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# Hospital Management Information System in Increasing Efficiency

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## Abstract

Healthcare services are the main topic because of the high complexity challenges in the health sector. The purpose of this study is to determine the implementation of Hospital Information System (HIS) in increasing the efficiency of healthcare services. The research design used in this article is a literature review method related to Hospital Information Systems in supporting the efficiency of hospital services using databases. In this study, the researcher collected literature review data with a thematic structure based on the concept of thinking using the keywords "hospital information system", "information system efficiency", and "healthcare efficiency" which were compiled to answer scientific questions by grouping and discussing literature sources accordingly to the theme or topic. The results showed that Hospital Information System can minimize the complexity of healthcare services by increasing organizational efficiency through innovation in developing information system based on business process management, service automation, reducing costs, improving hospital performance, which aims to develop human resources, organizational development, and technological quality improvement to achieve efficiency in healthcare services.

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## 1. Introduction

Hospital Management Information System (SIMRS) is one of the subsystems in the Hospital that processes all information related to humans as users according to their respective roles (Haux, 2010). The Hospital Management Information System plays an important role in supporting the entire process in the Hospital with information technology (Chen & Hsiao, 2012). The implementation of SIMRS is very much needed to integrate all services in the Hospital; modern SIMRS is very comprehensive, integrated, and is specifically designed as an information system to regulate the administrative, financial, and clinical aspects of the Hospital and healthcare facilities, which are an important focus as a basis for information on providing care for patients and integration with external institutions such as health insurance and other healthcare facilities that are interrelated in the exchange of information (Ismail, Jamil, Rahman, Bakar, & Saad, 2010).

## 1.1 Literature Review

Hospitals have various complexities as health service facilities from each dimension, including situational complexity, system complexity, and medical complexity itself (Kuipers et al., 2011). The complexity of hospitals is increasing when faced with various government regulations and national health insurance systems that are continuously updated to achieve the best quality of care for patients. This creates complexity in terms of the system, namely related to the patient administration process in health services. With the existence of information technology, integrating the system becomes easier, minimizing the negative impact of the complexity, and improving the best quality of care for patients so that patient satisfaction is achieved (Peng, Ye, Feng, Ding, & Heim, 2019).

Hospital Management Information System is very important in the health industry as a supporter of specialized health activities and services with a wide scope (Ahmadi, Nilashi, Shahmoradi, & Ibrahim, 2017). There are many benefits from implementing a Hospital Management Information System found in previous studies, including increasing access to information, increasing the productivity of healthcare professionals, increasing the efficiency and accuracy of codes and patient financial billing data, improving the quality of healthcare services, improving clinical management in terms of patient diagnosis and care, reducing the cost of paper requirements for medical records, minimizing medical errors, increasing patient safety, improving patient care outcomes, and increasing patient satisfaction. Of the various benefits, the benefit that is most felt from the implementation of the Hospital Information System is improving access to information in the Hospital between healthcare workers and patients so that the service flow is more efficient (Handayani, Hidayanto, Ayuningtyas, & Budi, 2016).

## 2. Research Methods

The research design used in compiling this article is a literature review method related to the Hospital Information System in supporting the efficiency of Hospital services using databases including PUBMED, Sciencedirect, Researchgate, and Google Scholar, in the period 2010-2020. In this study, researchers collected literature review data with a thematic structure based on the concept of thinking that was arranged to answer scientific questions by grouping and discussing literature sources according to their themes or topics. Search based on the topics discussed by compiling the discussion topics into a mind map (**figure 1**) as an illustration to facilitate searching based on topics in each branch of the mind map, then the search begins by inputting the keywords "*hospital information system*", "*information system efficiency*", and "*healthcare efficiency*" in each database.

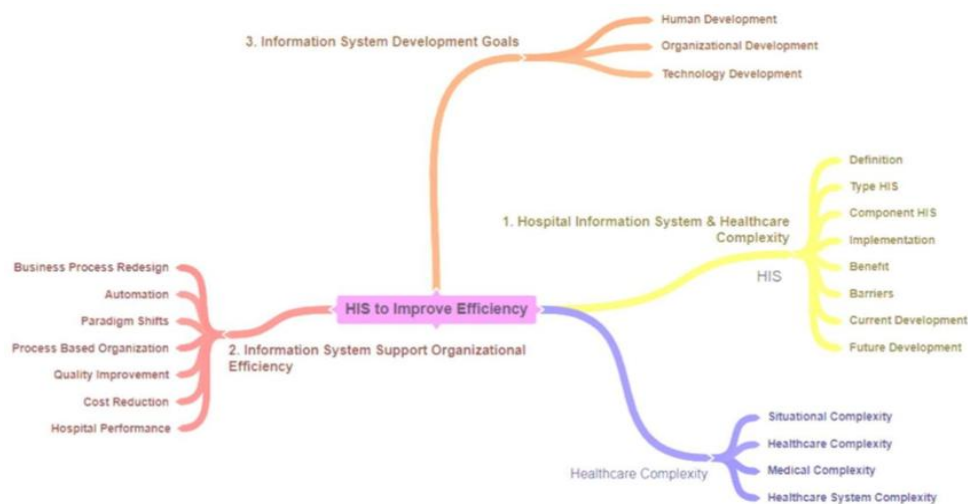


Fig 1. Research Mind Map

The image above is a concept of thought that is arranged based on the topic of discussion of literature search to answer the formulation of the problem related to the implementation of the Hospital Management Information System in increasing efficiency, covering 3 discussion topics, namely, Hospital Information Systems and complexity in health services, information systems supporting organizational efficiency, and the purpose of developing information systems. Data analysis carried out by researchers in this literature review using the critical appraisal method, with the process of analyzing the journals used as the basis for the theory related to the differences, similarities and shortcomings of the selected journals. Journals are reviewed to select journals that are appropriate to answer research questions from each branch of the topic to be discussed in the concept of thought above. then the researcher synthesizes and pours the results of the literature review into a new article that provides an overview of the implementation of the Hospital Management Information System in supporting the efficiency of current health services.

### **3. Result and Discussion**

Based on the literature search and literature review, three discussion topics were obtained with detailed points that support the explanation of the Hospital Management Information System in increasing efficiency.

#### *3.1 Hospital Information System and Complexity of Health Services*

##### *3.1.1 Hospital Information System A Hospital*

Information System is a subsystem of the entire technical Hospital consisting of all information processing systems used by individuals concerned according to their respective roles in using the system, the purpose of using this system is to support patient care starting from patient administration by considering economic and legal aspects related to patient data security. In the current era, there is a modern Hospital Information System, namely a comprehensive and integrated information system with a special design to manage all aspects starting from administration, finance, and clinical needs of the Hospital and other health service facilities, with this information system being one of the main focuses of the health service support system in the Hospital.

Hospital Information System has 5 important components or modules including registration, request data entry and result reporting, clinical documentation, scheduling, and patient billing . Hospital Information System in its implementation process must have several integrated modules ranging from front to back services and supporting modules including: registration module, medical record module, Order Communication System (OCS) module, billing module, and emergency room, outpatient, and inpatient service modules.

The development of Hospital Information Systems continues into the era of industry 4.0, where the principles of industry 4.0 combine the digitalization process of clinical, medical and laboratory data and implement the automation process of manual processes that have long been used by hospitals and other health services through innovations in cloud computing systems and the Internet of Things to manage large amounts of patient data. These system innovations will minimize delays and provide opportunities for the field of medical information technology to significantly improve health services [30]. The use of Internet of Things (IoT)-based medical information technology is a health education tool that sends information directly to patients via smartphones, the information obtained will increase patient knowledge of disease conditions and patients can integrate it with pharmacological therapy and non-pharmacological care that they receive, other facilities obtained by patients are independent monitoring of health conditions such as independent blood sugar checks, then patients enter their data into the available application and doctors can routinely monitor the patient's condition and attitude towards their disease, making it easier for doctors to make medical decisions for patients and achieving an increase in health quality and patient satisfaction so that optimal and efficient services are achieved.

### *3.1.2 Complexity of Health Services*

Complexity arises from multifactorial interactions, namely patient factors in the form of culture, behavior and socioeconomic level, health practitioner factors in the form of competence and training, health task factors in the form of workflow and availability of time and technology, team factors in the form of communication barriers and leadership roles, physical and social environmental factors, and organizational factors in the form of organizational structure and policies and standard operating procedures. Complexity has a very large effect on the health care process and its outcomes, complexity in health services increases the cost of health services related to comorbid conditions and the need for more sophisticated technology, and also becomes a source of injustice in health services such as the provision of health services according to certain ethnicities or certain socioeconomic conditions, who are entitled to receive health services so that it can affect the results and quality of health care.

The complexity of the health care system is a problem that is often faced related to systems such as referral systems from primary health care services into complex conditions between general practitioners and other parts of the health system, and the difficulty of reporting back referrals that are hampered by inadequate information [20]. Other system complexities include fragmentation of services in the form of differentiation in specializations related to the health system in terms of policy, funding, organizational differences, non-uniform service delivery making the health system more complex. Funding is also a system complexity, such as poor medical conditions and having comorbid diseases will increase health care costs, because there is no clear conceptual agreement in the management of ineffective and inefficient care complexity, thus increasing costs.

## *3.2 Information Systems Supporting Organizational Efficiency*

Efficiency is a process to achieve predetermined goals with appropriate and optimal results, based on the definition of the efficiency process, namely the achievement of good organizational goals, with minimal costs and short time based on previously set targets.

### *3.2.1 Process-Based Organization*

Organizations can improve their quality by measuring the added value of business processes exclusively from various external and internal customer perspectives, ensuring the level of quality of product output and its quality processes is an important aspect of process-based organizational design. A good process-based organization has a significant influence on Hospital efficiency, so that Hospitals must implement a process-based organization to improve its efficiency, but to achieve optimal results on efficiency it is very important to make important rules, especially to mobilize the participation of doctors and other health workers to create an adequate organizational culture [38]. Organizations can increase their efficiency by creating a good work environment and system, reducing costs, and increasing organizational productivity.

Digital transformation is one of the challenges for organizations that can change the previously designed business process model, whether the Hospital can face the challenge or be negatively impacted by it. The company system model such as the system and service model using software is important, because it can provide optimal contributions to increasing organizational efficiency, the digitalization model that can be implemented such as Hospital Information System software that uses a digitalization architecture model using the internet [43]. This model can be used by the Hospital in developing an internet-based Hospital Information System so as to facilitate access to information for both health workers and patients.

### *3.2.2 Automation*

Automation is the transformation of manual tasks in a business process into tasks that can be done or assisted by information and communication technology. In other studies, the automation process has been successfully implemented in health care because it can improve the management of patient information to be integrated

and improve the clinician's workflow in storing and obtaining information related to the patient. The document management system and automation process use the Hospital Information System platform, which integrates the laboratory data system to the information center into an automated chain until validated by the doctor in a shorter time than before, so that clinicians can obtain data on the time of the analysis request, the time the process starts, and the time the results will appear, thereby reducing complaints from patients.

#### 4. Conclusions

Based on the literature review above, it is concluded that the Hospital Management Information System is an innovation in the development of Hospital technology that supports the optimization of health services. Optimal service is indicated by the achievement of the Hospital's vision in increasing efficiency through an integrated system, which is able to minimize the complexity of health service fragmentation so that patient health care efficiency is achieved.

Efficiency is also achieved by implementing a Hospital Information System that is oriented towards the business process needs of each Hospital. Adjusting business process needs with the Hospital Information System can support the Hospital to have a competitive advantage and be able to compete. The interaction of human resources, organizations, and technology quality in developing the system is able to achieve the objectives of implementing the Hospital Information System.

Implementation of the Hospital Information System aims to achieve the effectiveness of clinical flow, efficiency of use and security of technology, better control of operational costs, and contribute to improving health services for patients.

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