Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory

Sadam Musawir*¹, Sunarto Kadir², Teti Sutriyati Tuloli ³

¹,²,³Department of Public Health, Postgraduate, Gorontalo State University, Gorontalo City

ABSTRACT

Evaluation of information systems in the health domain goes beyond exclusively technological considerations but also includes evaluation of human and organizational dimensions. The information system evaluation model frequently used is called HOT-Fit (Human Organization Technology-Fit). This model considers the complex interactions between human, organizational, and technological elements in the context of health information systems. This research aims to analyze the implementation of the Laboratory Information System using the HOT Fit method at the Maxima Clinical Laboratory. The research method used is quantitative with a cross-sectional research design using a survey approach. Research subjects include laboratory managers, laboratory staff, information system users, and patients. Primary data was collected through questionnaires and interviews, while secondary data was obtained from related documents. The data analysis technique used is descriptive analysis and Partial Least Square (PLS). The research results show that there is a significant influence between system quality (p-value = 0.041), information quality (p-value = 0.003), service quality (p-value = 0.003), and user satisfaction (p-value = 0.041). Research findings can be used as evaluation and improvement material for laboratory managers to increase the effectiveness and efficiency of health services by optimizing the use of information systems.

KEYWORDS: Laboratory Information System, HOT Fit, Maxima Laboratory Clinic, Net Benefit, Partial Least Square (PLS).

I. INTRODUCTION

Health is fundamental in life with the importance of providing optimal health. In context, This is the laboratory Clinic becoming Wrong One facility service responsible health answer provide service appropriate health. As a facility service health, the main Laboratory Clinic is to give effective service And efficient, with the hope that This will increase quality service health in a way whole as well as reach condition health ideal society. So that For reach the objective the required facilities that special handle data recording and information visit patients, or more known as system record medical (Susanto, et al., 2021).

Technology information realizes a significant role in the enhancement of quality And quality service, incarnate as form essential support in context This. In the realm of health, the utilization of technology information equips management Laboratory Clinics with efficiency And required effectiveness. (Lestari et al., 2020) noted that the Laboratory Clinic implements system information To facilitate transactions related to patient medical. The focus main of Laboratory Clinic is service health necessary society structured data management through system organized management with Good. This matter covers the management of recorded data medical, pharmaceutical, administrative, and various other required data. management in the Laboratory Clinic becomes an element critical in the implementation system the information in it. A manual approach to data management, besides needing investment of substantial time, presents several weakness significant. Insufficient data accuracy can be accepted to become Wrong One is the impact, along with potency tall For happen error. With progress technology available information moment, In this case, the data
Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory

management process can be done manually and replaced by a system information-based computer. Advantages gained involve efficiency more time OK, convenience implementation, as well enhancement significant in accuracy data management (Topan, et al., 2016).

Maxima Clinical Laboratory, as a business entity operating in the health services sector, plays a role in providing health services to the community, including outpatient services, laboratory examinations, and distribution of medicines. The challenges faced in the healthcare context involve monumental data management, patient medical data, and administrative aspects clinic. This condition results in several impacts, such as repetitive data recording and centralized data storage.

The Laboratory Information System owned by Maxima Clinical Laboratory aims to provide information that is accurate, timely, and by needs to support management functions and decision-making in providing services at Maxima Clinical Laboratory. The implementation of this Information System is expected to result in quality improvements, especially in the context of laboratory services, as well as providing optimal support for the main tasks and functions of Maxima Clinical Laboratory.

The results of interviews with users also illustrate discomfort regarding the system's responsiveness, especially in generating reports at the desired time. Low responsiveness can affect the productivity of laboratory personnel and result in delays in providing important information to those who need it. Therefore, a deep understanding of user needs and customization of the system to provide fast and accurate responses is crucial.

Improvement efforts in this area may involve increasing server capacity, optimizing databases, or implementing caching technology to improve overall system performance. In addition, improving scheduling and workload management algorithms can be an effective strategy to improve system responsiveness in peak-hour situations.

Second, the results of direct observations measuring the Quality of Information from the "Laboratory Information System" at Maxima Clinical Laboratory are a positive achievement in the context of laboratory information management. However, a more in-depth analysis revealed that there were several cases where the accuracy of certain test results was still in doubt. This condition raises critical questions related to the reliability of the system in processing and presenting accurate data, which is a crucial element in the context of clinical laboratory services.

Interviews were also conducted with laboratory personnel who provided insight, revealing that closer collaboration with vendors or updating analysis algorithms could be a solution to improve the timeliness and accuracy of results. Close collaboration with vendors may involve implementing periodic software updates or adjustments based on laboratory needs. This can not only optimize system performance but also ensure that the technology used is always up to date and in line with the latest developments in the world of clinical laboratories.

The importance of updating analysis algorithms cannot be ignored either. Clinical Laboratory

Next, thirdly, in the context of observing the Service Quality of the "Laboratory Information System" at Maxima Clinical Laboratory, the observation involves an assessment of two critical aspects, namely the availability of documentation and the responsiveness of the technical support team. Although the documentation was found to be quite complete, it is important to note that the level of information availability Engineering is often the main determinant of user efficiency in solving problems or understanding system features better. Therefore, efforts to ensure that documentation is not only complete but also easily accessible and understandable to users is of paramount importance. This can include reorganizing information, using clearer language, and integrating more interactive user guides.

Additionally, the finding that response times from technical support teams could be improved reflects the urgent need to improve responsiveness in responding to users' technical questions or problems. In a clinical laboratory world that often demands speed and accuracy, delays in obtaining technical assistance can have a significant impact on operational performance and user satisfaction. Increasing the responsiveness of a support team may involve increasing the number of personnel, implementing a more efficient help ticket system, or even using a more advanced technical support platform.

Based on the problems above, the researcher will conduct research entitled "Evaluation of Implementation Laboratory Information System By Using the Hot Fit Method at Maxima Clinical Laboratory"

METHODS

This research was conducted at the Maxima Clinical Laboratory, which is the focus subject of the implementation of the Laboratory Information System and disease diagnostic methods. Study This was done on March 1, 2024, and ended on March 31, 2024. This study uses a quantitative approach. This approach was chosen to gain an in-depth understanding of the application of the Laboratory Information System using the Hot Fit method at Maxima Clinical Laboratory. The research method used in this research is quantitative with a cross-sectional research design using a survey approach to determine the influence between independent variables. Subject study This involves various stakeholders with evaluation implementation of the Laboratory Information System using the hot fit method at Maxima Laboratory Clinic. The subject study covers Clinical Laboratory Managers and Administrators, Laboratory Officers, Laboratory Information System Users,
Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory

and Patients. Step beginning in the data analysis process involves exploration And in-depth evaluation of all data collected through an instrument questionnaire.

Table 1: Distribution of Answers to the Laboratory Information System Implementation Questionnaire Towards System Quality

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Scale Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T.S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F     %</td>
</tr>
<tr>
<td>1</td>
<td>Laboratory Information Systems show the level of convenience high usage And availability of a friendly interface for users.</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>The Laboratory Information System is easy to learn and easy to understand.</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Data security is maintained through the application of passwords (password) for para users, so information is still protected with Good.</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Laboratory Information Systems is very easy to access.</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Errors rarely occur in the Laboratory Information System application.</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2024

Information:
F: Frequency
STS: Strongly Disagree
TS: Disagree
CS: Quite agree
S: Agreed
SS: Strongly agree

RESULTS AND DISCUSSION

Table 1 shows the distribution of answers to the questionnaire regarding system quality at Maxima Clinical Laboratory. In the first statement, 6.1% of respondents quite agree (CS), 39.4% agree (S), and 54.5% strongly agree (SS) that the Laboratory Information System shows a high level of ease of use and the availability of a user-friendly interface.

In the second statement, 30.3% of respondents agreed (S) and 69.7% strongly agreed (SS) that the Laboratory Information System was easy to learn and understand. In the third statement, 39.4% of respondents agreed (S) and 60.6% strongly agreed (SS) that data security is maintained through the implementation of passwords for users so that information remains well protected.

In the fourth statement, 6.1% of respondents quite agreed (CS), 42.4% agreed (S), and 51.5% strongly agreed (SS) that the Laboratory Information System was very easy to access. In the fifth statement, 3.0% of respondents disagreed (TS), 27.3% quite agreed (CS), 42.4% agreed (CS), and 27.3% strongly agreed (SS) that errors rarely occur in the Laboratory Information System application. Thus, it can be concluded that the majority of respondents feel that the laboratory information system at Maxima Clinical Laboratory is easy to use, easy to learn, has good data security, is easy to access, and rarely experiences errors.
Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory

Table 2: Distribution Answer Questionnaire Application Laboratory Information System To Quality Information

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Scale Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>1</td>
<td>The information produced by the system is consistent with the data that has been entered</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>The power information produced by the system is by actual reality conditions</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>The information output produced by the system is by precision and accuracy</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Information produced by a cooperative system</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>The information output is very easy to understand</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2024

Information:
F: Frequency
STS: Strongly Disagree
T.S: Disagree
CS: Enough Agree
S: Agreed
SS: Very much Agree

Table 2 provides the distribution of answers from the questionnaire regarding the quality of information produced by the system at Maxima Clinical Laboratory. In the first statement, 42.4% of respondents agreed (S) and 57.6% strongly agreed (SS) that the information produced by the system was consistent with the data entered.

In the second statement, 51.5% of respondents agreed (S) and 48.5% strongly agreed (SS) that the information produced by the system was real or the actual situation.

In the third statement, 6.1% of respondents quite agreed (CS), 45.5% agreed (S), and 48.5% strongly agreed (SS) that the information produced by the system complies with the standards of precision and accuracy.

In the fourth statement, 18.2% of respondents quite agreed (CS), 36.4% agreed (S), and 45.5% strongly agreed (CS) that the information produced by the system was very comprehensive and detailed.

In the fifth statement, 45.5% of respondents agreed (S) and 54.5% strongly agreed (SS) that the information produced by the system can be easily read or understood. Thus, it can be concluded that the majority of respondents felt that the information produced by the system at Maxima Clinical Laboratory was consistent with the data entered, by reality, by standards of precision and accuracy, comprehensive, detailed, and easy to read or understand.

Table 3. Distribution of Answers to the Laboratory Information System Implementation Questionnaire To Service Quality

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Scale Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f</td>
</tr>
<tr>
<td>1</td>
<td>The information produced by the system is consistent with the data that has been entered</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>The information produced by the System is by reality or actual circumstances.</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>The information produced by the system complies with standards of precision and accuracy.</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Primary Data 2024

Information:
F: Frequency
STS: Strongly Disagree
TS: Disagree
CS: Quite agree
S: Agreed

In the third statement, 6.1% of respondents quite agreed (CS), 45.5% agreed (S), and 48.5% strongly agreed (SS) that the information produced by the system complies with the standards of precision and accuracy.
Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory

SS: Strongly agree

Table 3 shows the distribution of answers from the questionnaire regarding the quality of services provided by the system at Maxima Clinical Laboratory. In the first statement, 3.0% of respondents disagreed (TS), 24.2% quite agreed (CS), 42.4% agreed (S), and 30.3% strongly agreed (SS) that the information produced by the system was consistent with the data that had been entered.

In the second statement, 9.1% of respondents quite agreed (CS), 45.5% agreed (S), and 45.5% strongly agreed (SS) that the information produced by the system was reality or the actual situation.

In the third statement, 15.2% of respondents quite agreed (CS), 51.5% agreed (S), and 33.3% strongly agreed (SS) that the information produced by the system complies with the standards of precision and accuracy. From this data, it can be concluded that the majority of respondents feel that the services provided by the system at Maxima Clinical Laboratory are consistent with the data entered, by reality, and by standards of precision and accuracy.

Table 4. Distribution of Questionnaires on Application of the Laboratory Information System to System Users

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Scale Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STS</td>
</tr>
<tr>
<td>1</td>
<td>In my daily work activities, I often use the Laboratory Information System application.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>All my work tasks depend on the Laboratory Information System application.</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>I have good skills in operating Laboratory Information System applications.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>By using the system, I find it easy to carry out my work duties.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary Data 2024

Table 4 depicts the distribution of answers from the system user questionnaire at Maxima Clinical Laboratory. In the first statement, 39.4% of respondents agreed (S) and 60.6% strongly agreed (SS) that in their daily work activities, they often use the Laboratory Information System application.

In the second statement, 3.0% of respondents quite agreed (CS), 42.4% agreed (S), and 54.5% strongly agreed (SS) that all their work tasks depended heavily on the Laboratory Information System application.

In the third statement, 51.5% of respondents agreed (S) and 48.5% strongly agreed (SS) that they had good skills in operating the Laboratory Information System application.

In the fourth statement, 27.3% of respondents agreed (S) and 72.7% strongly agreed (SS) that by using the system, they felt it was easier to carry out their work duties. Thus, it can be concluded that the majority of respondents feel that they often use the Laboratory Information System application in their daily work activities, their work tasks are very dependent on this application, they have good skills in operating it, and they find it easy to carry out their tasks. Their job duties through the use of the system.

THE EFFECT OF IMPLEMENTING A LABORATORY INFORMATION SYSTEM ON SYSTEM QUALITY AT MAXIMA CLINICAL LABORATORY.

In this research, system quality has a coefficient of 0.267 with a T-statistic value of 1.746 and a P-value of 0.041, which shows that its effect is significant at a significance level of 0.05. This means that system quality plays an important role in improving the performance of the Laboratory Information System at Maxima Clinical Laboratory.

According to DeLone and McLean in Munzir, MR & Khaira, (2020), system quality is one of the three main dimensions in the information system success model, along with information quality and service quality. System quality includes factors such as reliability, responsiveness, and ease of use of the system. High-quality systems tend to be more reliable, easier to use, and more responsive to user needs, thereby increasing user satisfaction and overall system effectiveness.
The results of this research are in line with previous research conducted by Ilma Soraya et al. (2019) who also said that system quality has a very significant influence on the implementation of the drug management information system at the RSGMP UNSOED Purwokerto pharmacy installation.

Previous research also conducted by Wulandari et al. (2024) also confirmed that system quality has a significant effect on user satisfaction and use of information systems. Their research shows that high-quality systems increase user acceptance levels and organizational performance. The study by Wang et al. (2021) found that system quality has a significant impact on the effectiveness of information system implementation in various contexts, including clinical laboratories. They stated that factors such as access speed, reliability, and user-friendly interface greatly influence user satisfaction and laboratory operational efficiency.

The results of this research highlight the importance of developing and maintaining high system quality in the Laboratory Information System at Maxima Clinical Laboratory. To improve system performance, laboratory management needs to ensure that the system used has features that are easy to use, responsive to user needs, and have minimal technical problems. This can be achieved through regular training for users, routine system maintenance, and implementing feedback loops to continuously improve system quality based on user feedback.

System quality has a significant influence on the performance of the Laboratory Information System at Maxima Clinical Laboratory. This finding is consistent with previous theory and research which emphasizes the importance of system quality in determining the success of information system implementation. Therefore, clinical laboratories need to continue to focus on improving system quality to ensure efficient operations and high user satisfaction.

**THE EFFECT OF IMPLEMENTING A LABORATORY INFORMATION SYSTEM ON THE QUALITY OF INFORMATION AT MAXIMA CLINICAL LABORATORY**

The results of this research show that the quality of information has a very significant influence on the Laboratory Information System at Maxima Clinical Laboratory, with a coefficient of 0.585. These results are in line with the theory which states that information quality has an important role in improving individual and organizational performance. According to Information Quality Theory, high-quality information will increase user satisfaction, improve decisions taken, and ultimately improve overall organizational performance (Zheng et al., 2022)

Based on the results of this research, it is in line with research conducted by Setiorini (2021) which shows the same results, namely that the quality of information has a significant influence on the implementation of SIMRS at RSUD Dr. Kanujoso Djatiwibowo.

Previous research was also conducted by Wang et al. (2021) shows that information quality plays an important role in improving service quality and satisfaction of information system users. They found that systems that present more accurate and relevant information tend to be preferred by users and have a positive impact on operational efficiency. This latest study confirms that information quality remains a crucial aspect in evaluating the performance of information systems, including in the clinical laboratory environment.

From a practical perspective, this study emphasizes the importance of ensuring that information systems in clinical laboratories provide information that is accurate, relevant, and regularly updated. This can be achieved through implementing strict information management standards, training staff regarding the importance of using accurate information, and investing in information technology that is capable of providing quality information. Thus, clinical laboratory management can ensure that clinical decisions taken are based on reliable and accountable information, which in turn improves service quality and user satisfaction.

**THE EFFECT OF IMPLEMENTING A LABORATORY INFORMATION SYSTEM ON SERVICE QUALITY AT MAXIMA CLINICAL LABORATORY.**

Service quality has a significant influence on the Laboratory Information System (LIS). In the path coefficient table, service quality has a coefficient of 0.385, with a T-statistic value of 2.844 and a P-value of 0.003. This shows that service quality has a significant positive influence on LIS performance in the clinical laboratory.

The theory that supports these findings is the User Satisfaction Theory which states that high-quality service will increase user satisfaction with information systems. Munzir, MR & Khaira, (2020) emphasize that service quality is an important dimension in the success of information systems, which can affect user satisfaction, system use, and organizational performance.

A recent study by Basri et al. (2023) also strengthens these findings by showing that service quality contributes significantly to the effectiveness of information system implementation in various organizations, including clinical laboratories. They emphasize the importance of responsive, user-friendly, and efficient services in increasing user satisfaction and information system performance.

From a practical point of view, the results of this study indicate that clinical laboratory management needs to pay serious attention to the quality of services provided to LIS
users. This can be done through staff training in providing good services, improving service processes, and improving communication between users and information system service providers. Thus, improved service quality can increase user satisfaction, system usage, and overall performance of LIS in the Maxima clinical laboratory.

THE EFFECT OF IMPLEMENTING A LABORATORY INFORMATION SYSTEM ON SYSTEM USERS AT MAXIMA CLINICAL LABORATORY.

System users have an insignificant influence on the Laboratory Information System (LIS), with a coefficient of 0.055, a T-statistic value of 0.381, and a P-value of 0.352. This shows that the presence of system users does not have a significant influence on LIS performance in the clinical laboratory.

The Technology Acceptance Model (TAM) theory can be used to explain these findings. According to TAM, factors such as perceived usefulness and perceived ease of use play an important role in the use of information systems. However, if users do not experience sufficient benefit or convenience from using the system, then they may not use the system effectively.

The results of this research are in line with previous research conducted by Dien Aprilia (2018) which showed that the results of system users did not have a significant influence on the implementation of SIMRS at RSIA Grand Family.

Recent research was also conducted by Ahmad et al. (2021) regarding the adoption of information systems in the health industry and found that perceived system usefulness has a significant effect on users’ intention to use the system. If users do not see the value or benefits of using the system, then they tend not to actively use the system.

From a practical point of view, the results of this study indicate that clinical laboratory management needs to pay attention to efforts to increase the perception of usefulness and ease of use of LIS among staff and other potential users. This can be done through appropriate training, providing adequate technical support, and ensuring that the LIS is designed to properly meet user needs and expectations.

System users have an insignificant influence on LIS performance at Maxima Clinical Laboratory. This shows the importance of paying attention to factors that influence the perception of usefulness and ease of use of information systems in increasing the adoption and performance of LIS in clinical laboratories.

CONCLUSIONS

Based on the results of the research carried out, the following conclusions were obtained:

1. There is a significant influence between the implementation of the Laboratory Information System on system quality with a significant value (p-value = 0.041).

2. There is a significant influence between the implementation of the Laboratory Information System on the quality of information with a significant value (p-value = 0.03).

3. There is a significant influence between the implementation of the Laboratory Information System on service quality with a significant value (p-value = 0.003).

4. There is no significant influence between the application of the Laboratory Information System on system users with a significant value (p-value = 0.352).

REFERENCES


Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory


Evaluation of The Implementation of The Laboratory Information System Using the Hot Fit Method in Maxima Clinical Laboratory


