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Assessing the Impact of Healthcare Information Systems on Administrative and Operational Management

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Abstract:

This research endeavors to explore the efficacy and impact of Healthcare Information Systems within healthcare settings, with a specific focus on their influence on administrative and operational decision-making. . Analysis of survey responses reveals positive user feedback regarding health information retrieval, facility inquiries, and staff efficiency. Notably, the study identifies a significant correlation between health information retrieval and administrative and operational decision-making, particularly in medical contexts. Furthermore, accessibility to health information is found to correlate significantly with decision-making

processes. Given the relevance of healthcare organizations in Saudi Arabia and the Gulf Cooperation Council countries, the findings of this research hold broader implications for the region.

Keywords: Healthcare Information Systems, Health Informatics, Health Administration Decision-Making, Operational Decision-Making.

1. Introduction:

The proliferation of information within hospitals and healthcare centers has reached a level where traditional handling methods are no longer adequate. Utilizing supportive tools for effective information analysis is crucial for informed decision-making and enhancing the efficiency of data collection, storage, organization, and retrieval processes. (Almunawar & Anshari, 2019)

Accurate information is paramount in the healthcare sector, necessitating the integration of decision support systems, including information inquiries, data cross-referencing, and data mining techniques. Thus, optimizing information flow processes becomes a key focus for healthcare institutions. (Yamin, 2019a)

The intentional selection of Alhada Military Hospital for this study stems from its status as a leading healthcare institution in Saudi Arabia, renowned for its implementation of an Integrated Health Care Management Information System, supported by the Ministry of Defense. This system encompasses a comprehensive suite of integrated tools for hospital process computerization, spanning patient information recording, auditing, and hospital entry management. (Alkhaffaf, 2012)

Health Informatics plays a pivotal role in evaluating and utilizing healthcare systems within healthcare organizations. This study aims to assess the impact and

effectiveness of Healthcare Information Systems on administrative and operational decision-making in healthcare settings. Findings are derived from a feedback survey involving 94 respondents representing various healthcare user perspectives. Statistical analysis of the survey data reveals predominantly positive feedback across the measured areas. (Okab, 2013)

In the subsequent sections, we delve into the capabilities of healthcare systems and their implications for administrative and operational management.

2. Healthcare Information Systems:

The healthcare industry has undergone significant transformations over time, influenced by various social, economic, and political factors. Implementing an integrated information system within the healthcare sector, particularly in developing countries, remains a challenge due to inconsistent funding for health programs. Central to the improvement of health systems is the adoption of Healthcare Information Systems (HIS), which facilitate the collection, analysis, and timely utilization of reliable health data concerning health status, system performance, and related factors. HIS serves as the bridge between information systems and commercial healthcare operations, aiming to enhance healthcare service provision. Defined as systems integrating data collection, processing, reporting, and information use, HIS plays a crucial role in improving healthcare effectiveness and efficiency through enhanced management across all levels of health services. Robust healthcare data regulation programs are essential for generating reliable and timely information, facilitating data analysis, and guiding activities within the healthcare system. These programs not only minimize errors and enhance healthcare quality

but also optimize service coordination, ultimately reducing costs. (Coleman & Delea, 2013)

Electronic Health Records (EHRs):

Electronic Health Records (EHRs) constitute electronic registration software housing comprehensive patient health information. EHRs offer significant advantages, including enhanced service quality, medical outcomes, and patient safety. They facilitate automatic reminders and alerts, improve adherence to instructions and protocols, minimize medical errors, enhance efficiency, and reduce costs, leading to improved services and patient satisfaction. (Wager et al., 2009)

Public Health Informatics:

Public health informatics entails the systematic implementation of information systems, computer science, and technology for public health-related purposes, research, and education. It is crucial for enhancing self-regulation and monitoring within the public health sector. Integrated and validated healthcare information technology serves as a vital tool for monitoring health institutions and evaluating and improving public health practices.

Obstacles to HIS Application:

Despite being a fundamental component of national health systems, HIS often lacks sufficient attention. Obstacles to implementing computerized healthcare data regulation programs in the Middle East, as identified by the World Health Organization, include a lack of long-term vision among healthcare leaders and professionals, limited experience in HIS implementation, and a general lack of awareness regarding its value. Addressing these challenges is essential for fostering

the effective adoption and utilization of HIS within healthcare institutions. (World Health Organization, 2004)

3. **Decision Making:**

Every day, we engage in a multitude of decision-making processes. Some decisions are routine and instinctive, while others require careful consideration and deliberation. Decision making is the act of selecting the best option from various alternatives to achieve a desired outcome or objective. The chosen outcome represents the result of mental activity aimed at reaching a final decision, guided by certain standards:

1. **Alternatives:** Decision makers evaluate and choose among several available options.
2. **Outcomes and States of Nature:** Decision making considers not only the alternatives but also the potential consequences of those choices. This includes assessing the collective effects of the chosen alternative and the prevailing conditions.
3. **Decision Matrices:** Decision-making processes often involve the organization of available options against possible states of nature, typically encompassing four stages.
4. **Data Gathering:** Decision makers collect and analyze information using various sensory inputs. This information is processed in the brain, considering both the decision maker's characteristics and the nature of the decision itself.

5. **Conditional or Contingent Decision:** Some decisions are straightforward and depend on the fulfillment of specific conditions. Once these conditions are met, the decision can be easily made.

4. The Impact of Information Systems on Decision Making:

Decision-making relies on information systems (IS) that facilitate the assessment of alternative options prior to the decision-making process. Implementing an information system within an institution can yield significant benefits and advantages. These benefits extend to managers and decision-makers, as IS often enhance decision-making by improving the quality and performance of audits, as well as augmenting their knowledge and proficiency in information technology.

Information systems also contribute to the efficiency of staff working within the system. Computer and information systems staff play diverse roles according to their specific titles, ultimately speeding up processes and ensuring accuracy. Furthermore, IS aids in managing, regulating, and retrieving information, which in turn facilitates the rapid provision of services and simplifies marketing efforts. This aspect positively impacts the overall performance level of the organization.

5. Previous Studies:

Several studies have contributed valuable insights into various aspects of healthcare data regulation programs, information systems, and decision-making processes within different contexts:

A study titled "Healthcare Data Regulation Programs: Past, Present, and Future" explores the evolution of healthcare data regulation programs over time, emphasizing international access to health services and medical knowledge. The study highlights the role of computing networks in facilitating access to updated healthcare information and biomedical data analysis opportunities. (Braa et al., 2007)

In a descriptive and analytical approach, a comprehensive inventory of a community study focused on the General Directorate of Medical Services in Riyadh. The study population consisted of officers and personnel, aiming to assess the performance enhancement efforts using the latest technology. Recommendations included providing specialized training sessions on modern technology and developing an integrated work plan to leverage modern technology effectively. (Haux, 2006)

Another study examined the role of information systems in decision-making processes within Jordan Bank, highlighting a strong relationship between information systems and decision-making.

A case study investigated the role of administrative information systems in decision-making during crises at the General Directorate of Border Guard in Saudi Arabia.

Additionally, several research articles have addressed similar issues and studies in business and scientific contexts within Saudi Arabia. (Al-Zhrani, 2010)

These studies collectively contribute to the understanding of the importance of information systems and data regulation programs in healthcare and decision-making processes, both locally and internationally.

Research Method:

This study employs a descriptive and analytical methodology to investigate the impact of healthcare information systems on administrative and medical decision-making.

The descriptive approach is chosen due to its suitability for studying human and social phenomena, such as managerial behavior, obstacles to scientific research, and organizational challenges. This method allows for a detailed description and analysis of the phenomenon under study, enabling insights into various aspects of decision-making processes.

Primary data collection is conducted through the distribution of questionnaires to the school community and administrative and medical decision-makers . The data obtained from the questionnaire is analyzed using the SPSS statistical program to derive indicators that support the study objectives.

Additionally, secondary data obtained from periodicals, books, and publications related to the study theme are utilized to enrich the theoretical framework and discussion. Both Arabic and English references are considered to ensure a comprehensive understanding of the topic. The researcher also reviews previous studies and research related to the subject using online resources.

The questionnaire method is employed for data collection, representing a qualitative approach. Statistical methods are subsequently applied to analyze the data and achieve the research objectives outlined in the study.

Results and Discussion:

A comprehensive analysis of the collected data was conducted, where a total of 107 questionnaires were distributed to participants. However, only 94 were returned, with four being discarded due to associated problems, considered as neglected questionnaires for being partially answered. Subsequently, data from 90 questionnaires were deemed suitable for testing after undergoing preparation, screening, and checks for illogical and missing values.

The hypotheses formulated for the study were tested using regression analysis, with a significance level set at 0.05. To assess the consistency of the instrument, Cronbach's Alpha was utilized, achieving a value of 78%, which is considered excellent. Additionally, frequency distribution methods and other statistical measures were employed to describe the characteristics of the study subject. Frequencies and percentages played a crucial role in describing categorical variables and providing insights into the distribution of responses among participants.

The data analysis process facilitated a deeper understanding of the impact of healthcare information systems on administrative and medical decision-making. By rigorously examining the collected data, we were able to draw meaningful conclusions and insights, shedding light on the effectiveness and efficiency of healthcare information systems in facilitating decision-making processes within the healthcare environment.

Furthermore, the results obtained from the analysis provide valuable implications and recommendations for healthcare institutions aiming to optimize their information systems for enhanced decision-making outcomes. Overall, the findings

contribute to the existing body of knowledge in the field of healthcare informatics, offering insights into the intricate relationship between information systems and decision-making in healthcare settings.

Descriptive Analysis:

We will divide this description into the following parts:

Independent Variable:

As depicted in Fig. 1, the healthcare information system encompasses the retrieval of health information, acquisition of health information, and working staff efficiency.

1. Retrieval of Health Information: Means and standard deviations (SD) were calculated for the statements related to retrieval of health information. Table 1 presents the results, showing that the average perception of the sample regarding the retrieval of healthcare information was 3.977, indicating a high estimation level. The means of the statements ranged from 3.432 to 4.456.
2. Acquisition of Health Information: Means and SD were calculated for the statements related to the acquisition of health information. Table 2 displays the results, indicating an average perception of 3.8267, signifying a high estimation level. The means of the statements ranged from 3.244 to 4.344.
3. Working Staff Efficiency: Means and SD were calculated for the statements related to working staff efficiency. Table 3 showcases the results, revealing an average perception of 3.704, indicating a high estimation level. The means of the statements ranged from 3.056 to 4.444.

Dependent Variable:

4. Decision Making: Means and SD were calculated for the statements related to decision making. Table 4 presents the results, showing that the average perception of decision making was 4.130, signifying a high estimation level. The means of the statements ranged from 3.489 to 4.611.

These findings provide valuable insights into the perceived effectiveness and efficiency of healthcare information systems in facilitating decision-making processes within the healthcare environment. The high estimation levels across all variables indicate a positive perception among participants regarding the impact of the healthcare information system on decision-making outcomes.

Conclusions:

Based on the feedback survey conducted, this study has unveiled several key findings regarding the effectiveness and efficiency of healthcare information systems in supporting decision-making processes within the healthcare environment.

1. Retrieval of Health Information: The study indicates that most respondents highly appreciated the retrieval of health information, as evidenced by the high scores received. The analysis suggests that the current information system adequately provides detailed information required by various hospital departments and administrative levels, meeting the objectives of the hospital.
2. Working Staff Efficiency: Employees across departments demonstrate proficiency in dealing with information systems. The administration recruits individuals with high experience in information systems, and employees are equipped with the necessary skills to navigate modern systems effectively.

3. Areas for Improvement: However, the study also highlights areas for improvement. Information systems currently do not sufficiently provide the statistical data and information requested by various departments and sections of the hospital. Additionally, there is room for enhancing the efficiency of information provided by the systems.

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