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Digital Transformation in Healthcare 4.0: Critical Factors for Business Intelligence Systems

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Abstract: The health sector is one of the most knowledge-intensive and complicated globally. It has been proven repeatedly that Business Intelligence (BI) systems in the healthcare industry can help hospitals make better decisions. Some studies have looked at the usage of BI in health, but there is still a lack of information on how to develop a BI system successfully. There is a significant research gap in the health sector because these studies do not concentrate on the organizational determinants that impact the development and acceptance of BI systems in different organizations; therefore, the aim of this article is to develop a framework for successful BI system development in the health sector taking into consideration the organizational determinants of BI systems' acceptance, implementation, and evaluation. The proposed framework classifies the determinants under organizational, process, and strategic aspects as different types to ensure the success of BI system deployment. Concerning practical implications, this paper gives a roadmap for a wide range of healthcare practitioners to ensure the success of BI system development.

Keywords: digital transformation; Business Intelligence; critical factors; healthcare; acceptance

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1. Introduction

Healthcare is one industry that creates a considerable amount of data due to the need to meet patient records, compliance, and care standards [1,2]. As a result of advances in medical technology, rising life expectancy, and a surge in non-transmittable chronic diseases, the expense of healthcare may increase to unprecedented levels during the next few decades [3]. Digital transformation and information technology play a critical role in processing data into intelligence that can be used to improve healthcare services, patient care, and business process management to meet healthcare demands and enhance the quality of therapies for patients [4–7].

Business Intelligence (BI) has grown in importance as a research and practice focus due to the critical role data play in driving digital transformation and organizational improvement [8]. BI encompasses various technologies and processes that help healthcare organizations better access and analyze data to make better and more informed decisions [9]. It has been proven repeatedly that BI systems in the healthcare industry can help firms make better decisions. Making decisions based on evidence necessitates timely and accurate information that can be relied upon [10]. Digital transformation, BI, and healthcare analytics can be used together in a new way to assist the healthcare sector in improving service quality, cutting costs, and better controlling risk [11].

With the ever-growing amount of data and the aim to use them effectively, the demand for BI solutions in the health industry is expanding [12]. A prevalent misconception is that a successful BI system produces accurate and graphically appealing reports that can be easily understood [13]. BI analysis has focused on the possibility of IS to better accommodate decision-makers in light of evolving BI solutions, Big Data, and the growing demand for data-savvy executives with excellent analytical skills, according to many

research studies [8]. With the connectivity to hospital data, a BI system has made some headway toward development in a healthcare organization that would utilize predictive and prescriptive analytics [14].

Yeoh (2011) [15] used multiple case studies to evaluate the success of BI systems in seven large engineering companies. The main condition for successful implementation of BI systems was that the introduction of the system should be business-driven and organization-focused. Stakeholders noticed that addressing the critical success factors from a business perspective was the cornerstone on which they successfully based the implementation of their BI systems; furthermore, Harison (2012) [16] examined the success of a BI system in a gas company. The findings indicated that information quality, service quality, and system quality were the most significant factors that affect intention to use the BI system, user satisfaction, and individual and organizational impact; moreover, Olszak and Ziemba (2012) [17] examined the success of BI systems in Small and Medium Enterprises and they concluded that the most important factors for managers were the adequate budget, well-defined business processes and users' expectations, and the integration between the BI system and other systems. Finally, Yeoh and Popovič (2016) [18] analyzed the success of BI systems in seven organizations. Findings indicated that those enterprises which had a clear vision and a well-established business case, and committed management support and sponsorship from the business side, were more likely to be successful in implementation. For this reason, it is necessary to take into account, not just the technology and resources involved in BI deployment but also the business processes and corporate culture as a whole [19]. In addition, the development of a BI system shows that a hospital is ready to use data analysis to improve its performance. Hospital treatment quality, margins, patient and employee satisfaction, and clinical and operational efficiency can be improved through the usage of BI tools [20]. BI is not ubiquitous in healthcare, despite its potential for upheaval [21]. There have been numerous studies on the use of BI solutions in the health sector, but there is still a dearth of information on how to do so effectively [10,14,22–25]; still, their findings fail to take into account the organizational determinants that influence BI system development and acceptance, creating an important research gap in the health sector [10,13,18,26,27], similarly to the Information Systems (IS) research about the critical factors that affect IS adoption. There is a shortage of comprehensive frameworks to assist practitioners in developing an appropriate BI solution [8], to the IS research on the determinants that influence IS adoption [28–31].

This article aims to develop a framework for successful BI system development in the health sector taking into consideration the organizational determinants of BI systems acceptance, implementation, and evaluation. Defining and analyzing organizational determinants that affect BI system adoption and acceptance, as well as understanding why some of these elements may be unique to the BI system in healthcare, helps this paper bridge a knowledge gap in the field.

2. Theoretical Background

2.1. Literature Review Methodology

To analyze the current literature about the organization of BI systems in hospitals, a structured literature review was applied to synthesize the conceptual framework. The literature review methodology is based on Webster's and Watson's (2002) [32] guidelines who suggested a three-step methodology; this methodology has been used in the field of Business Management [33,34]. A preliminary search of the available literature reviews was done to figure out which databases and keywords to use for the main search, which was then done. In order to investigate the references of the selected articles, a backward search was performed, and then a thorough search was conducted, which examined the papers' citations in order to determine which papers were selected. Following the selection of papers, they were divided into categories based on their content.

We conducted a thorough search of the existing literature in Scopus and Web of Science using a combination of keywords such as Business Intelligence systems, factors, success,

hospital, health, and healthcare. Papers published in peer-reviewed academic journals and conference proceedings were chosen without regard to whether or not they were published during a certain time period. A total of 301 articles were found. 183 articles were cut down because of language restrictions and the source of publication; then, after scanning their titles, it was discovered that 118 papers were relevant to the aim of this chapter. After scanning their titles, it was discovered that 90 papers were relevant to the purpose of this chapter. Following that, after reviewing their abstracts, 81 were accepted. Many papers were rejected because the full text of the studies was not available, or they were duplicates. A prompt investigation was conducted to verify them; this second overview emphasizes the importance of including each and every one of them. As a result, 57 articles were read in their entirety and evaluated accordingly.

As a result of the backward search, 18 additional articles were added to the total of 57 articles that were found through the initial search. In addition, 12 more articles were added as a result of the forward search, bringing the total number of articles identified to 87. The process of selecting articles is depicted in Figure 1.

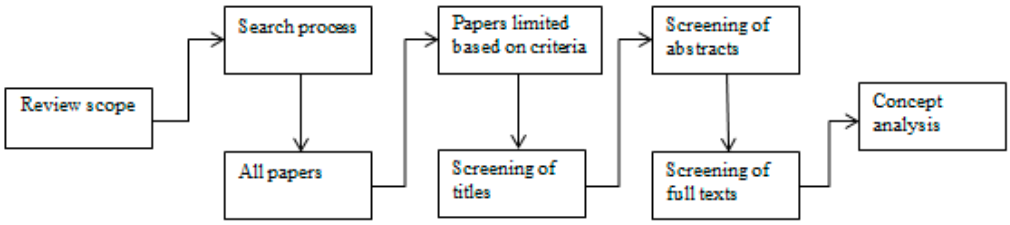

Figure 1. Article process selection.

2.2. Hospital 4.0

As a result of statistical averages, the numbers that characterize normality have changed (e.g., the type and dose of medication or the surgical approach to be chosen). Individualized treatment will be the norm in the future [35–37]. The goal is to improve chronic and non-communicable illness management by using intelligent algorithms to process patient data in real-time, ideally to represent better the actual status of a patient [38]. According to Tortorella et al. (2021) [39], these design components are intimately tied to the development of Hospital 4.0. Virtualization, interoperability, real-time capabilities, service orientation, and decentralization are required to support the seamless flow of contextual information and modularity, resulting in a system that is adaptive to changing needs. Cloud Computing, Artificial Intelligence, Big Data, and the Internet of Things (IoT) are a few new technologies that make up these key principles (AI) [33,34].

Due to the sheer widespread adoption of cutting-edge medical information technology, including mobile devices and wearable connected gadgets that track patients' vital signs in great detail, hospitals are now generating vast amounts of clinical and administrative "Big Data" [19]. It is becoming increasingly difficult for healthcare decision-makers to obtain valuable data from the vast amounts of data accumulating in their hospital information systems. These data are derived from various sources and in multiple formats, making it even more challenging [40].

With Big Data in the health domain, the focus is on relevant datasets that cannot be processed or interpreted by healthcare providers using current approaches [41]. It is driven by a never-ending effort to make sure health services can last and be efficient in an aging population and changes in how health care is delivered. Data gathered from individuals at multiple scales, such as high-throughput sequencing platforms, real-time imaging equipment at the point of care, and wearable computing and mobile health technologies, are all contributing to this trend [42].

Computing in the cloud has the potential to cut healthcare integration costs, improve resource efficiency, and bring in new technology. According to current trends, moving to the cloud is becoming more popular. Healthcare data to the cloud will allow users to access

information from any location. Healthcare can be more efficient and productive with this new delivery model and at a reduced cost to technology budgets [6]. Healthcare providers, insurance companies, pharmacies, and others can collaborate and share information to improve the quality of service and minimize costs through collaboration. When physical data storage is not an option, a developing technology known as cloud computing can readily manage the scenario [43]. As a result, Cloud Computing reduces infrastructure and staffing requirements, enables access to patient records whenever needed, and improves real-time response times by reducing latency. Cloud Computing also provides computing redundancy and backup ensuring that data are secure [44].

2.3. BI in Healthcare

The health sector is one of the most knowledge-intensive and complex industries; it also poses one of the most severe economic difficulties [19]. Thanks to the rise of Big Data, BI has secured a prominent position in the digital transformation landscape [8]. Accordingly, BI may help improve healthcare's overall quality, efficacy, and efficiency [45–47]. For quicker and more accurate decisions, BI integrates a wide range of approaches, applications, and technologies [24,48,49]. BI is a set of theories and practices aimed at assisting businesses in making better decisions by distributing "the appropriate information to the right people at the appropriate time" to those who need it [50]. BI is about ensuring that managers at all levels can get the right and timely information they need for better and faster decision-making [51–54]; it is a management philosophy or strategic goal that sums together the features of BI, including gathering raw data, determining the authenticity and trustworthiness of the data, analyzing the data, and storing and disseminating the analyzed data [55,56].

Using BI in the healthcare industry can improve patient service, marketing, operational analysis, employee development, and financial performance [46]; they also say that real-time data are crucial for increasing quality and reducing patient risk. New or improved products and services, more effective operations, or more effective organizational intelligence can all be attributed to BI [57]. The use of BI tools in hospitals can improve a variety of aspects of care, including patient and employee satisfaction, profitability, and clinical and operational efficiency [20].

Much research has been done on the importance of BI. Researchers highlight that organizational performance can be improved by completing a specific goal, such as boosting revenue and productivity or minimizing expenditures [57,58]. Parente and Dunbar (2001) [59] suggested that organizations in the health sector that use hospital information systems make more money than those that do not. Implementing and excelling with BI is complex, and BI systems are costly, given the price of software, licenses, training, and salaries [26,27,60]. Another study by Ratia et al. (2018) [55] also found that poor-quality data, the difficulty in quickly adapting data sources and BI systems to rapidly changing organizational environments, and a lack of internal and external capabilities were the main problems with data and BI use, additionally. A new set of unified BI systems could be used to utilize the current data more effectively; this would lead to new products and services, as well as value creation.

The rapidly evolving digital transformation in the healthcare industry necessitates data-driven decisions at all levels of the hospital and in the everyday work of physicians [61–63]. Better decision-making tools are now needed to help with clinical work and business decisions, which means the healthcare sector is becoming more valuable [55]. BI tools aim to deliver business-oriented and results-oriented information [64].

Strategic decision-making is made more accessible with the multidimensional macro and micro analyses made possible by BI solutions [65–67]. Medical staff productivity must be increased, outcomes analyzed, and care delivery methods continually refined to keep the organization profitable while keeping expenses in check and preserving the quality of care [68,69]. An increased interest in data usage and the use of BI systems, which enables the investigation and use of organizational data isolated in operational systems, has been

shown by professionals [70–72]. The impact of these systems on organizations at several levels, including operational, tactical, and strategic cannot be overstated [73,74].

As a result, BI systems and solutions are becoming more critical in organizations because they give users high-quality information that helps them make more intelligent decisions that have a significant impact. In order for users to benefit from these solutions, they must be knowledgeable about the value of the BI solutions and how they may improve their work [75].

2.4. Critical Success Factors for BI Systems

The ineffectiveness of BI may be linked to a lack of knowledge of these determinants [76]. A variety of success factors have varying effects on BI, which prompted researchers to investigate and examine the numerous success determinants in various industries [67]. According to Yeoh and Koronios (2010) [77], determinants are divided into three categories: organizational, process, and technology; this way, it was possible to see what determinants were the most important and which roles were responsible for preventing problems with a crucial success factor; furthermore, this categorization shows that technical success factors are not the only things that matter for BI systems.

BI users' skills, human resources management, trust, and knowledge, among other variables, were cited by Olszak (2016) [78] as the essential factors in the success of BI efforts [79]. For BI, Adamala and Cidrin (2011) [80] identify managerial support as one of the most important criteria for its success. Small and medium-sized businesses that get good management support are more likely to be successful, according to a survey of small and medium-sized enterprises by Olszak and Ziemba (2012) [17]. Yeoh and Popovič (2016) [18] and Salmeron and Herrero (2005) [81] agree that BI projects need help from the people who run them to be successful; moreover, both Wixom and Watson (2001) [56] as well as Dawson and Van Belle (2013) [82], emphasize strong management as a significant determinant. Yeoh et al. (2008) [79] suggest a framework of seven dimensions that includes several critical success factors. First and foremost, there must be a firm commitment to ongoing management support.

Adamala and Cidrin (2011) [80] use the same three viewpoints and classify the quality of information and integrity as essential and crucial success criteria for the technical view. Data quality is cited as the most essential and crucial success criterion by Olszak and Ziemba (2012) [17] and Dawson and Van Belle (2013) [82]. Yeoh et al. (2008) [79] refer to determinants concerning data, such as the quality of information from the source systems. As a result, data that need to be saved are readable and comprehensive; moreover, information has a shared knowledge of the metrics and classifications of data. Compatibility with other systems is a significant success factor that is highlighted by Olszak and Ziemba (2012) [17], who emphasize compatibility when discussing the integration of BI with other systems as a crucial success criterion.

According to Dawson and Van Belle (2013) [82] as well as Wixom and Watson (2001) [56], users' involvement is the most significant component. While Olszak and Ziemba (2012) [17] define the determinants for leaders as having a qualified manager, Yeoh et al. (2008) [79] identify various essential factors of success for IT managers, such as sensitivity, IT knowledge, and experience with information systems, social skills, and credibility; indeed, they also state that planning and having a good relationship with executives are essential, and furthermore, Yeoh et al. (2008) [79] propose educating staff in the BI system. According to Sadeghi (2018) [83], management support, user engagement, and team capabilities have the most crucial effect on the utilization of BI systems.

Adamala and Cidrin (2011) [80] say that having a clear vision for the organization is very important for these BI solutions to work. Yeoh and Popovič (2016) [18] and Dawson and Van Belle (2013) [82] say that having a clear vision and a well-established business case is one of the most important things to succeed. Another essential thing which is highlighted by Thamir and Poulis (2015) [84] is the existence of a well-defined implementation plan; moreover, Olszak and Ziemba (2012) [12] and Yeoh et al. (2008) [79] have talked about

change management as an important determinant of BI implementation success, and this is also thought of as the system's users being involved in the project's whole life cycle. According to Wixom and Watson (2001) [56], the company's resources can also influence its potential to prosper. Yeoh et al. (2008) [79] state that having enough money is a significant factor in success. Table 1 presents the critical success factors of BI systems based on the existing literature.

Table 1. Critical success factors for BI systems.

Factors	References
Support from top management	[18,26,56,74,76–82,84,85]
Well defined business process and requirements	[17,18,74,77–79]
Clear business vision	[17,18,26,74,77,82,84]
Project management	[17,74,80]
Change management	[17,18,26,74,77,79]
Participation of end-users	[17,18,74,77]
Education	[74,78]
Skills	[17,26,56,74,78,80]
Data and information accuracy	[17,18,26,56,74,77,79,82,84]
User-friendly system	[17,18,26,74,77,80]
Organizational culture	[17,74,80,84]
Resources	[17,26,56,74,79]

An outline of the crucial determinants can help many stakeholders in a BI project better understand what is needed to make their work more efficient and thrive during the planning and implementation phases [79].

3. Methodology and Proposed Framework

3.1. Management Support

The use of BI by firms can help them manage information more efficiently and make better decisions. BI is all about knowing how vital institutions, people, and tools work together in an organization. Healthcare managers use these data to make better decisions, and users in the health industry need real-time data to manage information better and develop communication and knowledge that can increase the quality of health services and reduce risks. BI systems could have a significant impact if they are implemented correctly. An integrated data source can help prevent inconsistencies between departments' cost or benefit estimates and allow the senior management team to perform practical impact analysis. In order to keep their staff up-to-date on the latest developments in healthcare, firms need to collect case studies from both successful and unsuccessful implementations and communicate this information with experienced healthcare professionals [13].

According to Jahantigh et al. (2019) [27], executives should not rush into using BI and should not view it as a cure-all for all issues; the organization's infrastructure must be thoroughly assessed before BI can be implemented; organizational infrastructure must be looked at to see if BI can be used technically and managerially; the first and most critical prerequisite for a successful BI adoption is "senior management support."

Several non-technical characteristics of a company, such as dedicated management support and a sufficient organizational and technological infrastructure, can substantially impact employees' cognitive views and their internal motivation to adopt change and begin employing this prominent innovation Specifically, an information culture that is quickly set up and nurtured can help spread a "BI culture" across the organization [82,86].

3.2. User Involvement

User interaction is required to provide input beyond the initial development process, such as updating data features and business rules and eliminating metadata conflicts that developers may otherwise overlook [77]. Functional testing can be done to ensure that

the system meets the user's needs; when the BI system is used regularly, the users can be significant in recommending and reviewing changes.

In addition to allowing users to appreciate better the missed opportunity and risk that results from a lack of specific information or system capacity, interactions with the BI system enable users to request and demand the missing data or increase system functionality [87]. Top management also helps users figure out if they can make decisions with the dimensions of the BI systems they use regularly; they also give constructive feedback (reinforcement or suggestions for how to add more features to support their unsupported and evolving decision-making requirements), which improves the firm's BI system's ability [87].

As Grublješič and Jaklič (2015) [86] note, continuous support for BI system usage is vital for intensive usage. Otherwise, utilization falls, especially in the early stages of service, until the adoption of the system. Concerning BI systems acceptability, user participation and involvement in the deployment of BI systems are particularly stressed. The use process is not usually built into the application like in operational IS; this means that training to help users understand the content is more exposed to BI systems. The gap between using the system and its information is more significant, assuming that BI systems also provide relevant information.

3.3. Processes

Processes are fundamental in the context of BI and they can be thought of as the main aspects that start gathering, processing, and delivering data and information. People in the healthcare industry use a lot of different types of data to help them diagnose and treat diseases and illnesses and run their businesses and groups. Patient data, clinical, operational, and financial data, and medical know-how fall under the healthcare umbrella [2,42]. People who study healthcare data often find many different data sources, complex data, different regulations, and possible adverse effects on a patient's health and life [11].

3.4. Information Technology

When technology is used for BI, it helps with data storage, analysis, visualization, and access [67]. The BI system can show statistics about how healthcare management and strategy are done, as well as how well care is delivered. Analytic tools can help hospital administrators improve operational efficiency, clinical outcomes, and financial performance [13]. To ensure that management decisions are made on time and correctly, BI tools provide visually appealing reports that make it easier for users to grasp complex processes and relationships; this helps improve overall performance and helps managers better understand the impact of their decisions on the company as a whole [23].

In the context of BI systems, high-quality systems and data play a crucial role. One of the most important things about a system is that information should be easy to find and get to. When it comes to determining system quality, the traditional metrics of reliability and complexity aren't as important as they once were because the BI system is supposed to provide users with competitive information that they can use to help enhance the organization's performance [86]. The BI system was thought to be complicated, but both businesses found it simple, friendly, and easy to use.

According to Setiawan (2019) [24], the failure of healthcare information systems is hindered by the fact that the underlying data used to build the system is not sufficiently structured. Because of its ability to assist healthcare business decision-makers in making better choices, BI has emerged as a novel and beneficial technology. In this case, data accessibility is linked to the essential characteristics of data quality, which are output quality (e.g., data with intelligible meaning and relevance) and data correctness [22,84,86,88].

3.5. Individual Characteristics

Age, education, computer literacy, computer self-efficacy, attitude, prior experience, and computer anxiety are significant factors in determining whether or not a person is willing to use a BI system. Aside from demographic variables, personal innovativeness

and readiness for change were the most critical individual determinants. With regards to BI systems, more inventive individuals can use data in the less structured business processes in which BI systems are typically used, which in turn boosts their ability to be innovative [86].

3.6. Strategy

By combining and analyzing critical organizational data, BI systems have already demonstrated their value in the current business environment [89]. By gathering, storing, evaluating, and communicating critical organizational information, BI systems help organizations make better decisions [85,90]. Additionally, BI systems aid firms in achieving their strategic business goals by helping them make better decisions [91,92].

According to Grublješič & Jaklič (2015) [86], since these enterprises are more reliant on new and competitive information, BI systems are more widely accepted and implemented in these organizations than other businesses. A growing amount of pressure is being placed on healthcare institutions to boost patient care while using few resources and ensuring that resources are used most effectively and efficiently [93]. A hospital's ability to integrate and analyze data is enhanced by BI tools, which require quick, strategic decision-making. BI systems provide an organization's stakeholders with processed data to aid strategic decision-making [93].

By using BI systems properly, firms can save money, time, and resources while also improving their business processes, which helps them achieve their long-term strategic goals [91]. Main activities' performance, the timelessness and quality of information, and managers' ability to understand their company's position concerning their competitors are all aims of BI system implementations. Organizational decisions are supported by providing access to existing data [94].

3.7. Social Factors

BI systems users must experience social influence when using BI systems. As a result, users will begin to use BI systems more frequently if they see the benefits, particularly in terms of their image, and can see and demonstrate the effects of their use. The increasing recognition that social influence and the demonstrability of results influence an individual's cognitive process for conducting a behavior is particularly highlighted in the BI systems context because the usage of BI systems is largely voluntary and there is extensive data sharing [86].

Even though BI systems users are more inclined to use BI systems if they believe the outputs of their usage are measurable and transferable (that is, demonstrable) and if they believe personal image enhancements that could lead to greater social participation and status in the organization [86].

3.8. Organizational Learning Culture

In order for BI systems to be accepted, the organization's culture must be healthy [94,95]. For example, Marsick and Watkins (2003) [96] argue that employees should be actively involved in the learning culture; they look at aspects of learning culture related to employees, such as team-based learning, continuous learning, and empowerment. Creating a learning culture and engaging in information processing is vital for the senior management of healthcare organizations [96]. There has recently been research on the moderating effect of corporate learning as a resource for organizations (exploration and exploitation) by Fink et al. (2017) [89]; they found that only exploration tempered the effects of the BI infrastructure and the BI team on operational and strategic BI skills. Following up on the previous analysis, we claim that organizational learning culture, a big part of corporate culture, could positively affect BI systems in the health industry.

In healthcare organizations with a learning culture, knowledge creation, processing, and dissemination are done, and staff is encouraged to show the behavior that shows they have learned new things. Organizations that have a learning culture are better

able to learn and grow in ways that help them achieve their goals and be successful in the long run. Learning culture and BI systems can impact how well a healthcare organization does; an organization's learning culture affects the BI systems that are part of it. Consequently, hospital administrators must create a learning culture that facilitates an intelligence repository for strategic decisions that improve performance [67,93,97].

In accordance with the existing literature, Figure 2 presents the proposed framework for the factors that influence BI development and acceptance. The framework will be evaluated by employees in the health sector who use a BI system. A quantitative survey will be conducted to investigate how the suggested factors influence BI development and acceptance in Greek hospitals. The main purpose of this system is to standardize and harmonize planning and reporting procedures, as well as to empower public hospital staff in Greece with the appropriate information and knowledge to support decisions in their role. The main objective of this study is to identify areas that need to be improved in order to increase users' acceptance of the BI system in place.

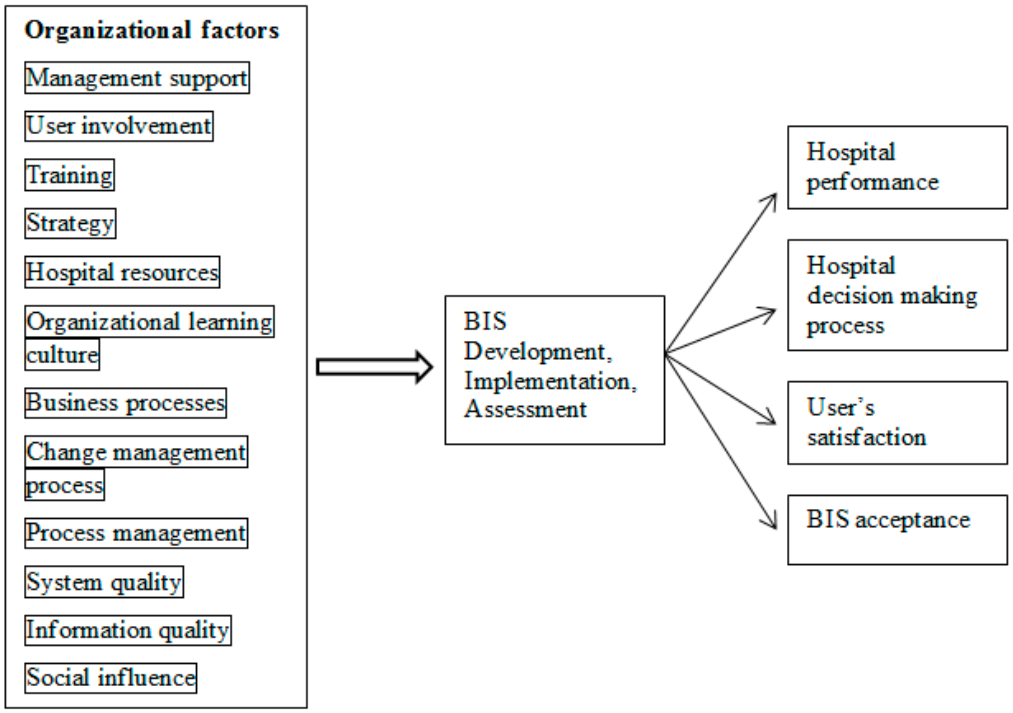

Figure 2. Proposed framework.

The BI System named "BI-Health" is a modern information system that enhances the actions of the Ministry of Health's Administrative Information; it plays a central role in the organizational, functional, and economic modernization of the National Health System, and simplifies administrative information procedures, more efficient management of resources, and detailed control of operational and financial figures. The BI-Health system ensures the collection and processing of analytical and aggregated data of the Public Health Units by connecting the Ministry of Health, the seven regional health information systems, the 131 hospitals, and the primary care units.

4. Discussion

Changes and difficulties are occurring worldwide in the healthcare industry. Both private and public sectors are under intense pressure to improve. One of the goals of creating an integrated BI system is to help hospitals become "Hospital 4.0". Organizationally, cutting down on the time and money spent on specific tasks is important because it will allow for maximum productivity in a variety of hospital specialties.

When it comes to the theoretical contribution, one of the most crucial aspects is the framework for better use of BI in the healthcare field. As a result, investments in BI systems should do better. Supporting the effective usage of BI systems is critical to realizing the advantages of BI investments, which in turn help businesses perform better; this study gives us a better knowledge of how BI systems can help in eight important ways: management support, user involvement, processes, information technology, individual characteristics, strategy, social factors, and organizational learning culture.

Organizations in the health industry can focus their efforts on the disclosed success factors, which have important implications for practice to get the potential benefits of BI systems development. BI systems initiatives must be very business-oriented, with a strong focus on strategic alignment and process orientation, a customer focus and analytical culture, management commitment, and a plan for change management. The proposed framework breaks down the determinants under organizational, process, and strategic environment into several ways and techniques that should be used to help them grow so that BI systems can be successfully deployed. For managers, this will be an excellent way to figure out which factors need to be looked at during digital transformation.

This framework could have implications for information technology project management teams, management strategies for future BI systems installations, end-user perspectives on BI systems use, as well as technology-based projects and strategies; this study could help develop new BI systems, especially when it comes to the main factors that increase the extent of their adoption in healthcare organizations.

Concerning practical implications, this paper shows healthcare executives, managers, hospital administrators, information technology executives, system analysts, and human resource managers how to better allocate resources to BI systems implementation to improve their organizations' performance; to get the results they want, they need to ensure that the BI system is implemented successfully and adequately. As a result, BI systems users must be trained to the highest level possible to achieve a competitive advantage by having a successful organization.

5. Conclusions

The aim of this article was to develop a framework for successful BI system development in the health sector, taking into consideration the organizational determinants of BI systems' acceptance, implementation, and evaluation. The proposed framework classified the determinants under organizational, process, and strategic aspects as different types to ensure the success of BI system deployment.

A limitation of this paper is that the framework has not yet been tested. Researchers will be able to conduct interviews with healthcare professionals in the future to find out what the most critical factors and challenges are to using BI systems effectively. Future studies might empirically evaluate the suggested research framework in different hospitals, as well as summarize the main barriers and success factors. To examine if BI can make a difference in how well a healthcare organization does, this framework could look at the BI maturity of different healthcare organizations and then evaluate a set of hypotheses about how BI might affect their performance.

In addition, field studies (in the form of surveys) that look at a wide range of organizational and environmental factors such as size, structural attributes, system architecture, resources, culture, management attitude, institutional and competitive forces, and technology support structures that affect how organizations work to improve their BI systems should be done as a new way to look into the field of BI. There are still many unanswered questions about the post-adoption use of the BI system, so this could be another avenue for future research. To better understand how BI systems are used, it is essential to look at various ways people use them; this is because there is a significant difference between how people use the system and what they do because of the information the system gives them.

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