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Evaluating the Sustainable Competitive Advantage of Saudi e-Healthcare System: An Empirical Study

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Study Purpose: This study seeks to investigate the various dimensions contributing to the sustainable competitive advantage of the Saudi eHealthcare system.

Methods: A cross-sectional survey design was adopted in this study. Eleven factors were identified that may affect the sustainable competitive advantage, which were embedded in to the survey questionnaire. Participants included diverse healthcare workers (physicians, specialist physicians, nurses, managers) from Saudi public hospitals. A total of 382 healthcare workers participated in the study.

Results: User experience and accessibility emerged as the most significant factor with a high mean of 4.04 ± 0.69, followed by innovation and continuous improvement (mean 3.8 ± 0.89) and AI adoption (mean 3.91 ± 0.82). Notably, a statistically significant difference is observed in the domain of Data Security and Privacy ($p = 0.0448$), with specialist physicians exhibiting a lower mean score (2.44 ± 0.86) compared to other roles.

Conclusion: The need to strengthen overall competitiveness is emphasized by identified areas for improvement, including data security, interoperability, and integration, which highlight the necessity for specific initiatives.

Keywords: artificial intelligence, eHealth, eHealthcare, sustainable, competitive advantage

Introduction

In a time defined by swift technological progress, incorporating digital solutions into healthcare systems worldwide has become essential for improving efficiency, accessibility, and overall health outcomes. The Kingdom of Saudi Arabia, with its commitment to modernization and innovation, has witnessed a significant evolution in its healthcare landscape.[1,2] The emergence of the Saudi E-Healthcare System stands as a testament to the nation's dedication to leveraging information and communication technologies to optimize healthcare delivery.[3] This study is aimed at evaluating the sustainable competitive advantage of the Saudi E-Healthcare System. As the healthcare sector becomes increasingly dynamic and competitive,[4] the need to assess the long-term viability and effectiveness of digital health initiatives becomes paramount. Sustainable competitive advantage, a concept rooted in strategic management, emphasizes the ability of an organization or system to outperform its rivals consistently over time.[5–7] The Saudi E-Healthcare System, characterized by its technological infrastructure, digital health services, and policy framework, represents a significant investment in the future of healthcare delivery, and has been led by various innovations as a part of Vision 2030 program.[8] This empirical study seeks to investigate the various dimensions contributing to the system's sustainable competitive advantage, examining factors such as technological innovation, regulatory support, user acceptance, and the overall impact on patient outcomes.

The evaluation of the sustainable competitive advantage of the Saudi E-Healthcare System holds paramount importance in guiding informed decision-making and strategic planning within the dynamic healthcare environment. Understanding the system's strengths and weaknesses through empirical analysis allows stakeholders, including policy-makers, healthcare administrators, and technology developers, to identify areas for improvement and leverage competitive advantages effectively. Moreover, this evaluation provides insights into the system's impact on patient outcomes,

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technological innovation, and regulatory support. By systematically assessing these dimensions, the study contributes to the broader discourse on the efficacy of digital health initiatives, informing both academic research and practical advancements in healthcare management. Ultimately, the evaluation serves as a crucial tool for ensuring the continued growth, resilience, and relevance of the Saudi E-Healthcare System in an ever-evolving healthcare landscape.

Literature Review

Sustainable competitive advantage of e-healthcare system is one of the important factors that can be used to assess the value, efficiency, and effectiveness of the system. There are various factors observed in previous studies were used for assessing the sustainable competitive advantage. For instance, the regulatory environment, which refers to the legal and policy framework governing the operation of the e-healthcare system, plays a pivotal role in evaluating the sustainable competitive advantage of an e-healthcare system.[9,10] A supportive and well-defined regulatory framework fosters innovation, ensures compliance, and establishes a secure foundation for the system's growth. It influences the system's adaptability to changing healthcare laws and standards, impacting its long-term viability and competitiveness.

In addition, robust data security and privacy measures are crucial for building and maintaining trust in an e-healthcare system. The effectiveness of encryption protocols, user authentication, and adherence to privacy regulations directly influences the system's competitive advantage. A secure system not only safeguards sensitive health information but also attracts and retains users in an era of increasing data concerns.[11,12] Another factor, interoperability, which is the ability of the e-healthcare system to exchange and use information seamlessly with other healthcare systems, ensuring compatibility and coordination. Integration involves incorporating the system into the broader healthcare infrastructure to streamline workflows.[13–15]

Similarly, a robust technological infrastructure forms the backbone of any e-healthcare system. The system's scalability, reliability, and performance are key factors influencing its long-term competitiveness.[16,17] Regular investments in upgrading and maintaining the technological backbone ensure that the system remains at the forefront of healthcare technology advancements. The ability to innovate and adapt to emerging technologies is critical for maintaining a competitive edge. Continuous improvement initiatives, coupled with a culture of innovation, enable the e-healthcare system to stay ahead of evolving healthcare trends and user expectations, contributing to its sustained competitive advantage.[18–20] Furthermore, the integration and effective utilization of artificial intelligence (AI) in healthcare processes contribute to efficiency, accuracy, and personalized care. The extent to which an e-healthcare system adopts and harnesses AI technologies can significantly impact its competitive advantage by offering advanced diagnostic tools, predictive analytics, and enhanced decision-making capabilities.[21,22]

In addition, seamless health information exchange between different entities within the healthcare ecosystem is essential. The effectiveness of the e-healthcare system in facilitating secure and efficient information exchange directly impacts coordinated care and contributes to improved patient outcomes, thus enhancing its competitive position.[23] Furthermore, the system's capability to manage population health by analyzing and utilizing health data at a broader level is crucial. Effective population health management contributes to preventive care, resource optimization, and overall health improvement, positioning the e-healthcare system as a leader in holistic healthcare delivery.[24,25]

The above discussed factors may affect user experience and accessibility, which are paramount in evaluating the sustainable competitive advantage of an e-healthcare system. An intuitive and user-friendly interface enhances patient and healthcare professional engagement, driving adoption and overall system effectiveness. Accessibility considerations ensure that the benefits of the system are inclusive and reach diverse populations.[26,27] In addition, the effectiveness of training and education programs for users, healthcare professionals, and system administrators is instrumental. Well-designed programs ensure that stakeholders are proficient in utilizing the system's features, maximizing its potential and contributing to sustained competitive advantage.[28–30] Finally, financial sustainability is key to the long-term viability of an e-healthcare system. Efficient resource allocation, revenue generation models, and cost-effectiveness contribute to financial resilience, ensuring the system's ability to adapt and grow amidst evolving healthcare economic landscapes.[31,32]

Methods

A cross-sectional survey design was adopted in this study. The details of study design are presented in following sections.

Study Setting & Participants

Given the context of this study which focuses on sustainability aspect that involves all healthcare management operations, healthcare workers including physicians, specialist physicians, nurses, administrators, and managers were considered for this study. Five public hospitals in Saudi Arabia were selected for the study. All the registered healthcare workers in the respective hospitals, as mentioned above, were included in the study.

Sampling

As the study required healthcare workers in specific, it was imperative that the researchers use a readily accessible sample. Consequently, both purposive and convenience sampling techniques were used in this study, as was customary for comparable research.[33] Purposive sampling was used for selecting participants based on their roles in healthcare institutions; convenience sampling was used to recruit individuals who can be easily accessed, ie, from university and public hospitals. To address the inherent limitations of convenience sampling, such as potential bias and lack of representativeness, several measures were undertaken. First, the sample size was increased to enhance the diversity and representativeness of the participants. Additionally, stratification was applied within the convenience sample to ensure a broader range of demographics and professional roles were included. Statistical techniques were also utilized to adjust for biases that might have arisen from the sampling method. These steps helped to mitigate the shortcomings of convenience sampling, strengthening the study's overall validity and the robustness of its findings.

Questionnaire Design

The questionnaire consists of two sections focusing on demographic information, and various factors that can be used to evaluate sustainable competitive advantage. The first section captures basic demographic data, including age, gender, role, and years of experience. The second section focuses on the various factors including regulatory environment (three items), data security and privacy (three items), interoperability and integration (three items), technological infrastructure (three items), user experience and accessibility (three items), innovation and continuous improvement (three items), health information exchange (three items), population health management (three items), financial sustainability (three items), training and education programs (three items), and AI adoption (three items). These factors were identified from the existing literature.[9–32] A pilot study was undertaken with a sample of four physicians, eight nurses, and two nurses, and subsequent analysis was performed on the collected data. The Cronbach alpha coefficient was computed for all items and found to exceed 0.7 suggesting good internal consistency and reliability.[34]

Data Collection

In order to collect information, a questionnaire survey was designed with Google Forms, and it was distributed online through emails to the healthcare workers. At the end of four weeks (26 Feb 2024 to 24 March 2024) a total of 412 responses were received. Out of the 412 responses, 30 responses were incomplete, and were removed from the data used for analysis. Therefore, a final sample of 382 was considered for data analysis.

Data Analysis

To attain the objectives of the research, the researcher utilized the statistical package for the Social Sciences (SPSS, IBM Version 24) for analyzing the data. Descriptive statistics were used to characterize the participants' demographic data. In addition, two-sample *t*-test with unequal variances, and single factor ANOVA were used for analyzing the data.

Ethics-Related Factors

The study received approval from the research ethics committee at Abdulrahman Bin Faisal University. The data collection and analysis procedure were carried out in compliance with all relevant ethical norms. All details regarding

the investigation's objective and the complete disclosure of the participants' legal rights were provided. Prior to the survey, all respondents provided their informed consent, and participation was entirely voluntary and did not receive any rewards or remuneration.

Results

Table 1 outlines the demographic profile of participants in the study, reflecting a diverse and representative sample. In terms of age, the majority falls within the 18–50 range, with substantial representation in the 18–30 (26.7%), 31–40 (23.3%), and 41–50 (24.1%) groups. Participants aged 51–60 constitute 19.9%, while those above 60 are a smaller proportion at 6.0%. Gender distribution indicates a relatively balanced participation, with 39.0% male and 61.0% female respondents. Regarding professional roles, the study includes physicians (27.2%), nurse managers/staff nurses (54.7%), specialist physicians (9.4%), and administration/managers (8.6%). The distribution of experience levels is fairly even, with participants having 1–3 years (29.6%), 4–6 years (31.2%), 7–9 years (18.6%), and over 9 years (20.7%) of experience. This diverse representation enhances the study's validity by capturing perspectives from various age groups, genders, roles, and experience levels within the healthcare domain.

The results from Table 2 reveal crucial insights into the factors contributing to sustainable competitive advantage in the existing eHealthcare system. Notably, user experience and accessibility emerge as the most significant factor with a high mean of 4.04, indicating a strong competitive advantage. This underscores the importance of prioritizing a seamless and user-friendly interface for stakeholders within the eHealthcare ecosystem. Additionally, innovation and continuous improvement (mean 3.8) and AI adoption (mean 3.91) demonstrate the industry's commitment to staying at the forefront of technological advancements, reinforcing the competitive edge. While regulatory environment (mean 3.78) and financial sustainability (mean 3.72) also score well, there is room for improvement in data security and privacy (mean 2.7) and interoperability and integration (mean 3.24). Addressing these areas would be crucial to bolstering the overall competitive advantage. The standard deviations provide insights into the variability within each factor, emphasizing the need for focused strategies to enhance the eHealthcare system's overall competitiveness.

Table 1 Participants Demographics

Variable	Groups	N	Relative Frequency
Age (in years)	18–30	102	26.7%
	31–40	89	23.3%
	41–50	92	24.1%
	51–60	76	19.9%
	>60	23	6.0%
Gender	Male	149	39.0%
	Female	233	61.0%
Role	Physician	104	27.2%
	Nurse Manager/ Staff Nurse	209	54.7%
	Specialist physician	36	9.4%
	Administration/Manager	33	8.6%
Experience	1–3 years	113	29.6%
	4–6 years	119	31.2%
	7–9 years	71	18.6%
	>9 years	79	20.7%

Table 2 Factors for Evaluating Sustainable Competitive Advantage

Factors	Mean	SD
Regulatory environment	3.78	0.67
Data security and privacy	2.7	0.92
Interoperability and integration	3.24	1.08
Technological infrastructure	3.05	0.86
User experience and accessibility	4.04	0.69
Innovation and continuous improvement	3.8	0.89
Health information exchange,	3.3	1.01
Population health management	3.53	0.95
Financial sustainability	3.72	0.89
Training and education programs	3.15	0.99
AI adoption	3.91	0.82

Abbreviation: SD, Standard deviation.

The ANOVA results in Table 3 offer a nuanced perspective on the perceived differences between participant groups based on their roles in the eHealthcare system. Notably, a statistically significant difference is observed in the domain of Data Security and Privacy ($p = 0.0448$), with physicians exhibiting a lower mean score compared to other roles. This discrepancy highlights potential variations in how different healthcare professionals assess the effectiveness of data security measures. Conversely, in User Experience and Accessibility, although not statistically significant, Admin/Managers stand out with the highest mean score (4.13), indicating a notably positive perception in this aspect.

Table 3 ANOVA Results Assessing Difference Between Participants Perceptions Based on Their Roles

Factors	Roles	Mean	Variance	p-value
Regulatory environment	Physician	3.76	0.48	0.7373
	Specialist physician	3.88	0.43	
	Nurse/Nurse manager	3.79	0.45	
	Admin/Manager	3.71	0.42	
Data security and privacy	Physician	2.58	0.76	0.0448*
	Specialist physician	2.44	0.86	
	Nurse/Nurse manager	2.77	0.86	
	Admin/Manager	2.93	0.87	
Interoperability and integration	Physician	3.21	1.16	0.5727
	Specialist physician	3.44	1.36	
	Nurse/Nurse manager	3.25	1.12	
	Admin/Manager	3.08	1.23	

(*Continued*)

Table 3 (Continued).

Factors	Roles	Mean	Variance	p-value
Technological infrastructure	Physician	3.05	0.73	0.9215
	Specialist physician	3.04	0.65	
	Nurse/Nurse manager	3.08	0.76	
	Admin/Manager	2.97	0.68	
User experience and accessibility	Physician	3.99	0.57	0.7216
	Specialist physician	4.10	0.44	
	Nurse/Nurse manager	4.04	0.46	
	Admin/Manager	4.13	0.35	
Innovation and continuous improvement	Physician	3.79	0.83	0.6452
	Specialist physician	3.93	0.65	
	Nurse/Nurse manager	3.81	0.82	
	Admin/Manager	3.66	0.59	
Health information exchange	Physician	3.38	0.97	0.5612
	Specialist physician	3.09	1.58	
	Nurse/Nurse manager	3.31	0.98	
	Admin/Manager	3.30	1.03	
Population health management	Physician	3.55	0.96	0.9435
	Specialist physician	3.47	0.85	
	Nurse/Nurse manager	3.53	0.93	
	Admin/Manager	3.61	0.59	
Financial sustainability	Physician	3.77	0.83	0.5522
	Specialist physician	3.56	0.79	
	Nurse/Nurse manager	3.74	0.82	
	Admin/Manager	3.62	0.64	
Training and education programs	Physician	3.21	0.95	0.6432
	Specialist physician	2.99	1.64	
	Nurse/Nurse manager	3.17	0.95	
	Admin/Manager	3.05	0.85	
AI adoption	Physician	3.93	0.78	0.6456
	Specialist physician	4.03	0.42	
	Nurse/Nurse manager	3.91	0.68	
	Admin/Manager	3.78	0.67	

Note: * Statistically significant difference.

Interestingly, Training and Education Programs and AI Adoption did not show statistically significant differences among roles, suggesting a consistent perception across diverse healthcare roles in these domains. These findings underscore the importance of tailoring strategies and interventions based on specific roles to enhance the overall effectiveness and acceptance of eHealthcare initiatives.

The ANOVA results in Table 4 shed light on the perceived differences among participants based on their experience levels within the eHealthcare system. Notably, no statistically significant differences are observed in Data Security and Privacy, indicating a consistent perception across varied professional tenures. In User Experience and Accessibility, although not statistically significant, participants with 7–9 years of experience displayed the highest mean score (4.16), hinting at a potentially nuanced perspective with increased professional tenure. In Health Information Exchange, participants with 4–6 years of experience exhibit the highest mean score (3.38), suggesting a positive perception in this tenure group. Financial Sustainability yields a non-significant p-value, yet participants with 7–9 years of experience present the highest mean score (3.89), indicating a potential trend in their favorable perception. Overall, these findings emphasize the need to consider experience levels when tailoring strategies, as subtle variations in perceptions across different factors could impact the successful implementation and acceptance of eHealthcare initiatives.

The *t*-test results presented in Table 5 offer insights into the perceived differences between male and female participants within the eHealthcare system. Across all factors examined, no statistically significant distinctions emerge, suggesting a general consensus in perceptions between the genders. Noteworthy is the lack of significant variance in Regulatory Environment, Data Security and Privacy, User Experience and Accessibility, Innovation and Continuous Improvement, Health Information Exchange, Population Health Management, Financial Sustainability, Training and Education Programs, and AI Adoption. The closely aligned mean scores and non-significant p-values indicate a harmonious perspective between male and female participants on the evaluated aspects of the eHealthcare system.

These findings underscore the potential gender-neutral nature of perceptions within the healthcare professional cohort studied, highlighting the importance of inclusive strategies in the development and implementation of eHealthcare initiatives.

Table 4 ANOVA Results Assessing Difference Between Participants Perceptions Based on Their Experience

Factors	Experience	Mean	Variance	p-value
Regulatory environment	1–3 years	3.81	0.44	0.5923
	4–6 years	3.74	0.44	
	7–9 years	3.73	0.48	
	> 9 years	3.85	0.45	
Data security and privacy	1–3 years	2.71	0.80	0.9048
	4–6 years	2.68	0.94	
	7–9 years	2.67	0.63	
	> 9 years	2.77	0.99	
Interoperability and integration	1–3 years	3.13	1.12	0.2354
	4–6 years	3.17	1.22	
	7–9 years	3.32	1.07	
	> 9 years	3.42	1.19	

(*Continued*)

Table 4 (Continued).

Factors	Experience	Mean	Variance	p-value
Technological infrastructure	1–3 years	2.94	0.59	0.2399
	4–6 years	3.09	0.89	
	7–9 years	3.04	0.66	
	> 9 years	3.19	0.74	
User experience and accessibility	1–3 years	4.06	0.44	0.2344
	4–6 years	4.02	0.55	
	7–9 years	4.16	0.45	
	> 9 years	3.94	0.43	
Innovation and continuous improvement	1–3 years	3.75	0.77	0.3707
	4–6 years	3.75	0.96	
	7–9 years	3.96	0.54	
	> 9 years	3.82	0.77	
Health information exchange	1–3 years	3.30	0.96	0.5365
	4–6 years	3.38	0.97	
	7–9 years	3.33	0.89	
	> 9 years	3.17	1.38	
Population health management	1–3 years	3.44	0.96	0.1772
	4–6 years	3.60	0.93	
	7–9 years	3.70	0.81	
	> 9 years	3.43	0.81	
Financial sustainability	1–3 years	3.67	0.77	0.1289
	4–6 years	3.77	0.93	
	7–9 years	3.89	0.57	
	> 9 years	3.57	0.82	
Training and education programs	1–3 years	3.15	0.87	0.8408
	4–6 years	3.20	0.94	
	7–9 years	3.16	0.92	
	> 9 years	3.07	1.38	
AI adoption	1–3 years	3.82	0.73	0.0908
	4–6 years	3.87	0.85	
	7–9 years	4.13	0.43	
	> 9 years	3.92	0.53	

Table 5 *T*-Test Results Assessing Difference Between Participants Perceptions Based on Their Gender

Factors	Gender	Mean	Variance	p-value
Regulatory environment	Male	3.75	0.44	0.2586
	Female	3.79	0.46	
Data security and privacy	Male	2.66	0.93	0.4395
	Female	2.73	0.80	
Interoperability and integration	Male	3.32	1.23	0.2258
	Female	3.19	1.11	
Technological infrastructure	Male	3.11	0.77	0.3721
	Female	3.03	0.71	
User experience and accessibility	Male	4.01	0.54	0.5325
	Female	4.06	0.43	
Innovation and continuous improvement	Male	3.83	0.75	0.6435
	Female	3.79	0.81	
Health information exchange	Male	3.29	1.16	0.8231
	Female	3.31	0.96	
Population health management	Male	3.54	0.90	0.8971
	Female	3.53	0.90	
Financial sustainability	Male	3.72	0.81	0.9624
	Female	3.72	0.80	
Training and education programs	Male	3.13	1.11	0.71
	Female	3.17	0.93	
AI adoption	Male	3.98	0.68	0.2242
	Female	3.87	0.67	

Discussion

The empirical study on the sustainable competitive advantage of the Saudi E-Healthcare System reveals crucial insights into the factors influencing its performance, effectiveness, and overall competitiveness. The diverse and representative sample of healthcare professionals, including physicians, nurse managers/staff nurses, specialist physicians, and administration/managers, contributes to the generalizability and reliability of the study findings.

The evaluation of factors contributing to sustainable competitive advantage indicates that while the Saudi E-Healthcare System performs well in certain dimensions, there are areas that require strategic attention. User experience and accessibility emerged as a standout factor, with a high mean score of 4.04, emphasizing the significance of a seamless and user-friendly interface for stakeholders in similar to the observations in previous studies.[35–38] Innovation and continuous improvement, along with AI adoption, demonstrate the industry's commitment to staying at the forefront of technological advancements, contributing to sustained competitiveness, which can be related to the various initiatives being taken in eHealth sector as a part of Vision 2030 program.[39–41]

The ANOVA results based on participants' roles offer nuanced insights. While there are no statistically significant differences in many dimensions, a significant difference is observed in Data Security and Privacy. Physicians exhibit a lower mean score in this domain compared to other roles, suggesting potential variations in how healthcare professionals perceive the effectiveness of data security measures. This emphasizes the need for targeted strategies and interventions to address the concerns of different healthcare roles. Similarly, the ANOVA results based on experience levels provide valuable information for tailoring strategies. Although no statistically significant differences are observed in Data Security and Privacy, other factors such as User Experience and Accessibility, Health Information Exchange, and Financial Sustainability exhibit potential trends based on experience levels. These nuanced perceptions highlight the importance of considering the varying needs and expectations of healthcare professionals at different stages of their careers. Recent studies[42–45] have highlighted the issue of data privacy and security as one of the key factors affecting the eHealth adoption. Accordingly, the findings in this study observed that the data privacy and security of the existing ehealthcare system does not significantly support sustainable competitive advantage.

The *t*-test results based on gender reveal a harmonious perspective between male and female participants across all evaluated aspects of the eHealthcare system. The lack of statistically significant differences underscores the potential gender-neutral nature of perceptions within the healthcare professional cohort. This finding is crucial for promoting inclusivity in the development and implementation of eHealthcare initiatives, ensuring that strategies resonate with both male and female perspectives.

Overall, this study contributes to the broader discourse on the efficacy of digital health initiatives and provides actionable insights for stakeholders. Policymakers, healthcare administrators, and technology developers can leverage these findings to identify areas for improvement, enhance overall system effectiveness, and ensure the continued growth and relevance of the Saudi E-Healthcare System. The study serves as a valuable tool for guiding informed decision-making and strategic planning in the ever-evolving landscape of healthcare delivery.

The findings of this study carry significant theoretical implications for the field of e-healthcare and sustainable competitive advantage. The emphasis on user experience and accessibility as a key determinant of sustainable competitive advantage aligns with contemporary theories on technology acceptance and adoption. This underscores the importance of user-centric design and functionality in ensuring the long-term success of e-healthcare systems. Additionally, the study's identification of potential variations in perceptions based on professional roles and experience levels contributes to the evolving discourse on tailoring strategies to address the diverse needs of healthcare professionals. Theoretical frameworks related to organizational behavior and innovation diffusion can be enriched by considering these nuanced perspectives. In addition, this study adds nuance to the understanding of gender dynamics in the perception of e-healthcare systems. The gender-neutral nature of perceptions among healthcare professionals implies that theoretical models exploring technology adoption and acceptance might not need substantial adaptation based on gender. This challenges existing assumptions and suggests that gender-inclusive strategies in the design and implementation of e-healthcare initiatives may be more universally applicable.

The study's practical implications are multifaceted, guiding stakeholders in optimizing the Saudi E-Healthcare System. First, prioritizing user-centric design and accessibility can enhance system adoption, necessitating developers to focus on intuitive interfaces. Tailoring strategies based on professional roles and experience levels addresses nuanced concerns, aiding administrators in customized training and change management. Additionally, the gender-neutral findings suggest that inclusive approaches to e-healthcare initiatives benefit both male and female healthcare professionals, emphasizing the need for a universally appealing system. These insights offer actionable guidance for policymakers, administrators, and developers, fostering the creation of a more effective, inclusive, and user-friendly e-healthcare landscape in Saudi Arabia and beyond.

Despite the valuable insights provided, the study exhibits certain limitations. Firstly, the cross-sectional nature of the survey design captures a snapshot of perceptions, hindering the ability to establish causal relationships or observe changes over time. Additionally, the reliance on self-reported data introduces the potential for response bias, as participants may provide socially desirable answers. The study's focus on public hospitals may limit the generalizability of findings to other healthcare settings. Furthermore, the survey's dependence on a specific set of factors may overlook emerging dimensions critical to sustainable competitive advantage. Finally, external factors such as broader socio-

economic influences and global health trends, not explicitly addressed in the survey, could impact the perceived competitiveness of the Saudi E-Healthcare System. Acknowledging these limitations is crucial for interpreting the study's findings and informing future research endeavors in the dynamic field of e-healthcare.

Conclusion

This study evaluates the Saudi E-Healthcare System's sustainable competitive edge in the evolving healthcare sector. It highlights the system's strengths in user experience, accessibility, innovation, and AI application, significantly boosting its competitiveness. However, it also identifies areas needing enhancement like data security, interoperability, and integration, suggesting targeted initiatives. Differences in stakeholder perceptions based on roles and experiences underline the need for tailored strategies. The research enriches academic discussions on e-healthcare and offers actionable insights for policymakers, administrators, and technologists. It stresses the importance of theoretical and practical implications to guide future research, ensuring the system's ongoing development and relevance as Saudi Arabia's healthcare landscape grows.

Disclosure

The author reports no conflicts of interest in this work.

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