indicates that Environmental Design does not have significant association with Sustainable development. Therefore, hypothesis H1-D is not supported, while H1-E, results revealed that the proposed relationship between Sustainable development and sub-hypotheses of green transition practices (Cost and Resource Management) H1-E was supported (t-Statistics = 2.188, p=0.029) because t-statistic is greater than 1.96 and P-Value is less than 0.05. Furthermore, we observed a very high significant relationship between Sustainable development and sub-hypotheses of green transition practices (Quality of Services Provision).H1-F was supported (t-Statistics = 12.273, p=0.000) because t-statistic is greater than 1.96 and P-Value=0.000. While testing Hypothesis H1-G, this study found there is no significant association between Sustainable development and Community Interaction and Participation (t-Statistics = 0.037, p = 0.971) because t-statistic is equal to 0.037. It indicates that Community Interaction and Participation does not have significant association with Sustainable development. Therefore, hypothesis H1-G is not supported. It is worth noting here, that the lack of stable plans and partnership agreements may delay the impact of community participation on sustainability in the healthcare institutions. The most relevant ways to engage communities effectively and to enhance their role in promoting sustainable practices in healthcare institutions are creating education and communication strategies, empowering the role of community leaders, increasing community members to achieve shared goals, evaluating and adjusting to changing contexts, pre-planning and preparedness for future emergencies and acknowledgement of historic context. Also hypothesis H1-H was not supported, this study found there is no significant association between Sustainable development and Sustainable recruitment and Training (t-Statistics = 0.692, p = 0.489) because t-statistic is equal to 0.692. It indicates that Sustainable recruitment and Training does not have significant association with Sustainable development. Therefore, hypothesis H1-D is not supported.

7.6 Coefficient of Determination R2

The Coefficient of Determination or R2 provides an indication of the predictive accuracy of the model. It is calculated as the squared correlation between a specific endogenous variable's actual and predicted values.(Hair J. J., Hult, Ringle, &Sarstedt, 2014). The out pus of Smart PLS indicated that R2 of study model equal 0.924, it is obvious that study model is capable of explaining the variance at independent variable hence; it has a high predictive accuracy.

7.7 EffectSizeF2

In examining the strength and impact of exogenous latent variable on endogenous latent variable, the effect size (F2) can be implemented. Based on the value obtained for effect size, values higher than 0.02, 0.15 and 0.35 would represent small, medium and large effect sizes respectively (Garson 2016). The following table show Effect size F2of each dependent variable on independent variable:

Table 4: Effect Size F^2

Dependent variable → Independent variable	Sustainable Development
CIP→SD	0.000
CRM→SD	0.127
EE→SD	0.234
ED→SD	0.062
QOSP→SD	2.317
RWU→SD	0.028
SRT→SD	0.016
WP→SD	0.511

Source: Outputs of Smart PLS 4.0

With this, Quality of Services Provision, Waste Management has a large effect size on Sustainable Development (f2=2.317, 0.511) respectively. The Quality of Services Provision gave the largest effect size with a value of (f2=2.317). On the other hand, the Cost and Resource Management has a medium effect size on Sustainable Development (f2=0.127), and the Rationalization of Water Use has a small effect size on Sustainable Development (f2=0.02).

7.8 Goodness of Fit (GOF)

It measures the extent to which the standard and structural model of the study can be relied upon and can be calculated mathematically by combining both according to the following equation:

$$GOF = \sqrt{R^2 \times AVE} = \sqrt{0.924 \times 0.778} = 0.843.$$

By applying the equation, we find that the Goodness of Fit (GOF) of the study model reached 0.843, which is higher than the required minimum, which is 0.404, which is a high value indicating that the model is suitable for the study.

8. Discussion

This study highlighted several important issues such as improving the waste management, and as it has been seen from the results of this study there is a significant relationship between sustainable development and Waste Management and this finding is consistent with the study of Karani and Jewasikiewitz (2007) on waste management and sustainable development in South Africa. The findings of the study asserted that the waste management is considered as one of the emerging key factor for sustainable development in South Africa. Moreover, sustainability in healthcare sector involves the concept of 'greening' with special attention to energy.

The crucial role of waste management strategies (WMS) is to minimize waste and as mentioned earlier the routine activities of healthcare institutions can contribute to contamination and environmental hazard. According to the Waste hierarchy set out by European Commission in a priority order the waste strategies for sustainable development include prevention, reuse, recycling, and recovery and disposal. The prevention strategy decreases the size of waste and its negative effect connected with waste, and enhances efficiency use of resources, the success of this strategy demands consumption and production patterns changes (Amutenya etal., 2009). Obviously he selection of long life-span products and reuse of items goods for relatively long life-span can reduce the amount of waste directed to landfills or baskets. Recycling is the most famous strategy to make healthcare institution more sustainable. It involves specific steps such as separation of gathered waste and convert the waste into useable materials/product or extracting energy. Disposal is final strategy in sustaining the environment however a certain proportion of the waste can be prevented, reused, recycled so simply it be classified as disposal as a part of sustainable development principle (Wan etal., 2019). In this context a significant relationship between sustainable development and energy efficiency is found in our present study and this finding is a lined with the study of Feng etal; (2019) showed the average overall efficiencies of energy and non-energy in European Union (EU) countries were higher than in non-EU countries, however an overall efficiency of 1 in all four years (2010 to 2014) was achieved by Malta which is EU country and Saudi Arabia, Brunei, Japan, Iceland, Singapore, and United States which are non-EU countries. The technological interventions can reduce environmental degradation by mitigating the amount of energy demanded for industry by rising the quantity of cleaner sources of energy Also, other key challenges related with increasing energy consumption such climate change, GHG emissions, and confronted different organizations including healthcare institution. Can be resolved through technological interventions alone (Foster 2001).The behavioral aspect is very important element in energy conservation particularly in healthcare institutions. Human behavior plays an important role in long-run changes in consumption pattern including energy consumption for buildings and hardware (Lutzenhiser, 1993). Regarding the link between sustainable development and renewable energy the results showed negative relationship between the two variables and this finding

is in line with study of Al Shammre (2024) that said renewable energy consumption has a negative but insignificant effect on sustainable development in the Kingdom of Saudi Arabia and this point our study argue the Saudi government policymakers to reform the country's renewable energy efficiency technologies in order to reduce energy waste and achieve the goals of sustainable development. It is indicated that the practice related to rationalization of water use does not have significant association with sustainable development in this study and this result is compatible with the study of Rasul (2016) that revealed that the free water and subsidized electricity have not only encouraged misused of resources, but also led to under-investment and underdevelopment in water and energy-saving technologies and approaches. There is no significant association between Sustainable development and Environmental Design in our study finding and statically (t-Statistics = 1.619, p = 0.106). A similar study of Jobran (2015) showed results of the quantitative data analysis that firstly identified mosques; staff breaks areas, cafeterias, and women and visitors waiting rooms as important design aspects in hospitals. Secondly the mean scores ascribed by respondents who worked in hospitals with no places of respite were higher than the mean scores of the participants who worked in hospitals with places of respite. Results our study revealed that there is proposed relationship between Sustainable development and cost and resources management and this result may be well understood if we look at the Saudi Arabia vision 2030. In this new vision the government was pledged to continue its development and modernization of health infrastructure and services. Overall, the government is required to improve the governance of the health sector through resources and cost management in order to extend the same to other sectors that will enhance state capacity (Rahman and Qattan, 2021). In order to develop a set of strategies related to cost management in the healthcare sector, we propose several focal points for how efficient resource allocation and financial planning can bolster sustainability in healthcare. Efficient allocation of resources is critical for minimizing waste and optimizing the use of available assets. This involves prioritizing resource distribution based on healthcare demands, patient needs, and clinical priorities. Implementing data-driven decision-making processes can further ensure that resources are utilized where they are most needed, thereby improving operational efficiency. Robust financial planning is essential for achieving long-term sustainability. This includes developing comprehensive budgeting strategies that account for both immediate and future financial requirements. Transparent financial management practices can help healthcare institutions track expenditures, reduce unnecessary costs, and allocate funds effectively to support sustainable initiatives. Future research could explore innovative strategies such as adopting environmentally friendly procurement policies that prioritize sustainable products and services to reduce the environmental impact and promote economic sustainability. Investing in energy-efficient technologies and infrastructure can lead to significant cost savings and reduce the carbon footprint of healthcare facilities. Implementing comprehensive waste reduction and recycling programs can lower disposal costs and contribute to environmental sustainability. Utilizing advanced technologies such as healthcare information systems, predictive analytics, and automated resource management tools can streamline operations, improve accuracy in resource allocation, and enhance overall financial planning. Technology-driven solutions can also facilitate better monitoring and reporting of sustainability metrics. Engaging stakeholders, including

healthcare professionals, patients, and policymakers, in the planning and implementation of sustainable practices can foster a collaborative approach to sustainability, leading to the development of policies and practices that are economically viable and environmentally responsible. Although the results of the study confirmed the existence of significant relationship between quality of services provision and sustainable development in healthcare institutions in Saudi Arabia, The study by Rahman and Al-Borie (2021) concluded that there is a need to improve service delivery by building cooperation and coordination among different service providers and other stakeholders in Saudi Arabia. In response, researchers propose several focal points and mechanisms for how efficient resource allocation and financial planning can bolster sustainability in healthcare. Efficient allocation of resources is critical for minimizing waste and optimizing the use of available assets. This involves prioritizing resource distribution based on healthcare demands, patient needs, and clinical priorities. Implementing data-driven decision-making processes can further ensure that resources are utilized where they are most needed, thereby improving operational efficiency. Robust financial planning is essential for achieving long-term sustainability. This includes developing comprehensive budgeting strategies that account for both immediate and future financial requirements. Transparent financial management practices can help healthcare institutions track expenditures, reduce unnecessary costs, and allocate funds effectively to support sustainable initiatives. Future research could explore innovative strategies such as adopting environmentally friendly procurement policies that prioritize sustainable products and services to reduce the environmental impact and promote economic sustainability. Investing in energy-efficient technologies and infrastructure can lead to significant cost savings and reduce the carbon footprint of healthcare facilities. Implementing comprehensive waste reduction and recycling programs can lower disposal costs and contribute to environmental sustainability. Utilizing advanced technologies such as healthcare information systems, predictive analytics, and automated resource management tools can streamline operations, improve accuracy in resource allocation, and enhance overall financial planning. Technology-driven solutions can also facilitate better monitoring and reporting of sustainability metrics. Engaging stakeholders, including healthcare professionals, patients, and policymakers, in the planning and implementation of sustainable practices can foster a collaborative approach to sustainability, leading to the development of policies and practices that are economically viable and environmentally responsible. On the other hand the present study demonstrated that there is no significant association between community interaction and participation and sustainable development. This result according to the author's points of view is due to the lack of standardized plans, partnerships agreements, and monitoring processes that enhance the role of local community interaction and participation on hospital sustainable development. Finally the study found that there is no significant association between recruitment and training and sustainable development. This result is in line with the study of Chowdhury (2021) which confirmed the existence of significant capacity and skill gaps in the workforce, especially among Saudi employees. Al-Hanawi et al. (2019) highlighted the shortage of trained healthcare professionals in Saudi healthcare institutions and their heavy reliance on foreign workers. Addressing this issue requires enhancing local workforce training through several strategic initiatives: increasing investment in healthcare education, expanding medical and nursing schools, offering

scholarships, and developing specialized training programs that meet international standards. Establishing partnerships with international medical institutions can facilitate knowledge transfer and capacity building, while implementing attractive incentive structures can help retain local talent. Continuous professional development through workshops, seminars, and certification courses is essential. Additionally, government policies should focus on reducing dependency on foreign workers by creating a supportive environment for local professionals, streamlining recruitment processes, recognizing foreign qualifications, and ensuring adequate working conditions.. This finding make us to argue healthcare policymakers to consider the application of appropriate Human Resources Development (HRD) in the healthcare institutions to promote the capacity building needs of employees along the policy regulation.

Acknowledgement

The authors extend their appreciation to the Deanship of Scientific Research at Northern Border University, Arar. KSA for funding this research work "through the project number "NBU-FFR-2024-1291-02".

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