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The Impact of Big Data Dimensions on the Performance of Jordan's Medical Sector: A Case Study of Al-Bashir Hospital

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Abstract. This study examines the impact of big data on the performance of Jordan's medical sector, using Al-Bashir Hospital as a case study. The authors adopt a descriptive analytical approach and collect data from a sample of 378 hospital employees using a questionnaire. The study analyzes four dimensions of big data (infrastructure, variety, security and privacy, and quality) and three aspects of sector performance (user experience, patient care, and physician-patient communication). The results indicate that big data significantly impacts the overall performance of the medical sector in all four studied dimensions. However, the study's methodology has limitations, such as the lack of qualitative data and the focus on a single hospital. Future research should explore the challenges and opportunities of big data adoption in Jordan's medical sector using a more comprehensive approach. The study's findings highlight the need for policymakers and hospital administrators to invest in big data technologies and develop strategies for their effective implementation.

Keywords: Big Data, Hakeem Program, Electronic Health Records, Al-Bashir Hospital, Medical Sector Performance.

1. Introduction

The digital revolution and the Internet have led to a significant increase in the amount of data that is now accessible online. Big Data (BD) refers to the ever-increasing volume of data generated globally. According to Al-Jumaili et al. (2023), BD is described as a massive dataset that poses challenges for traditional data processing software. Processing a large volume of data in different fields necessitates the use of a dedicated tool for efficient data management and analysis. This flood of data is effectively utilized by scholars and researchers to enhance the quality of human life, as big data has significant impacts on various domains such as social, economic, cultural, and health (Al-Jumaili et al., 2023).

The nature of big data is often intricate, encompassing various types of data collected by institutions globally. Various industries have faced the challenge of efficiently managing large amounts of diverse data from multiple sources known for their high output. They strive to store, manage, and analyze this data to meet their needs. The healthcare industry (Kumar & Singh, 2018) is a field that collects data from various sources, leading to significant data growth over time. Healthcare data is a complex and diverse collection of information that necessitates specialized tools for processing and analysis. Given the importance of healthcare in people's lives, the spotlight is on the role of BD in the healthcare sector. BD provides valuable data on people's health and healthcare services, which helps in the development of the healthcare sector. The effective management of BD is crucial in converting data into valuable information that can be utilized by organizations and individuals to drive economic growth, improve living standards, and achieve a competitive edge. The management of BD also plays a crucial role in enhancing international government strategies, including those in Arab countries. It helps governments recognize the importance of utilizing BD to gain new insights and ideas (Maknani, 2019).

Jordan, like other countries, prioritizes the use of BD in various contexts and segments, with a particular emphasis on the healthcare sector. The mentioned sector plays a vital role in the economy by providing essential healthcare services to patients, including both preventive and curative care. The health and safety of patients is a top priority for BD software developers and scientists. They are dedicated to gaining valuable knowledge that will enhance the healthcare services provided to patients. BD analytics is renowned for its ability to facilitate decision-making and enhance quality across various industries, including healthcare (Salahuddin et al., 2020). The Hakeem program, developed in Jordan, aims to streamline the public healthcare sector by implementing various technological solutions. These include Computerized Physician Order Entry (CPOE), Hospital Information Systems (HIS), Electronic Prescriptions (E-Prescribing), Bar-Coded Medication Administration (BCMA), Clinical Decision Support Systems (CDSS), Encrypted Drug Management, and Electronic Health Records (EHRs). (Salahuddin et al., 2020).

The Jordanian healthcare system is known for its high level of quality and expertise. Jordan is a regional hub for medical tourism, with many patients coming from neighboring countries for treatment. The country has made significant investments in healthcare infrastructure and technology in recent years, including the development of new Hospitals, the expansion of existing facilities, and the implementation of electronic medical records (Al-Azzam, 2016).According to the latest updates from the Ministry of Health, Al-Bashir Hospital has been handling a significantly higher workload compared to other government hospitals in Jordan. With an impressive occupancy rate of 102.9%, it outperforms all other medical facilities. The prominence of this health institution can be attributed to its strategic location in the heart of the capital and the large influx of visitors seeking access to its comprehensive services (MOH, 2022).

The application of healthcare automation aims to enhance health services and increase patient satisfaction. The Hakeem program in Jordan is revolutionizing public healthcare through automation. This text highlights the importance of maintaining electronic health records (EHRs) for patients to easily access their medical records within healthcare facilities, thus improving the quality and efficiency of healthcare. Prior research has identified certain issues associated with the utilization of the automated healthcare software, specifically the Hakeem program. (Bizzari, 2022) highlighted the absence of

electronic guidelines that provide clarity on the usage of these systems. As a result, the Jordanian hospitals have limited experience in implementing EHRs. The importance of embracing EHRs in Jordanian hospitals was emphasized by Al-Rawajfah & Tubaishat (2019) due to the current deficiency in the utilization of electronic medical records. Consequently, policymakers face significant challenges in achieving healthcare objectives that depend on electronic medical data. The importance of expanding the sample size cannot be overstated, particularly given the early stage of development of Hakeem's system. The measurement of usability presents valuable opportunities for significant enhancements in the healthcare system. Therefore, significant measures can be implemented to improve usability.

The Hakeem program efficiently handles a vast amount of data concerning various stakeholders such as patients, laboratories, hospitals, radiology centers, and insurance corporations. It is crucial to ensure that electronic health records (EHRs) and stakeholder information are accurately entered and consistently kept up to date. The BD resulting from the Hakeem program requires additional analysis to enhance the quality of healthcare service. After conducting interviews with the staff of both Al-Bashir Hospital and the Hakeem program, it has been discovered that there is a lack of studies addressing the impact of big data on medical performance at Al-Bashir Hospital. Further investigation is needed to achieve the desired results and formulate necessary recommendations. The main focus of this study is to answer the question: what is the impact of using big data on the performance of the medical sector at Al-Bashir Hospital in Jordan?

There are numerous factors contributing to the automation of healthcare systems. The text discusses different aspects of motivation, such as the significance of healthcare in individuals' lives and the effective management of health-related tasks like monitoring health status, scheduling appointments, and engaging patients. The Hakeem program in Jordan aims to automate public healthcare, enhancing patient engagement, cost reduction, and the delivery of improved services that align with patient expectations. The Hakeem program efficiently handles extensive data on Jordanian patients, establishing itself as a robust big data platform. The assessment of the impact of big data in the Hakeem program on the performance of the medical sector at public hospitals, specifically Al-Bashir Hospital, is crucial.

This research is highly significant in both theoretical and practical aspects. The theoretical significance of the study lies in the exploration of the impact of big data dimensions on clinical performance at Al-Bashir Hospital, highlighting its academic and theoretical importance. Numerous healthcare organizations in the public sector have seamlessly integrated their healthcare data, which can be considered as big data, into the Hakeem program. This study emphasizes the impact of big data in the Hakeem program on the quality of medical services at Al-Bashir Hospital in Jordan. The practical importance of the healthcare sector in Jordan is reflected in the same context, as it is a key economic sector. It is crucial in bolstering the local economy and boosting national income and production. Furthermore, the significance of utilizing big data becomes apparent when it comes to developing the concept, dimensions, characteristics, and elements of the healthcare sector in Jordan.

2. Literature Review

Nowadays, many government agencies and organizations navigate through a wide and deep pool of data described as voluminous and unstructured. Data could be text, videos, images, and sounds collected by many institutions around the world to form big data (Fernández et al., 2015), which could be structured, unstructured, or semi-structured. In contrast, this data is also frequently described as lacking a structured organization, leading these entities to collect and analyze information through conventional means (Davenport, Barth, & Bean, 2012). BD is used to store, manage, and analyze data to serve various fields including the healthcare sector (Kumar et al., 2018), which collects data from different sources causing an exponential growth of data over time.

Much research is concerned with studying the impact of big data on the medical sector performance and improving healthcare services. Some studies examined the emergence of big data in the healthcare

industry in new contexts, such as the USA (Schaeffer et al., 2016), Malaysia (Salahuddin, et al., 2020), and Greek hospitals (Aggelidis, et al., 2022) to evaluate the capability of the hospitals to efficiently use complex and large data and envisage possible hospital benefits. These studies find that hospitals could gain several benefits when analyzing big data in healthcare. Moreover, business intelligence support and cost savings are enhanced. They concluded that BD technology positively impacted healthcare providers. On the other hand, there are studies concerning the improvement of EHRs of the Hakeem system and its impact on the performance of healthcare in Jordanian hospitals (Al-Rawajfah & Tubaishat, 2019; Bizzari, 2022). Their findings demonstrate significant positive correlation between the ease and usefulness of using EHRs and the acceptance of technology. In this work, the impact of utilizing big data with four dimensions "infrastructure, variety, security and privacy, and quality" on the medical sector performance represented in the dimensions "user performance, patient care, communication between patients and physicians" is examined. The most important differences are reflected in the adopted dimensions in terms of dependent and independent variables, study population and study methodology.

It is important to explain the main concepts of big data and its dimensions, as well as the sub-dimensions related to the dependent variable, Medical Performance.

2.1. Big Data: Concept and Dimensions

Big data is vast and complex, consisting of structured, semi-structured, and unstructured data collected by organizations (Hu et al., 2014; Cappa et al., 2021; Hashem, et al.,2022). It can be analyzed using machine learning, artificial intelligence, and advanced analytics applications (Microsoft, 2013; Cappa et al., 2021). An accessible architecture is needed for effective manipulation, analysis, and storage (Chang &Grady, 2020). This study uses specific dimensions to describe big data. The big data dimensions used in this study are:

- **Big Data Infrastructure:** Big Data Infrastructure stores manages and processes large and complex data sets using cutting-edge technologies such as distributed computing, cutting-edge storage, and big data processing technologies (Oussous et al., 2018). On the other hand, EHR infrastructure stores, manages, and shares EHRs through software, hardware, security protocols, networks, and data storage systems (Tutty et al., 2019). The components of EHR infrastructure are:

    1. EHR software: Health information of patients can be recorded, stored and managed on local or cloud-based servers by EHR software . (Haskew et al., 2015).
    2. Data storage: EHRs create vast amounts of data that must be securely stored and easily accessible when necessary (Dubovitskaya et al., 2017).
    3. Security & Networks: EHR systems need robust secure communication with devices and providers to protect patient data (Shah & Khan, 2020), (Keshta & Odeh, 2021).
    4. Interoperability: EHRs should exchange data with other healthcare systems and device seamlessly (Zhang et al., 2018).
    5. User training and support: Healthcare staff need effective EHR training and ongoing tech support to handle challenges (Tutty et al., 2019).

- **Big Data Variety:** refers to the inclusion of various sources and types of data (audio, video, social media data, and texts) in large datasets. This could be structured and unstructured data. However, handling such a variety of big data poses significant challenges in terms of analysis, processing, storage, and interpretation (Vranopoulos, Clarke, & Atkinson, 2022). EHRs contain patient data such as diagnoses, medical history, lab results, medications, and imaging. Significant variation in structuring, coding, and formatting EHRs creates challenges when sharing data across systems (Jensen, Jensen, & Brunak, 2012). Effective EHR management is crucial for big data analytics in healthcare. Standardization efforts, such as using common

coding systems and data models, aim to establish interoperability among different EHR systems. Sharing and analyzing EHR data improves healthcare outcomes. (Baxter & Lee, 2021).

- **Big Data Quality:** EHRs are digital records of patient's health information. They improve patient outcomes, care management, and efficiency in healthcare delivery (Diaz-Garelli et al., 2021). The ***quality*** of data within EHRs is critical for successful medical treatments and accurate diagnoses. Therefore, managing big data quality in EHRs is an important aspect of efficient healthcare management (Diaz-Garelli et al., 2021). The processes involved in big data quality management in EHRs include data normalization, data cleansing, and data integration (Juddoo, 2022)
- **Big Data Security and Privacy:** In the World Health Organization, big data security involves protecting sensitive health information collated and analyzed in big data applications. This contains ensuring the data availability, integrity, and confidentiality, integrity, along with complying with data protection laws and regulations (Organization, 2000). Securing electronic health records, particularly sensitive patient information, is crucial. Organizations using big data in EHR must ensure data privacy and security by implementing essential security measures to reduce the risk of cyber-attacks and unauthorized access to sensitive information (Patil & Seshadri, 2014).

2.2. Medical Performance

Performance is crucial for organizations to achieve their objectives. Modern management methods and fair evaluations of workers' efforts are vital to improving the speed, quality, and accuracy of tasks (Sutaguna et al., 2023). As defined by (Kumari et al., 2021), performance is the behavior used to achieve the results. Given the past definitions, performance is the process adapted to measure the capability to attain prearranged objectives compared to recognized standards. The review of the many healthcare performance studies shows a notable absence of a straightforward definition of healthcare performance. After extensive research, it was deduced that healthcare system performance comprises three pivotal dimensions: accessibility, quality, and efficiency. These factors collectively establish the attainable level of healthcare. Accessibility pertains to how promptly patients can access essential care (Mosadeghrad, 2013; Pastorino et al., 2019). The theoretical framework concerning the sub-dimensions related to the dependent variable “Medical Performance” in this study:

- **User Performance:** Performance refers to the degree of attainment of intended goals highly associated with customer satisfaction, strategic organizational objectives, and economic contributions (Yellowlees et al., 2008). The capability to execute selected tasks within the given constraints and timeframe of the situation and stakeholders is used to evaluate the performance. Achieving measurable targets through proper behaviors and using required skills, knowledge, and abilities are among the key aims (Haux et al., 2018). Stakeholder satisfaction is a crucial measure of performance success, exemplified in the performance of the stakeholders, the healthcare quality, and the interactions between patients and medical staff. In certain cases, the complexity and nature of the services delivered to beneficiaries cause a significant level of anxiety and stress among healthcare workers and doctors regarding their performance (Aydin Guclu et al., 2022). With that, a royal recommendation is reflected in the fact that the Jordanian Ministry of Health shall adopt electronic medical records to improve staff and doctor performance, increase the satisfaction of the patients, and increase effiency and productivity (Organization, 2019).
- **Communication Between Patients and Physician:** With the use of the electronic medical records, physicians are allowed to access patient information quickly and accurately, leading to more informed decisions about treatment. They also enable better collaboration and

coordination among medical staff involved in running the healthcare of the patients (Ajami & Bagheri-Tadi, 2013). The regular update of the electronic medical records helps doctors make informed treatment decisions (Masor, 2013). It is found that "EHRs progress the performance of the physicians by improving coordination and communication, providing real-time patient information, decreasing errors, and furnishing data to improve quality and research" (Jalilian & Khairat, 2022, p. 2).

- **Patient Care:** E-health tools and health information systems like EHRs and medical portals have empowered patients to undertake a more practical role in their healthcare, and improve healthcare delivery (Khalifa, 2017). The crucial and primary value of the e-health system is its success in enhancing patient care (O'Donnell et al., 2018). An effective Health Information System (HIS) is crucial for providing efficient and high-quality patient care. No access to patient data means that making up-to-date decisions related to patient treatment is difficult, which can have severe effects (Colombo, Oderkirk, & Slawomirski, 2020; Musen, Middleton, & Greenes, 2021). Also, a positive association between the utilizing an all-inclusive outpatient EMR system and patient care enhancement is reported by clinicians. This enhancement is due to numerous factors, i.e. improved availability of clinical information, better-quality interdepartmental communication, the efficacy of decision support methods in affecting patient care results, a decrease in medication errors including dosage errors, adverse drug reactions and drug interactions (Dahleez et al., 2021).

The study hypotheses are articulated to address the study problem, objectives and questions.

1-1 H01: There is a statistically significant impact is found at the significance level ($\alpha \leq 0.05$) for utilizing big data dimensions "infrastructure, variety, security, privacy, & quality" on the medical sector performance in its dimensions "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

Furthermore, the following sub-hypotheses are formulated:

1-2 H01-1: At the significance level ($\alpha \leq 0.05$), the "infrastructure" dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan

1-3 H01-2: At the significance level ($\alpha \leq 0.05$), the " variety " dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan

1-4 H01-3: At the significance level ($\alpha \leq 0.05$), the " security and privacy " dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan

H01-4: At the significance level ($\alpha \leq 0.05$), the "quality" dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan

The variables adopted in the study model illustrated in Figure (1) are prepared based on previous studies as shown in Table (1).

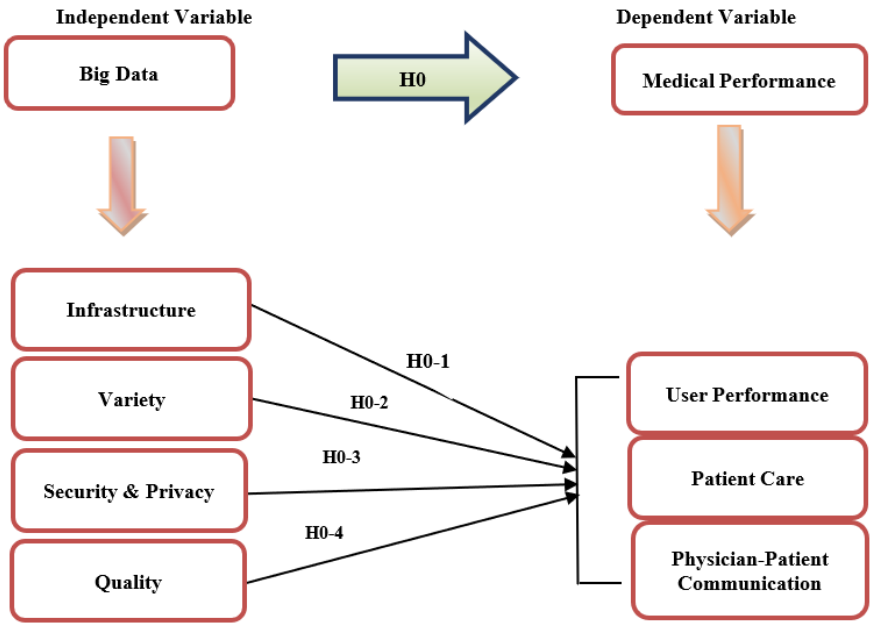

Fig.1: The Study Model

Table 1. The Adopted Variables

The Variable	References
Independent Variable: Big Data	1- (Palanisamy & Thirunavukarasu, 2019) 2- (Bizzari, 2022) 3- (Bornet et al., 2021) 4- (Nafi, 2018)
Dependent Variable: Medical Performance	1- (Dahleez et al., 2021) 2- (Malik Bader Alazzam et al., 2021)

3. Study Methodology

Due to the nature of the study, the descriptive analytical approach is appropriated to achieve the study objectives.

The study population involves Al-Bashir Public Hospital employees in Jordan, including administration and medical staff. The hospital has around 4,000 employees, according to the 2023 job category report from the employee affairs system. The reason for selecting the said sample to conduct research tests is that because they can take in hand the basic concepts related to the study variables and use the system in their daily operations.

Having visited the Al-Bashir Public Hospital and communicated with administration staff, and medical staff to get acquainted with the study community, the researcher distributed the questionnaire to a stratified random sample of its employees, department heads, and managers. Of the (400) questionnaires distributed to the occupants of the lower, middle, and upper administrative positions, (15) were excluded as they were empty questionnaires. The number of returned questionnaires were (385) questionnaires with a ratio (%96.25) of the number of distributed ones. With the analysis of the

returned questionnaires, (7) incomplete and invalid questionnaires were found. Therefore, the questionnaires' number valid for analysis is now (378) questionnaires, representing (%94.5) of the whole questionnaires.

Assessing the questionnaire internal consistency requires utilizing the Cronbach's Alpha coefficient. The coefficient was utilized to test the questionnaire items' and dimensions' reliability and ensure consistency. After redistributing the questionnaire to the study sample, the same results were obtained, indicating consistency. The reliability level is measured on a scale from 0 to 1, with a questionnaire considered reliable if the alpha value is greater than 60%. As indicated in Table (2), the internal consistency coefficients have ranged between (0.70) and (0.82) with (0.86) Cronbach's Alpha coefficient for the overall items, which are highly reliable coefficients for conducting the study questionnaire.

Table 2. Reliability Test

No.	Dimension	Number of Items	Cronbach's Alpha
1	Infrastructure	6	0.76
2	Variety	5	0.71
3	Security & Privacy	5	0.71
4	Quality	4	0.71
Utilizing Big Data Scale		20	0.82
1	User Performance	6	0.65
2	Patient Care	4	0.70
3	Physician-Patient Communication	4	0.70
Medical Sector Performance		14	0.75
Overall Questionnaire		34	0.86

4. Results:

Main Hypothesis:

H01: No statistically significant impact is found at the significance level ($\alpha \leq 0.05$) for utilizing big data dimensions "infrastructure, variety, security, privacy, & quality" on the medical sector performance in its dimensions "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

A multiple regression analysis was utilized to test the main hypothesis. Table (3) illustrates those results.

Table 3. H01 Testing

Independent Variables	T-Value	Sig. T	β	R	R^2	F-Value	Sig. F	Durbin-Watson	H01 Result
Infrastructure	3.623	.000	.190	.539	.290	38.157	.000	1.738	Rejected
Variety	3.808	.000	.207						

Security & Privacy	.232	.816	.013						
Quality	5.472	.000	.284						

Dependent Variable: Medical Sector Performance

As indicated in Table (3), utilizing big data in dimensions such as infrastructure, variety, security and privacy, and quality significantly and positively impacts the medical performance. The correlation coefficient R between big data and medical performance is 0.539, indicating a direct relationship. The determination coefficient R2, with a value of 0.290, indicates that 29% of the changes in medical performance can be attributed to changes in big data utilization. The value of the statistical coefficient F for the total effect between the independent and dependent variables is (38.157), which is a function at a significant level ($\alpha \leq 0.05$) and consistent with what was previously mentioned. To quantify the effects of each dimension of the utilized big data, the values of the influence coefficient β are relied upon. Based on Table (3), the amount of influence of the dimensions of the utilized big data is (0.190) for the infrastructure dimension, (0.207) for the variety dimension, (0.013) for the security & privacy dimension, and (0.284) for the quality dimension. With that, the invalidity to accept the first main hypothesis is confirmed. Accordingly, the null hypothesis is rejected, and the alternative hypothesis is accepted, demonstrating a statistically significant impact at the significance level ($\alpha \leq 0.05$) for utilizing Big Data dimensions "infrastructure, variety, security & privacy, quality" on the medical sector performance in its dimensions "user performance, patient care, communication between physician-patient" at the Al-Bashir Hospital in Jordan.

Sub-hypothesis (1)

H01-1: A statistically significant impact is found at the significance level ($\alpha \leq 0.05$) for utilizing big data dimensions "infrastructure, variety, security, privacy, & quality" on the medical sector performance in its dimensions "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

Simple linear regression is utilized to test the H01-1 hypothesis to find out the impact of "infrastructure" on the medical sector performance. Table (4) illustrates those results.

Table 4. H01-1 Testing

Independent Variables	T-Value	Sig. T	β	R	R^2	F-Value	Sig. F	Durbin-Watson	H01-1 Result
Infrastructure	8.545	.000	.403	.403	.163	73.025	.000	1.778	Rejected

Dependent Variable: Medical Sector Performance

As illustrated in Table (4), a statistically significant impact of infrastructure on the medical sector performance is found at the significance level ($\alpha \leq 0.05$), where (t) value was (8.545), by Sig. (0.000). The value of the correlation R between the infrastructure and the performance of the medical sector is (0.403), which proves that both infrastructure and the medical sector performance changed in the same direction "increasing or decreasing". The value of the determination coefficient R^2 is (0.163) indicating that (16.3%) of the change in the performance of the medical sector is caused by the infrastructure. The value of the statistical coefficient F for the total effect between the independent and dependent variable

is (73.025), which is a function at a significant level (α≤0.05). To determine the size of the effect of the infrastructure, the values of the effect coefficient β are relied upon. As shown in Table (4), the amount of influence of the infrastructure dimensions is (0.403). This proves the invalidity of accepting the first sub-hypothesis. Consequently, a statistically significant impact is found at the significance level (α ≤ 0.05) for utilizing "infrastructure" dimension of big data on the medical sector performance in its dimensions "user performance, patient care, communication between physician-patient" at the Al-Bashir Hospital in Jordan.

Sub-hypothesis (2)

H01-2: At the significance level (α ≤ 0.05), the " variety " dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

Simple linear regression is applied to test the H01-2 hypothesis. Table (5) illustrates those results.

Table 5. H01-2 Testing

Independent Variables	T-Value	Sig. t	β	R	R^2	F-Value	Sig. F	Durbin-Watson	H01-2 Result
Variety	8.827	.000	.414	.414	.172	77.913	.000	1.693	Rejected

Dependent Variable: Medical Sector Performance

As shown in Table (5), a statistically significant impact of variety on the medical sector performance is found at the significance level (α≤0.05), where (t) value is (8.827) by Sig. (0.000). The value of the correlation R between the variety and the medical sector performance is (0.414), which proves that the variety and the medical sector performance changed in the same way "increasing or decreasing". The value of the determination coefficient R^2 is (0.172), indicating (17.2%) of the change in the medical sector performance results from the variety.

The value of the statistical coefficient F for the total effect between the independent and dependent variable is (77.913), which is a function at a significant level (α≤0.05). To determine the size of the effect of variety, the values of the influence coefficient β were relied upon, which indicated that the amount of influence of the dimensions of the variety is (0.414). With that, a statistically significant impact is found at the significance level (α ≤ 0.05) for utilizing "variety" dimension of big data on the medical sector performance in its dimensions "user performance, patient care, communication between physician-patient" at the Al-Bashir Hospital in Jordan.

Sub-hypothesis (3)

H01-3: At the significance level (α ≤ 0.05), the " security and privacy" dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

Simple linear regression is used to test hypothesis **H01-3** as shown in Table (6).

Table 6. H01-3 Testing

Independent Variables	T-Value	Sig. t	β	R	R^2	F-Value	Sig. F	Durbin-Watson	H01-3 Result

Security & Privacy	6.868	.000	.334	.334	.111	47.166	.000	1.712	Rejected

Dependent Variable: Medical Sector Performance

As shown in Table (6), a statistically significant impact of security & privacy in the medical sector performance is found at the significance level ($\alpha \leq 0.05$), where (t) value was (6.868), by Sig. (0.000). The value of the correlation R between security & privacy and the medical sector performance is (0.334), which confirms that security and privacy and the medical sector performance changed in the same direction "increasingly or decreasingly". The value of the determination coefficient R^2 is (0.111), demonstrating (11.1%) of the change in the medical sector results performance from security and privacy.

The value of the statistical coefficient F for the total effect between the independent and dependent variable is (47.166), which is a function at a significant level ($\alpha \leq 0.05$). The size of the effect of "security & privacy" is determined based on the values of the influence coefficient β, which indicates that the amount of influence of the dimensions of the (Security & Privacy) is (0.334). With that, a statistically significant impact is found at the significance level ($\alpha \leq 0.05$) for utilizing the security and privacy dimension of big data on the medical sector performance in its dimensions "user performance, patient care, communication between physician and patient" at the Al-Bashir Hospital in Jordan.

Sub-hypothesis (4)

H01-4: At the significance level ($\alpha \leq 0.05$), the "quality" dimension of big data significantly affect the performance dimensions of the medical sector "user performance, patient care, and physician-patient communication" at Al-Bashir Hospital in Jordan.

Simple linear regression is used to test the H01-4 hypothesis. Table (7) illustrates those results.

Table 7. H01-4 Testing

Independent Variables	T-value	Sig. t	β	R	R^2	F-value	Sig. F	Durbin-Watson	H01-4 Result
Quality	9.414	.000	.437	.437	.191	88.627	.000	1.705	Rejected

Dependent Variable: Medical Sector Performance

As shown in Table (7), a statistically significant impact of quality in the medical sector performance is found at the significance level ($\alpha \leq 0.05$), where (t) value is (9.414), by Sig. (0.000). The correlation coefficient R between quality and medical sector performance is 0.437, which confirms that both quality and the performance of the medical sector are changed in the same way "increasing or decreasing". The value of the determination coefficient R^2 is (0.191), indicating (19.1%) of the change in the medical sector performance results from quality.

The value of the statistical coefficient F for the total effect between the independent and dependent variable is (88.627), which is a function at a significant level ($\alpha \leq 0.05$). The influence coefficient β with a value of 0.437 invalidates the fourth sub-hypothesis. Consequently, it has been found that utilizing the "quality" dimension has a statistically significant impact (at the significance level of $\alpha \leq 0.05$) on the performance of the medical sector dimensions "user performance, patient care, communication between physician-patient" at the Al-Bashir Hospital.

5. Conclusion

This study analyzes big data's impact on Jordan's medical sector, using Al-Bashir Hospital as a case study due to its heavier burden. The study reveals that utilizing Big Data dimensions such as "infrastructure, variety, security & privacy, quality" has a statistically significant impact on the medical sector's performance in terms of "user performance, patient care, and communication between Physician-Patient". This is due to an increase in data availability, which allows for optimal use of technology and continuous monitoring of patients. The result is an improvement in the hospital's performance and the integration of many ideas to treat patients, making its work easier and more efficient. The study (Cozzoli et al., 2022) highlights the relationship between big data analytics and benefits for healthcare organizations that have been raised in the literature. The study determines the art of big data analytics adopted by healthcare organizations and the benefits for both health managers and healthcare organizations. The results indicate the positive relationship between big data analytics and healthcare organization management has emerged, which is also supported by the study (al-Sirr, 2018) whose results showed that (user performance, patient care, and communication between Physician-Patient) have a clear impact on the adoption of big data technology in Hospitals.

After considering the sub-hypotheses in this study, we concluded that using the "infrastructure" dimension of big data significantly impacts medical sector performance ($\alpha \leq 0.05$) in user performance, patient care, and communication between physician and patient. The appropriate infrastructure, including high-speed network connections, updated databases, modern computers, and medical equipment, plays a crucial role in developing medical services. Moreover, using proper data analysis tools is crucial in improving healthcare. By analyzing big data, the medical sector can improve treatment quality, predict epidemics, and reduce mortality, ultimately reflecting the level of healthcare provided in the hospital. The results of a study (Schaeffer et al., 2016) revealed that Hospitals can anticipate gains from employing BD analytics, including cost savings and business intelligence. The use of BD technology by healthcare professionals will be extremely advantageous. Additionally, the study (Bani-Salameh, Al-Qawaqneh, & Taamneh, 2021) sought to clarify the process by which big data analytics and management were adopted by Jordanian healthcare institutions. It also covers the characteristics of big data in health, as well as the difficulties and constraints facing big data analytics and management in Jordan

The findings also reveal that using the "variety" dimension of big data has a significant impact (at a significance level of $\alpha \leq 0.05$) on the performance of the medical sector in its dimensions "user performance, patient care, communication between Physician-Patient". This is because integrating structured and unstructured data from multiple sources, such as labs, x-rays, pharmacy, doctors' reports, patient and family information, and healthcare organizations, can enhance medical services and healthcare systems. Additionally, using heterogeneous data, including images, sounds, videos, texts, and sensor signals, can contribute to clinical decision-making, disease surveillance, and public health management. Consequently, the variety dimension comprehensively improves productivity for health facilities and individuals by making information easily accessible and retrievable. The study (Dias, Hassan, & Shahzad, 2021) attempted to examine the mediating role of the use of (variety) dimensions of big data on the relationship between Hospital performance, data quality, data integration, and data governance. The study (Al-Darras & Tanova, 2022) confirmed the big data analytics model by examining the mediating effects of entrepreneurial orientation between (variety) dimensions of big data and organizational agility, and this finding contributes to the management literature by showing that (variety) dimension of big data may enhance firm entrepreneurial orientation. The research findings demonstrate that using the "security and privacy" aspect of big data management has a meaningful impact on the performance of the medical sector in its dimensions “user performance, patient care,

communication between physician and patient". This impact is statistically significant at the significance level ($\alpha \leq 0.05$), which means it is a reliable finding. Using the "security and privacy" dimension in managing big data can improve the performance of the medical sector. By focusing on aspects such as user performance, patient care, and communication between doctors and patients, strict policies and procedures can be set to protect patients' privacy and sensitive health information. It is essential to establish a party responsible for determining who can access data in the hospital and implementing strong security measures to prevent breaches and leaks. By doing so, patients' confidence can be enhanced, and the hospital's reputation and performance can be improved. The study (Lv & Qiao, 2020) explored the development of healthcare in China and the privacy and security risk factors in medical data under big data, as the development status of China's healthcare sector was analyzed. The questionnaire is used to analyze the privacy and security risk factors of healthcare big data and protection measures are put forward based on the data privacy and security risk factors in the context of cloud services in the literature. It indicates that medical institutions need to pay attention to data privacy protection and grasp the use of digital medical data to provide decision support for subsequent medical data analysis. The study (Ye et al., 2016) provides a context to the work by introducing the security and privacy challenges triggered by characteristics of big data and presenting big data system security and privacy analyses. It finds that big data has become one of the most promising and prevailing technologies to predict future trends. The study also revealed that utilizing the "quality" dimension of big data management has a statistically significant impact on the performance of the medical sector at Al-Bashir Hospital in Jordan. The impact was observed in the dimensions of "user performance, patient care, and communication between physician-patient" and was found to be significant at the significance level of $\alpha \leq 0.05$. This result can be explained by the fact that managing big data using the "quality" dimension improves the performance of the medical sector by enhancing "user performance", "patient care", and "communication between doctors and patients", leading to increased profits", and reduced wasteful overheads. Since the Hakeem program includes huge medical records "big data", Al-Bashir Hospital provides a set of procedures to ensure the accuracy and consistency of the medical records. A study (Rajabion et al., 2019) focused on ways to improve the quality of healthcare big data processing technologies on Hospital performance. The study (al-Sirr, 2018) explored the most important opportunities and main challenges in the Gaza Strip to adopt big data technology, as this study was based on a study of five variables (quality of healthcare big data, information technology staff skills, technical cost, organizational culture, safety and protection) of big data technology. Furthermore, there are procedures in place to maintain the availability of stocks of medicines and medical supplies. These procedures enhance the quality and effectiveness of medical services and hospital performance.

Given the current study results, this paper recommends conducting more studies to analyze the impact of the use of big data dimensions "infrastructure, variety, security & privacy, and quality" on the Jordanian medical sector performance, analyzing patients' satisfaction with the quality of medical services in the medical sector considering the use of big data dimensions. Other key recommendations include the need for officials and authorities in Jordan to support the dimensions of big data "infrastructure, variety, security & privacy, and quality" and develop them to be able to absorb the high number of patients, alongside the importance of spreading full awareness about the dimensions of big data, given the possibility of exploiting these dimensions in the development of many sectors in Jordan. The study also recommends organizing promotional campaigns by the Jordanian government to spread awareness about the significance of big data dimensions in improving the Jordanian medical sector and other important sectors, along with the need to link the entire medical sectors with the Hakeem program to benefit, which leads to improving performance in the medical sector. The researchers suggested enhancing this study using its dimensions and completing the study based on questionnaires and interviews to be conducted with various parties (administrative, technical, medical staff, as well as patients). The interviews are then analyzed based on what the parties answer, then illustrate how the independent dimensions affect the dependent dimensions and how the healthcare system can be

developed in the future to meet its requirements

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