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Analysis of the Use of Hospital Management Information Systems with *Jobs to be Done* to Increase Innovation Simplifying Administrative Processes at CHP Hospitals

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Abstract

The Hospital Management Information System (HMIS) must be developed and implemented in every hospital, in accordance with Minister of Health Regulation Number 82 of 2013, to provide the best service to the Indonesian public, the quality of hospital services must be continuously improved. The management of patient information, data, data processing, and all activities related to a good hospital depend heavily on this. It is important to understand how the implementation of the Hospital Management Information System can improve healthcare service standards in Indonesia after its implementation. Thirty-two samples were used in this study, and SEM-PLS data were analyzed using the Jobs To Be Done approach. The findings indicate that human, organizational structure, and system usage within the Hospital Management Information System (HMIS) can enhance healthcare technology innovation by simplifying administration in hospital services.

Introduction

Hospitals must uphold their social mission in the information age while improving their operational efficiency and competitiveness. Hospitals need to have internal resources including assets, knowledge, organizational processes, capabilities, management, and strategic policies. In addition, hospitals must be able to decide quickly and precisely how to improve the standard of health services offered to the general public. Hospitals must do this in order to transform into a responsive, creative, effective, and of course growing and competitive company. Through a network of coordination, reporting, and administrative procedures, computer systems known as hospital management information systems process and integrate the entire flow of healthcare business processes. The purpose of this system is to get information quickly, precisely, and accurately. Currently, the hospital computer-based Management Information System (SIMRS) is a very important tool, to help manage hospital operations.

Hospitals that still use traditional administrative systems have lost competitiveness. The reason is the lack of fast, precise, accurate, and integrated information assistance and coordination between departments does not run well which has an impact on the quality of service both internally, namely operational and external, especially patients. One of the efforts to improve services for hospitals that already have SIMRS is to evaluate existing SIMRS so that their benefits and functions improve service quality.

All individual health administration activities must be recorded and reported at hospitals in Indonesia (Permenkes No. 4 of 2018). The failure of SIMRS to be implemented due to problems with technology, human resources (HR), and organizational benefits of the system. WHO data shows that system users and organizations are strongly influenced by the quality of

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systems, information, and services. Organization greatly affects user satisfaction, and system, organization, and system performance greatly affect user satisfaction. The user's purpose determines how useful the information is. The purpose of analysis, manipulation, and presentation of information, as well as the need for rapid delivery and processing of information, depend on whether the information is useful or not.

According to Indrayati (2021), there are three factors that can be used to assess the application of SIMRS: human factors, environmental factors, and technological factors. Since patients belong to the group of data users involved with SIMRS, the human factor is critical to the successful implementation of SIMRS. Environmental factors are divided into two parts: regulation and management. Regulations cover laws and policies on security, confidentiality, and data access rights, while management covers activities such as financing, human resources, training and continuing education, information management, and infrastructure development.

If SIMRS is not used properly, it can lead to lack of convenience and efficiency, lack of coordination between hospital departments, improved services, and lack of prudence in registering the same patient, leading to duplication of patient data. In addition, without a driver's license, nurses have to enter nursing care data repeatedly, which is time-consuming and hinders the decision-making process. Based on the author's observations at CHP hospitals, it can be seen that the current hospital management has implemented SIMRS but there are still some problems such as SIMRS errors, so that registration services are hampered, while there are doctors who limit practice hours, when the specified service hours are over, the doctor leaves the practice so that patients are disappointed because they are not served by the doctor of their choice, While the patient has been waiting long enough. Another problem related to insurance, systematically for problematic insurance patients there is already a warning / notification because from the accaunting section has activated the system, but with the problem of SIMRS error it cannot be immediately known, the effect is that the patient has to wait because the registration officer cannot immediately provide the information, and in the end the patient is disappointed because he is late in getting information that the patient has problems with insurance as a guarantor while it has been waiting for quite a while. There is still a *Human error* of entry errors due to inaccuracy of officers, which has an impact on the next process, which is having to repeat the initial process due to corrections. Obstacles to the use of SIMRS sometimes occur *human error* for example found in the financial department, when the patient is about to go home, data processing is carried out in the entry from the nursing ward the amount of use of medical equipment, laboratories, medicines, doctor services, administrative costs and others related to the costs incurred during the patient's treatment, but after verification still found discrepancies, namely the data entered does not match the real due to *human error* or inaccuracy of officers in inputting usage data. This is what sometimes makes the service long and patients complin because the waiting time for patients to go home becomes longer.

Problems are also found in other parts, for example, if there is damage or there is a problem with equipment or facilities only by telephone for cito reasons, the department asks for maintenance to make repairs, but does not make requests through the system (*work order),* when it comes to repairing equipment or facilities, the viewing department directly asks for goods to the logistics department without any system request process at SIMRS so that the logistics department You cannot order goods because the stock system still exists, but physically the goods are no longer there because they have been taken for repair.

In the world of healthcare, information technology is playing an increasingly important role. Hospital Management Information System (SIMRS) is one of the technological innovations that has helped simplify and improve operational efficiency in hospitals. SIMRS Innovation

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and Technology has several advantages compared to the manual system that has been used by many hospitals. First, SIMRS can speed up the patient registration process. In the manual system, patients have to register directly at the hospital, fill out various forms and wait in line to get the medical record number. With SIMRS, patients can register online and fill out the registration form through the hospital's website. This will save time and make it easier for patients who are difficult to come directly to the hospital.

In addition, SIMRS Innovation and Technology can also improve the accuracy of patient data. In manual systems, there are often errors in writing patient data. For example, a patient's name or address that is mistyped or reversed. In SIMRS, patient data will be stored digitally and automatically. This will reduce patient data writing errors and make it easier for hospital management to manage patient data.

Another advantage of SIMRS Innovation and Technology is the ease of accessing patient medical records. In manual systems, patient medical records are physically stored in files. This makes it difficult for hospital management to find the necessary patient medical records. In SIMRS, patient medical records will be stored digitally and can be accessed easily by hospital staff who need the information. The challenge in SIMRS is the issue of data security. In SIMRS, patient data is stored digitally and can be accessed by hospital staff who have certain access rights. Therefore, hospital management needs to ensure that patient data is well protected and not misused by unauthorized parties.

In the face of the market and sustainable management, innovation is one option. Freeman views innovation as a company's attempt to create new products using technology and information. In other words, innovation is the creation of new ideas for change and continuous development to fit customer needs. According to Neumeier (2012), innovation is not limited to the creation of things; It also concerns attitudes, behaviors, or movements towards a process of change in all aspects of people's lives. As a result, innovation is described as new concepts, objects, information technologies, institutions, behaviors, beliefs, and practices that are not commonly understood, accepted, or used by the majority of the population in a particular region. This can be used to encourage change in all levels of society, with the aim of improving the quality of life of each individual and the entire community.

As has been said before, innovation is the act of developing service concepts that help patients in completing work or work better (Ulwick, 2008). Anthony W. Ulwick, a well-known author in the field of innovation, has contributed to discussions about customer demand, customer roles, and customer analysis. An important reference for this research, he is the creator of *the jobs to be done* philosophy and *Outcome Driven Innovation. Outcome Driven Innovation* (ODI) seeks jobs and consumer outcomes that are important but underserved or easy yet underserved (Ulwick, 2008). In other words, ODI is aware of the client's actions to identify unmet needs. To measure innovation, the ODI process works because it connects the results—or measurements—that customers want to do with the tasks to be performed. Ulwick (2008) is perfect for companies that believe they should shift their focus from a product-centric strategy to a customer-centric strategy to drive innovation. However, innovation takes time. A deep understanding of innovation mechanisms, carefully thought-out innovation strategies, and well-designed means to implement those strategies are necessary for innovation success (Shilling, 2017).

Innovation relies on understanding the client's request (Kozludzhova, 2018), but there are several things to consider during the process. If innovation is to succeed, these things must be taken into account (Kozludzhova, 2018). These factors can help companies win the innovation competition. But innovation will not succeed if it does not attract customers. Marketable

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products only have value when consumers buy the product. Therefore, the company must first understand the needs and desires of its customers (Kozludzhova, 2018).

Faced with this problem, it is important to improve techniques that can help companies find opportunities to create shared value and increase the thoroughness in selecting customers, finding variables that indicate a greater potential for customers to convert the resources provided by suppliers into value. In this article, we discover how to create value in the customer world using an *Outcome Driven Innovation* (ODI) approach, powered by *the Jobs to be Done* (JTBD) technique. Identify the client's problem (work) and the outcome they expect when looking for a solution in the market that demonstrates the value of the opportunity. Therefore, the predicted outcome will be threatened with the expected value when the solution is applied to its own environment.

Organizations must implement strategies to develop and maintain innovation potential. Some companies cannot continue to provide innovative products despite their best efforts. This could be due to a lack of innovation strategy. Therefore, it is important to find and study the sources and reasons for such failures. "Value is at the core of marketing and sales, but it is hardly mentioned in sales management textbooks or marketing in general,". According to Osterwalder et al. (2014), emphasizing and understanding customer suffering, profit, and work is critical to the success of any organization. Organizations must use a variety of tools, techniques, or models to better understand their customers.

According to Restyandito (2016), some of the functions of hospital information management are planning, *organizing*, *actuating*, *controlling*, evaluation, and innovation. This process takes place interactively. The results of the evaluation indicate problems and innovations in the development of the system, which are then planned for subsequent development. In every stage of information management, SIMRS becomes very important. Therefore, to meet the needs and technological advances that continue to grow rapidly, competent human resources are needed. Innovation can be a new method of doing something, the development of a new product, or the application of knowledge in business processes. Various tools can be used to evaluate the maturity of information technology management of a health institution. These instruments can be used to determine how well an organization's management manages the implementation of information systems.

A hospital institution needs to have a Hospital Management Information System (SIMRS) to solve problems related to its services. One of the subsystems of the hospital, SIMRS is very important to support all IT operations because it handles patient data based on everyone's request. All procedures related to medical records, patient diagnosis and treatment services, pharmacies, drug storage, collection, human resource databases, employee payroll, and accounting procedures are managed by the hospital management information system or SIMRS. Hospital health services can face obstacles that can be overcome by using SIMRS. SIMRS is an important management tool for hospitals looking to improve patient care.

Literature Review

Understanding SIMRS

Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 82 of 2013, every hospital must have a Hospital Management Information System (SIMRS). The SIMRS application must meet the minimum requirements set by the Minister of Health. The organization that handles the collection, processing, dissemination, analysis, and inference of data as well as the dissemination of information necessary for hospital activities is known as the hospital information system. Hospital information systems ideally include the integration

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of clinical (medical), financial, and management functions. This subsystem is then a subsystem of the hospital information system, and its task is to simplify hospital services by preparing information in accordance with existing functions (Husni & Putra, 2019).

The purpose of the Hospital Management Information System (SIMRS) is to provide timely, as needed, and accurate information. To improve the quality of medical services and improve patient safety, electronic medical records (EHR), *computerized physician order entry* (CPOE) and *clinical decision support systems* (CDSS). A survey conducted in 2008 found that only ten percent of public hospitals in the United States have used both basic and comprehensive Electronic Health Records (EHRs). Comprehensive EHR adoption rates are about the same in European countries. In 2007, only 11.9% of public hospitals in Austria and 7.0% in Germany used HER, and only 9% in Korea used HER (Putra et al., 2020).

The use of Hospital Management Information Systems (SIMRS) is expected to increase the productivity, speed, convenience, safety, effectiveness, and efficiency of medical workers. Technology enables fast data delivery to required parties or units. Technology also reduces the need for paper, making it more environmentally friendly. Information technology can speed up the administrative process from the time a patient registers to the moment they are discharged from the hospital. Hospital management will use information to make decisions (Beny, 2019).

Innovation

Innovation is more than just coming up with unique ideas; It's about putting those ideas into action by inventing new gadgets or procedures. In this new era of modern business, marked by new technological breakthroughs such as the Internet of Things and the phenomenon of Industry 5.0, innovation is a virtual necessity for market continuity and economic progress. However, rapidly changing consumer patterns require a realistic innovation framework; This requires companies to make the implementation of the concept difficult to understand, not persuasive. For example, for almost a century, people have been quite satisfied with gasoline/diesel engines. However, customers have noticed the damage caused by this machine in recent years. This shows that customer behavior is constantly changing, which encourages companies to change.

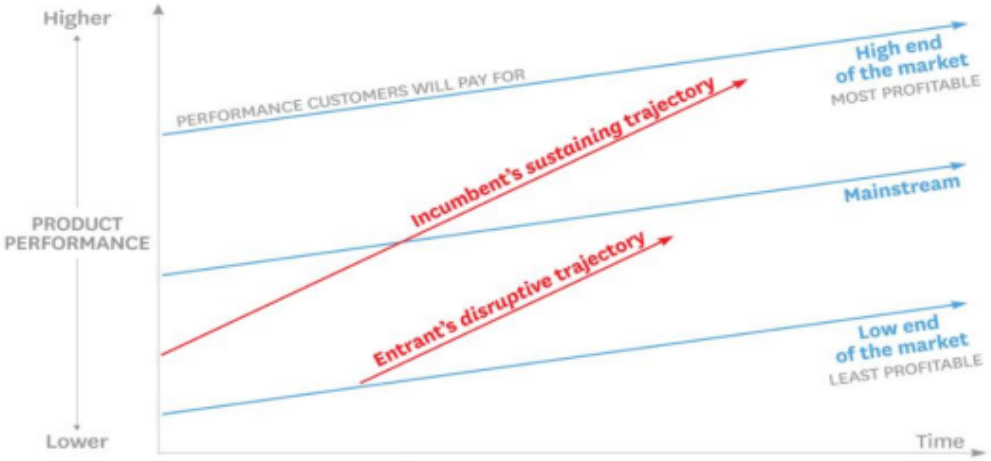

Figure 1. Disruptive Innovation Model

Ulwick (2017) states that the effort made is a perspective or lens that can be used to examine the market. He said the company can use the new perspective to better understand its market and client demands. Then, companies can use these new insights to improve innovation,

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development, sales, marketing, and research and development. To better understand its clients and see the market from a business point of view, the company is constantly developing new theories and techniques. This is the first step in any business. Although they have more customer data than ever before, managers face difficulties in meeting customer needs.

Innovation Oriented to Results and the Jobs to be done technique

The results-based innovation (ODI) approach, which combines innovation and development, was created by Anthony W. Ulwick. It emerged as a rival to a paradigm called Customer-Driven Innovation. This paradigm gains traction when businesses move from product-oriented strategies to marketing-oriented strategies (Ulwick, 2016). This paradigm states that businesses must understand the needs and preferences of their target market in order to create products and services that better meet consumer demand (Soares et al., 2005). Therefore, ODI provides another way for companies to develop new ideas. Thus, the innovation development process becomes more stable due to the idea of work to be completed (JTBD), which uses customer knowledge to produce more useful and successful solutions (Ulwick, 2016).

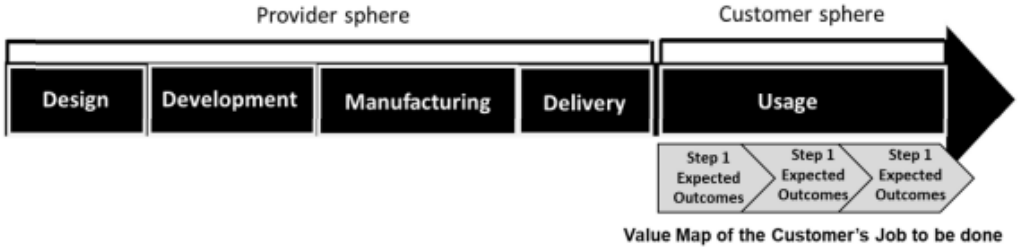

Figure 2. Value Acquisition Process

Source: Adapted from Grönroos & Voima (2013).

Therefore, the potential for value creation is enhanced through Results-Based Innovation and *the Jobs to be done* logic, which offers a comprehensive understanding of real problems facing customers as well as identification of areas where supplier organizations can find and pursue greater opportunities for action. There is a relationship between the value creation process that customers experience when using offerings in their environment and the process depicted by their work value map, which consists of related steps and outcomes. As a result, value gain will increase if customers receive more help with their JTBD. This perspective, adapted from the research of Grönroos & Voima (2013), is shown in Figure 2.

Research Hypotheses and Models

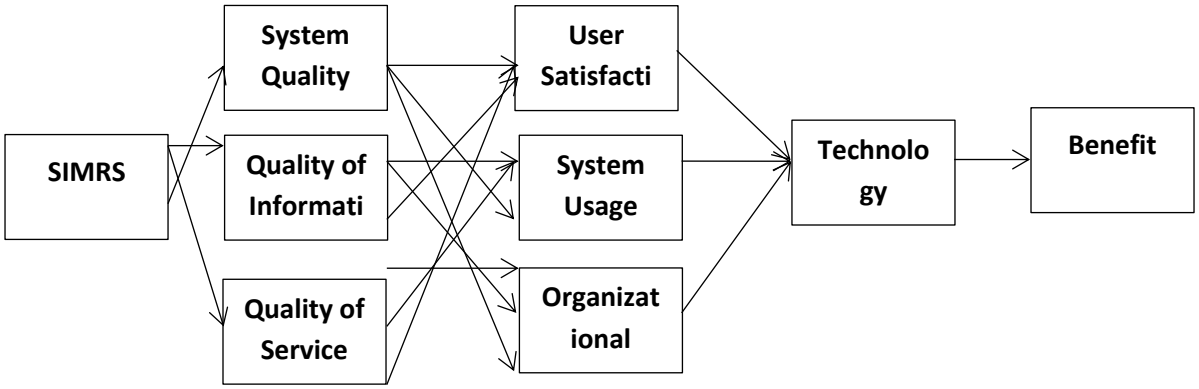

Figure 3. Hypothesis Model

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H1: User satisfaction has a significant effect on technological innovation

H2: Organizational structure has a significant effect on technological innovation

H3: The use of systems has a significant effect on technological innovation

H4: Technological innovation has a significant effect on benefits.

Methods

The methods and objectives of the study are described here. This dual case study answers research problems by relying heavily on qualitative methods and inductive approaches. Studies can be inductive, deductive, or abductive, according to Saunders, Lewis, and Thornhill (2012). Inductive techniques begin by looking at what is happening and anticipating what will happen when the theory comes to a conclusion. Using an inductive approach, this study looks at how organizations today seek to understand their clients through semi-structured qualitative interviews. After that, data from previous publications are evaluated. In short, the purpose of this study is to make hypotheses or anticipations. Deductive strategies study existing theories and then test hypotheses derived from those theories. Therefore, this study did not meet the standards of deductive strategies. This study will not investigate any hypotheses that arise from previous theories.

The JTBD technique assigns a score to each job based on job satisfaction – how much work was completed – and importance of the work – how close the task is to current management goals. To rate *Jobs to be done*, respondents rated satisfaction on a Likert scale. The *Jobs Done* Index (IJS) is another important indicator in this study because it will evaluate whether the work considered important by employees has an impact on organizational performance after completion. These indicators were combined by researchers to develop this index.

Adaptation to subjective measures in the past (Hosseini et al., 2022), information collected during qualitative interviews, and talks with professionals in their field led to the development of a scale of company performance. Researchers use a self-filled physical questionnaire that is sent and returned to the researcher directly. As shown below, the data were analyzed using SPSS® 20.0 and Smartpls® 2.0 software, starting with hypothesis analysis and moving on to model application and parameter comparison.

Key data were collected through a closed questionnaire of SIMRS users with selected respondents. While the survey was conducted of all system users with user identities, respondents from each service unit were interviewed. To investigate the relationship between the behaviors or events involved in the study, a closed questionnaire with five Likert scales was used. Quantitative data analysis is carried out using the SMART-PLS application for hypothesis proof. Inhibiting and motivating factors were identified using in-depth interview guidelines to eleven respondents selected by *purposive sampling*.

Table 1. Variable Operational Definition

Variable	Indicators	Source	Statement
User Satisfaction (Human)	aspects of system usage; User; Level Using System	Yusof *et al* (2006)	1. SIMRS can make employees interact flexibly 2. SIMRS supports tasks in building individual performance 3. SIMRS helps lower my error rate in doing work. 4. SIMRS can increase my work productivity 5. SIMRS is used according to my jobdesc 6. SIMRS helps in the decision-making process.

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System Usage	System quality; Output quality; Quality of service	Yusof *et al* (2006)	1. SIMRS improves communication between data. 2. SIMRS accelerates the presentation of information about hospitals. 3. SIMRS helps provide fast service (response time) to customers 4. SIMRS provides a reliable security system. 5. SIMRS has complete information data needed 6. SIMRS has a complete range of facility functions. 7. SIMRS has high access speed. 8. SIMRS assists in the implementation of government rules/regulations such as EHR 9. SIMRS provides accurate information. 10. SIMRS has user authorization as needed
Organizational Structure	Organizational structure; Organizational environment	Yusof *et al* (2006)	1. The support of hospital management in the use of SIMRS is good. 2. Management always completes all the needs needed by the SIMRS application 3. Hospital management conducts training related to SIMRS 4. Work unit supports the use of SIMRS 5. SIMRS makes communication between directorates more effective 6. SIMRS can improve organizational performance in facing current competition 7. Use of SIMRS in accordance with procedures (SOP)
Technology Innovation	Planning; Project management; IT strategy	Yusof *et al* (2006)	1. Develop a system plan 2. IT strategy for system development 3. The development of SIMRS can simplify the process of finding information 4. The development of SIMRS can facilitate decision making 5. SIMRS development is easy to use and *user friendly* 6. SIMRS development can reduce errors
Benefit			1. SIMRS has menus / facilities according to user needs that support in completing work 2. SIMRS helps do work on target 3. SIMRS has provided reports as needed in my work unit 4. SIMRS improves customer satisfaction 5. SIMRS can improve the efficiency of the service process work 6. The information/data displayed is in accordance with the data inputted 7. There is a facility / menu to correct data in the application 8. SIMRS speeds up and simplifies daily work

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Results and Discussion

Description of Respondents

The population of this study was CHP hospital employees using questionnaires used to collect information from respondents that had been disseminated online which was disseminated with a total sample of 32 respondents.

Table 2. Characteristics of Respondents

Characteristic		Sum
Gender	Man	9
	Woman	22
Education	SMA	15
	D3	2
	S1	13
Position	Executive	24
	PJ	5
	Head of Section	1
Period of Service	<1 Year	0
	1-5 Years	7
	6-10 Years	8
	>10 Years	18
Long Use of SIMRS	<1 Year	1
	1-3 Years	5
	4-5 Years	1
	>5Years	25

Measurement Model Analysis Results

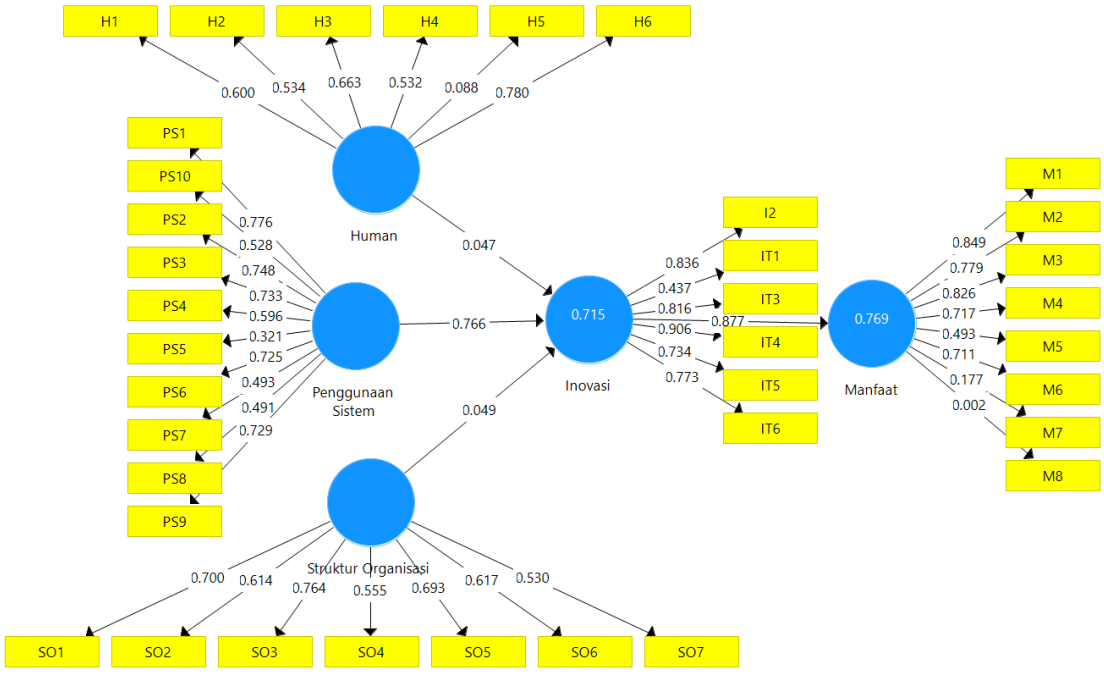

Figure 5. Initial Model of Measurement

The results of the initial outer model analysis there are several evaluations on variable coefficients with indicators. The coefficient value of <0.7 must be excluded from the model,

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the smallest loading factor value must be excluded so as to obtain a value according to the standard. After the process of issuing unqualified indicators periodically, the best outer model that meets the standard (>0.7) is presented in Figure 5.

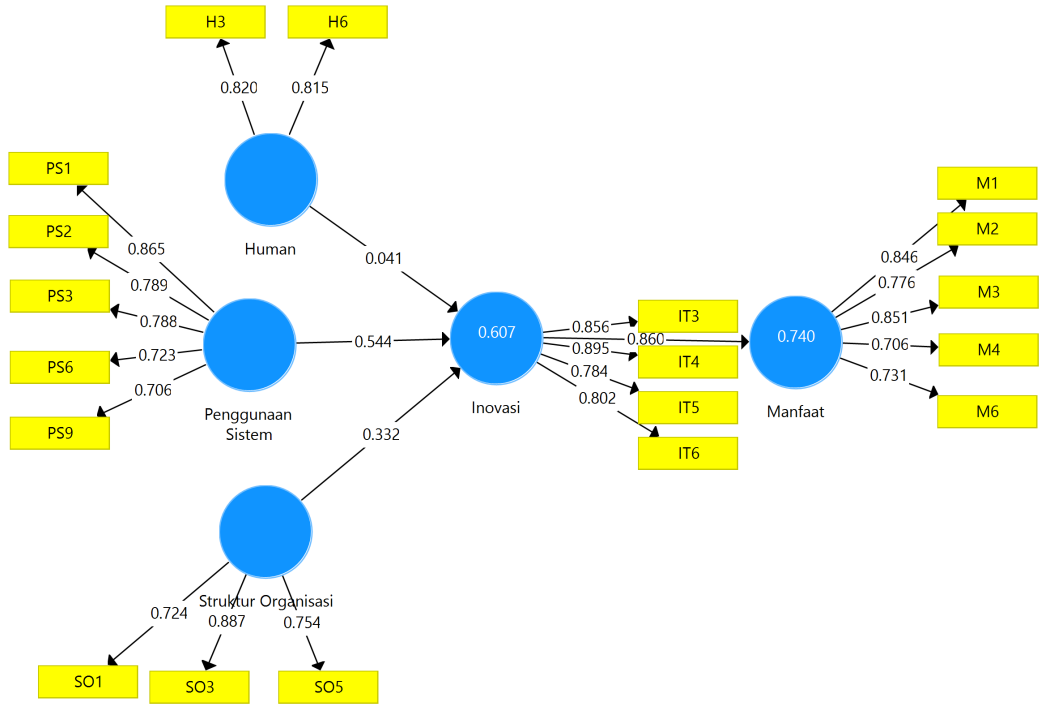

Figure 6. Final Model of Measurement

It is known that this model has met the standard values on the outer model criteria. This shows that this model has good validity and reliability.

Test Validity and Reliability

The analysis used to see the relationship between clear variables or indicators that represent the latent variable to be measured is called external model analysis. In this analysis, there are empathy tests that need to be done, namely: *discriminant validity*, composite reliability, *average variance extracted* (AVE) and *cronbach's alpha*.

The reliability of the indicator is indicated by the value of *the loading factor* which reflects the strength of the interrelation of variables with each indicator. The *outer* reflective final model is presented in Figure 1. After the process of issuing indicators that are valued at < 0.7, the best model is obtained with *a loading factor* value for each indicator > 0.7. After the process of issuing unqualified indicators, a model that has an excellent indicator reliability value is obtained.

Table 3. Constructs of reliability and validity

	Cronbach's Alpha	**Average Variance Extracted (AVE)**
Human	0,503	0,668
Innovation	0,855	0,698
Benefit	0,844	0,615
System Usage	0,843	0,603
Organizational Structure	0,711	0,627

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A test is said to be valid if validity indicates a consistent and valid test. Validity becomes a measure standard that indicates accuracy. This measurement is illustrated by the *Average Variance Extracted* (AVE) value. The AVE values for the four variables are presented in Table 3. The standard AVE value is > 0.5. All variables in this study had an AVE value of >0.5. Based on the standard AVE value shows that this study is very consistent and precise in measuring instruments.

Evaluation of Assessment on Structural Model Test (*Inner Model*)

An assessment of the inner model is used to determine how these variables relate to each other. Path coefficients and T-statistic values are obtained using the approach *bootstrapping* on Smart PLS. The requirement that the T count > the table = 1.96 and the P-value > 0.05 indicates the model variable has a strong positive influence. The results of bootstrapping using Smart PLS are shown in Table 4.

Table 4. Test Hypothesis

	TStatistics (|O/STDEV|)	**P Values**	**Information**
Human_ -> Innovation	0,183	0,855	Rejected
Innovation -> Benefits	17,419	0,000	Accepted
Use of > System Innovation	2,333	0,020	Accepted
Organizational Structure -> Innovation	2,923	0,004	Accepted

Based on the table above, the value of the parameter coefficient has one hypothesis that does not have a significant effect, namely user satisfaction (*human)* with innovation.

User satisfaction has a significant effect on technological innovation

Based on the first hypothesis proposed in this study, it proves that user satisfaction does not have a positive relationship with technological innovation in controlling SIMRS with a T-statistic value of 0.183 and a p-value of 0.855.

This is a basic assumption that underpins the Jobs To Be Done approach, which states that when patient-relevant problems are resolved, there is an increase in overall employee satisfaction and performance. Therefore, the JTBD approach will be the main source of information that can lead to the identification of patient competency gaps, which in turn can guide employees in the development of innovative new solutions and services. By knowing all patient needs and which needs are not being met, companies can predict new concepts and innovations for more effective services. Evaluating the new concept against all needs will reveal how well the proposed concept gets the job done.

Organizational structure has a significant effect on technological innovation

Based on the first hypothesis proposed in this study, it proves that organizational structure has a positive relationship with technological innovation in controlling SIMRS with a T-statistic value of 17.419 and a p-value of 0.000.

The right tools, processes, and organizational structure can help companies navigate a challenging, constantly changing, and dynamic business environment. When companies think about building innovation competencies, they often think of training hundreds or even thousands of employees as part of a change management effort—they want their employees to think differently about innovation. When companies take this approach, they usually have a concept of innovation that is closely related to broad cultural changes in the organization.

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The use of systems has a significant effect on technological innovation

Based on the first hypothesis proposed in this study, it proves that organizational structure has a positive relationship with technological innovation in controlling SIMRS with a T-statistic value of 2.333 and a p-value of 0.020.

There is a stable system application but sometimes still has problems in data storage so that the use of the system is sometimes still in using the system. Today, information technology is very important in health services. Where the quality of data processing is critical to the success of health facilities. Clinical workflows can be aided by good information systems in various ways, which will result in better patient care (Deddy, 2016).

Technological innovation has a significant effect on Benefits

According to Lin and Chang's (2011) study, technological readiness increases interest in use. People who are optimistic and innovative will be more comfortable using technology and will not need further proof of how it works. The belief that the difficulty of use and the performance benefits of technology are comparable can also affect someone who uses technology (F. Davis, 1989).

Conclusion

It can be concluded that the development of information systems, the use of information systems in hospitals is also increasingly sophisticated. With a sophisticated information system in the hospital, the confidentiality of patient data will also be guaranteed. Hospital Management Information System (SIMRS) plays an important role in improving the quality of health services in hospitals SIMRS can help improve the efficiency and effectiveness of hospital management processes, speed up the decision-making process, and improve performance monitoring of each hospital unit. In addition, SIMRS ensures that hospitals comply with government health regulations and policies. Hospitals can easily manage medical records, control schedules, and patient treatment history with SIMRS. Hospitals can share this information between their units, so that every doctor and nurse can easily access patient data to provide the best possible service. In the long run, this can improve the hospital's reputation and patient satisfaction. In addition, because documents can be stored electronically with SIMRS, hospitals can save money by no longer needing to use printer paper and toner to print documents. In the end, SIMRS can benefit the people of Indonesia because it can improve the quality of health services and make medical care easier for patients.

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