Implementation of management information system at health agencies

E S Soegoto¹, M E Wardana², and D Oktafiani³
¹Departemen Manajemen, Universitas Komputer Indonesia, Jl. Dipati Ukur No.112-116, Lebakgede, Kecamatan Coblong, Kota Bandung, Jawa Barat 40132, Indonesia
²Departemen Sistem Informasi, Universitas Komputer Indonesia, Jl. Dipati Ukur No.112-116, Lebakgede, Kecamatan Coblong, Kota Bandung, Jawa Barat 40132, Indonesia
³Departemen Sastra Inggris, Universitas Komputer Indonesia, Jl. Dipati Ukur No.112-116, Lebakgede, Kecamatan Coblong, Kota Bandung, Jawa Barat 40132, Indonesia

*dinaoktafiani@mahasiswa.unikom.ac.id

Abstract. The aim of this research is to make the business processes of a health agency especially clinics effective and efficient, by computerizing the system using a website to increase profits and reduce clinic expenditure, especially in the use of paper. The method used in this research was the descriptive method to describe the computerized and automated clinics' business processes. The result of this research was to identify how far the application of technology to business processes and the benefits of implementing a website-based information system at clinics. This research was conducted to discuss the clinic medical record management system, clinic transactions, and clinic drug management. The results of this research will improve business processes and the clinic's data management to be more effective and efficient by automating and computerizing the system.

1. Introduction
Entrepreneurs are the people who create organizations [1]. Organizations that are formed can work in various fields, one of which is in the health sector. A small independent form of individual health organization is the clinic. The clinic provides general services for the nurse, doctor, and patients practitioners, early diagnosis, offers multidisciplinary assessment, plans for an individual's care package for each patient, and also the clinic has an educational function as a provider of research resources [2]. Lasy explained technologies that often discussed in Industry 4.0 are Artificial Intelligence, Big Data, and the Internet of Things (IoT) [3]. Big data in health is related to data sets that are very large, fast, and complex for the health service provider process and interpret them with existing tools. This is driven by constant efforts to make health services more efficient and sustainable, given the demands of a growing population with an inverted age pyramid, and a paradigm shift in providing health services towards prevention, early intervention, and optimal management [4]. Traditional patterns that are still fully manual gradually change into an automation system that uses sophisticated technology in its business processes [5]. Nowadays, information systems are increasingly needed to measure and improve the quality of health [6]. The management information system is a formal method that provides management with accurate and timely information to facilitate the decision-making process and make the organization able to carry out the functions of planning,
operating, and controlling effectively [7]. Information systems are uniquely positioned to capture, store, process, and communicate information on time to decision-makers for better health care coordination at the individual and population level [8]. Symeonaki described that the application of Management Information Systems (MIS) is effective and efficient in helping an organization to reach the mature level of automation by managing their procedures through data collection, processing, analysis, and reporting [9].

Furthermore, the function of clinic information system is to enter, regulate, and produce output effectively with efficient business processes including registration processes, medical record services, medical actions, compounding medicines, drug data management, and to produce outputs in the form of reports for clinic leaders. In contrast to Duan Yan-e's research that designed the Agriculture Management Information System (AMIS) to increase the level of agricultural information processes and improve smart management and agricultural production decisions using tools with the internet of things (IoT) methods such as global positioning systems (GPS) to obtain geographical information on agricultural land, remote sensing (RS) for airborne data collection systems, radio-frequency identification (RFID) as the main component of tracking, and GSM mobile communication networks [10]. Unfortunately, researchers are not currently conducting an impact analysis that occurred after the health management information system was used in clinics located in Indonesia.

The purpose of this research is to develop a health management information system at clinics by computerizing and automating the system to improve business processes that are more effective and efficient, as well as reduce clinic expenditure by minimizing paper usage. The method used in this research was the descriptive method to describe the process of computerized and automated clinics management information system for all job positions.

2. Method

The method used in this research was a descriptive method, which aims to find out the components of clinics management information systems. And, this research used the previous research related to the development of clinics management information systems. So it can be analyzed how far the application of technology in management information systems in the clinic.

3. Results and Discussion

To facilitate users, management information systems applications in a company can implement a web-based system that can be accessed through a secure online interface that is embedded in the website [11]. The advantages of web-based applications include being able to be used for various devices wherever and whenever. The clinic can consist of the main modules in the management information system, with an example module recommendation as follows below:

1. Patient registration and medical records data management
2. Patient medical services
3. Data management of pharmacy and medicine warehouse
4. Reporting to the clinic manager

In the patient registration module, it describes how the system manages patient identity data recorded at the clinic. This module is suitable for clinic administration by an administrator. The activity that can be performed in this module is to add new patient data identity by pressing the ‘add new patient’ button and filling in new patient data on the registration form. Another activity you can perform in this module is to examine each patient's medical record data by pressing the ‘view’ button. Also, in the administration section, patient ID data can be edited at the push of a ‘edit’ button. This module also allows the administrator to delete patient identification data at the push of a ‘delete’ button. The final function of this registration module is that the doctor adds one of the patients to the medical service queue list by pressing a ‘next’ button. Patients registered in the physician's medical queue are displayed on the service data page. The system design results for the patient registration module are shown in Figure 1.
Figure 1. Patient registration page menu

The medical record management module is recommended for use by doctors and clinic management departments. On this page, doctors can view patient data in a tabular format, so they can serve patients in order starting with the lowest queue number. In addition to making it easier for the doctor to read the patient's medical history, the doctor can press a ‘show data’ button. This page also allows doctors to edit patient medical record data at the push of a ‘edit’ button. The purpose of editing patient data is to update patient data such as the name and date of birth performed by the administrator, or patient medical services that can be performed by the doctor. In addition to editing patient data, doctors or management departments can delete patient data at the push of a ‘delete’ button. Figure 2 below shows the display of the medical record management module in the form of the patient's data table.

Figure 2. List of patient medical records page menu

When the doctor presses the ‘edit’ button, the website page moves to the page in Figure 3. This Patient Health Service module has a form for editing patient data such as name, date of birth, address, doctor name, nurse name, etc. Doctors can add new medical records for patients after providing excellent service consulting services and medical care. The doctor can update the Anamnesis / Pemfis data describing the patient's complaint. In the diagnostic column, the doctor writes the patient's illness in the form of medical code. If the patient needs to be referred to the hospital, the doctor can press “Yes” on the Reference data to notify the administrator to help manage the patient's referral letter. Finally, the doctor selects the name of the medicine and the rules of use that the patient needs for the pharmacist to prescribe. The medical record data editing form is shown in Figure 3 below.
After the doctor performs the patient’s medical service, the data is entered into a drug product page that can be performed by pharmacists and pharmacy staff. This drug compounding module includes a page for dispensing drugs that need to be prescribed for administration to patients. The pharmacist can see the patient's latest medical record data, the patient's recent medical history, and the medicine data recommended by the doctor. The system displays medicine inventory data written in green in the Qty column so the pharmacist can easily check the available drug inventory without having to look directly into the pharmacy cabinet. To improve the process of formulating medicine, medicine data, formulated or not, can be viewed from the status ‘not finished’ if the drug is not formulated, and ‘finish’ for formulated medicine data. To update the medication status, the pharmacist can press a ‘edit’ button. The display of this patient's drug compounding module is shown in Figure 4.

**Figure 3. Editing Form Patient Medical Representative Data Page Menu**

**Figure 4. Drug Formulation Page Menu**
One of the important modules of the clinic is medical management. The medicine must be managed to find medicine inventory and expiration dates to minimize expired medicine in the warehouse. Warehouse management can be performed by medicine warehouse staff or pharmacists. There are three activities that can perform on the medicine data warehouse page. In other words, press the ‘edit’ button to edit the medicine data. In the next activity, you can put medicine into a medicine data warehouse with the push of a ‘next’ button. Defecta is a letter for ordering medicines from a pharmaceutical distributor or supplier. The last activity is to delete medicine data at the push of a ‘delete’ button. The pharmacists can delete medication data if the medication is no longer used or if the clinic does not subscribe to medication from the same distributor or supplier. Figure 5 below shows the display page management for pharmacies and warehouses.

Figure 5. Pharmaceutical Data Warehouse Page Menu

The advantage of using the system is data management is faster and more accurate since the data is computerized without human intervention. This system allows clinicians to receive reports anytime, anywhere, without having to wait for employees to process them. The clinic manager's report page has a dashboard that displays charts for all aspects of the component. This allows clinic managers to monitor employees and ongoing clinics in business processes. Some aspects that clinicians need to know are employee performance, patient data, reports on patient medical records, reports on medicine and medical device usage, defects submitted from warehouses, financial reports, and Disease reports that are frequently displayed to the community. Next to Figure 6 is a display for monitoring and reporting of the clinic director.

Figure 6. Clinic Report Page Menu
4. Conclusion
The development of technology provides many conveniences in managing various fields, one of which is in the health sector. One of them is the application of management information systems to private health clinic agencies which at present can automate business processes by computerizing the system using the application of website-based information system technology. Besides being able to reduce operational costs by minimizing the use of paper, the clinic can also improve the performance of patient services to be more effective and efficient with system functionality in accordance with clinic needs.

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