THE ANALYSIS OF PERFORMANCE, INFORMATION, ECONOMY, CONTROL, EFFICIENCY, AND SERVICE (PIECES) IN-LIBRARY MANAGEMENT INFORMATION SYSTEMS POSTGRADUATE UIN ALAUDDIN MAKASSAR

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Abstract: This article elaborates the PIECES analysis of the management information system evaluated in terms of performance, information, control, efficiency, and services resulting from the applied library management information system. The type of research used is descriptive research with a qualitative approach. This research is a phenomenological approach where the purpose of this approach is to study in-depth the state of the postgraduate library at UIN Alauddin Makassar. The results of this research show the description of the library management information system applied by the postgraduate library of UIN Alauddin Makassar, where the software used has been integrated into the core activities of the library, namely the management of library materials, circulation services, search engine services, membership services, and reporting on library activities. The use of *Slims 7 Candana* software has met the needs of library management. However, the control section for reporting the number of visitors Postgraduate Library of UIN Alauddin Makassar does not apply visitor attendance at the library either manually or automatically by the management information system (visitor counter service). This section has no data input process, so the output process for reporting visitors neither exists.

Keywords: Performance; Information; Economy; Control; Efeciency; Service

I. INTRODUCTION

The emergence of the information society in all parts of the world is one manifestation of the information age, the third wave of human civilization. In the information age, the role of communication technology is vital in all aspects of a global society. Everet M. Rogers, in his book Technology, Communication and Information by Muh Anshar Akil, defines *communication technology* as a device, organizational structure, and social value that is important for humans to collect, process, and exchange information.[1]

Information and communication technology cannot be separated from today's global world, where the application of technology is a benchmark for the progress and modernization of an agency or institution. Therefore, every institution or institution

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[1]Muhammad Anshar Akil, *Teknologi Komunikasi dan Informasi.* (Makassar: Alauddin University Press, 2011), pp. 27.

competes in integrating technology to build and empower human resources that have knowledge-based quality so that they can compete in the global era.

The era of globalization has made information undergo an exceptionally rapid transformation and has entered all lines of human life. Increasingly sophisticated technology makes information faster and easier to access and makes it easier for humans to carry out all their activities. Overgrowing information has become a significant need for some people, especially academics (students, lecturers, researchers, and others).[2]

The information explosion has had a significant impact on institutions or institutions operating in the world of information and being a center for information and documentation, which according to Koswara[3] is a sign of the opportunities and challenges that humans will face in the future.

One of the institutions engaged in the field of information is the library, as stipulated in *Undang-Undang No. 43 Tahun 2007 Pasal 1 Ayat 1* that[4]:

> *The library is an institution that manages the collection of written works, printed works, and recorded works professionally with a standard system to meet the users' needs of education, research, preservation, information, and recreation.*

Based on the law above, the library is one of the institutions with an essential function and role in managing information, starting from the creation, management, retrieval, and dissemination of information. In addition, the library also functions as a support for teaching and learning activities and research and development programs in various fields. So, to create an academic climate that is scientific and professional, libraries must provide collections and access to information based on information technology.

In line with *Undang-Undang No. 43 Tahun 2007 pasal 14 ayat 3* concerning library services which states:

> *"Each library develops library services based on the advances in information and communication technology."*[5]

The application of information and communication technology in libraries has become a benchmark for library progress. It is no longer seen from the size of the building, the number of bookshelves, and the number of users. The more sophisticated the system used, the more advanced the library. According to Atler, an information system is a combination of work procedures, information, and information technology organized to achieve goals within an organization.[6]

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[2]Mulyadi, *Pengelolaan otomasi Perpustakaan Berbasis Senayan Library Managemen system* (Jakarta: Rajawali press, 2016), pp.13.

[3]Koswara. *Dinamika Informasi dalam Era Globalisasi.* (Bandung: ISIPII.2009), pp. 181.

[4]Kementrian Hukum dan Hak Asasi Manusia, *Undang-Undang RI Nomor 43* (Jakarta : Tamita Utama, 2011), pp. 5.

[5]Undang-Undang Republik Indonesia No.43 Tahun 2007 Tentang Perpustakaan Pasal 14 ayat 3 pp.10

[6]Khoirul Maslahah "Analisis Sistem Informasi Perpustakaan IAIN Surakarta Dengan PIECES." *EduLib* (2011): 127-141.

The library information system is a library management using information technology (IT) assistance; with information technology, some manual work can be accelerated and streamlined. This library information system includes various facilities such as facilitating library collection data collection, membership, transactions, reports, and information retrieval that certainly provides significant benefits for users of the system. However, the implementation of library information systems sometimes does not run well due to a lack of support in terms of infrastructure, brand ware, and good maintenance. The system is seen as a comprehensive concept that encourages integration, the combination of several parts of the system.

Library management which becomes a sub-system is the field of procurement, processing, tracing, reporting and circulation services that can be integrated into a computer program called a library information system. The sub-systems are integrated systematically and regularly service.

A library information system is a collection of sub-systems in a library that interacts to achieve a common goal: managing and providing library information. When information is needed, it can be provided quickly and easily wholly. In terms of management (management techniques), with the increasingly complex needs of libraries today, there is a need to use information technology to automate business processes. This system is then known as the library automation system. A library automation system is software that operates based on a database to automate library activities.[7]

According to Hanif al-Fattah, the goals of information systems are improving performance, increasing information effectiveness, reducing costs, increasing application security, increasing efficiency, and improving customer service and storage.[8]

The library management information system needs to be evaluated to measure how effective and efficient in providing information about the success of a management information system that is being implemented and can be used as a guide for decision-makers to determine the next direction. According to Al-Fatta, system analysis is understanding or specifying what the system should do in detail. Based on this understanding, system analysis is a method used to produce an in-depth system report.

The Postgraduate Library of Universitas Islam Negeri (UIN) Alauddin Makassar is one of the libraries under the auspices of the university, which implements information technology-based library management with library automation information systems in library management. Several library activities have been comprehensively integrated with an automatic information system, such as procurement of library materials, processing of library materials, circulation, search engines or *OPAC* (*Online Public Access Catalog*), membership management, and reporting of library activities.

In applying a management information system at the Postgraduate Library of UIN Alauddin Makassar, the researchers found initial data; namely, there was a discrepancy between the data input process and the output that the management information system would generate. The researcher's analysis could not have output if there were no input data in the applied management information system. Second is the novelty of the software that was applied.

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[7]Mulyadi, *Pengelolaan otomasi Perpustakaan Berbasis Senayan Library Managemen system* (Jakarta: Rajawali press, 2016), pp. 34.

[8]Hanif al-Fattah. *Analisis dan Perancangan Sistem Informasi: Untuk Keunggulan Bersaing Perusahaan dan Organisasi Moderm* (Yogyakarta: Andi offset, 2018), pp.50.

According to the information above, library management information systems need to be evaluated to find out how the library management information system Postgraduate UIN Alauddin Makassar. The analytical method used to evaluate the library management information system uses the PIECES analysis method (performance, information, economy, control, efficiency, and service). The system is analyzed from various points of view.

II. THEORETICAL REVIEW

The management information system is a set of organizational procedures that provide information for decision-makers and control the organization. This management information system is designed to cause changes in the flow of information in an organization so that managerial implementation can take place effectively, efficiently, and strategically.

According to Atler in Kadir in the book Introduction to Information Systems, information systems are a combination of work procedures, information, people, and information technology to achieve goals within an organization. Meanwhile, according to Gelinas, an information system is an artificial system that generally consists of computer-based components and manuals designed to collect, store and manage data and provide output information to users.[9]

Based on the above definition, it can be concluded that an information system is a combination of a set of components based on information technology that is created to collect, store, and manage data that is organized to achieve the goals of an institution.

In addition, a system also has specific characteristics or properties which characterize a system. According to Tata Sutabri,[10] proposed the characteristics of the system consisting of: a) *Components*; b) *Environment*; c) *Interface*; d) *Input*; e) *Output*; and f) *Goal*.

Information systems consist of some components that interact and work together to form a single unit. The components can consist of several subsystems or subsections, where each subsystem has a particular function and will affect the overall system process.

According to Abdul Kadir, the components of an information system consist of six components such as:[11]

a. Hardware includes physical devices such as computers, printers, etc.
b. Software or program: instructions that allow hardware to process data.
c. Procedure: rules used to realize data processing and generate the desired output.
d. People: all parties responsible for information system development, processing, and use of information system output.
e. Database (Database): a set of tables, relationships, and others related to data storage.
f. Computer networks and data communication: a connecting system that allows resources to be shared or accessed by some users.

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[9]Abdul Kadir, *Pengenalan Sistem Informasi* (Yogyakarta: Andi, 2010), pp.11.

[10]TataSutabri, *Analisa Sistem Informasi* (Yogyakarta: Penerbit Andi, 2004).pp, 12.

[11]Abdul Kadir, *Pengenalan Sistem Informasi*.pp. 11

According to Habiburrahman, evaluation models in library information systems are as follows: a) PIECES analysis; b) End User Computing (EUC) Satisfaction; c) Tasks Technology Fit (TTF) Analysis, and d) Human Organizing Technology (HOT) Fit Model.

Khoirul Maslahah defines PIECES analysis (Performance, Information, Economy, control, Efficiency, and Service) as a technique to identify and solve problems in information systems. This analysis will result in the identification of the main problems of a system and provide solutions to these problems.[12]

a. *Performance Analysis*

Performance is a system's ability to complete tasks quickly to achieve goals immediately. Performance is measured by the amount of production and the time used to adjust the work. The average time delay between two transactions or jobs plus the time to respond to those jobs[13].

According to Al-Fattah, performance occurs when the tasks carried out do not reach the target, performance is measured by the amount of production and response time. The amount of production is the amount of work completed during a specific time. Response time is the average delay between a transaction and the response given to the transaction.[14]

b. *Information Analysis*

Information is essential because information management and users can take the next step with this information. If the information system's ability is good, the user will get accurate, timely, and relevant information as expected. According to Abdu Kadir,[15] the quality of information is often measured based on relevance, timeliness, and accuracy. Evaluation of the ability of information systems to produce value or valuable products to address opportunities in dealing with problems that arise. Situations in this information analysis include:

Accuracy, information must be free from error and not biased or misleading. Relevant, the information has benefits for both the user and the manager, where the relevance of each person is different from one another.

c. *Economic Analysis*

The economic analysis assesses the system based on the costs incurred and the benefits obtained from the applied system. This system will provide operational savings and benefits for agencies or companies, increasing economic needs affecting cost control and increasing benefits. According to Al-Fattah[16] the benefits can be obtained from increasing the value of the information and decisions produced.

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[12]Maslahah, Khoirul. "Analisis Sistem Informasi Perpustakaan IAIN Surakarta Dengan PIECES." *EduLib* (2011): 127-141, pp. 3.

[13]Maslahah, Khoirul. "Analisis Sistem Informasi Perpustakaan IAIN Surakarta Dengan PIECES." *EduLib* (2011): 127-141, pp. 4

[14]HanifAl-Fattah, *Analisis dan Perancangan Sistem Informasi: untuk Keunggulan bersaing Perusahaan dan Organisasi Modern* (Yogyakarta: Andi offset, 2018), pp.51.

[15]Abdul Kadir, *Pengenalan Sistem Informasi*(Yogyakarta: Andi, 2010), pp. 46.

[16]HanifAl-Fattah, *Analisis dan Perancangan Sistem Informasi: untuk Keunggulan bersaing Perusahaan dan Organisasi Modern*, pp.59.

d. Control Analysis

Control analysis is the security system used that must be able to secure data from damage, for example, by backing up data. In addition, the security system must also be able to secure data from unauthorized access. This analysis includes supervision and control. Control is closely related to control and security in terms of hardware, software, and brainware.[17]

However, in controlling a system, it needs to be emphasized that the portion control must be precise in practice. It should not be excessive or even less because, according to Al-Fatta quoted by Maslahah, this can cause the following:[18]

1. Weak security or controls can result in 1) Input data not being edited sufficiently; 2) Crime (e.g., embezzlement or theft) against data; 3) Ethics being violated in data or information-referring to data or information accessed by unauthorized persons; 4) Data is stored redundantly, inconsistently in different files or databases; 5) Data privacy rules or guidelines were violated (or could be violated); 6) Processing error occurred (by human, machine or software); 7) Decision making error occurs.
2. Excessive control or security can cause: 1) Bureaucratic procedures slow down the system; 2) Control of disturbing customers or employees; 3) Excessive control causes processing delays.

e. Efficiency Analysis

Efficiency relates to how these resources can be used optimally. Operations at an agency are said to be efficient or not usually based on the duties and responsibilities in carrying out activities. According to Al-Fattah, the following are indications that a system can be said to be inefficient:[19]

1. Much time is wasted on human, machine, and computer resource activities.
2. Excessive input or copying of data
3. Data is processed excessively
4. Information is over-generated
5. The effort required for the tasks is too excessive
6. Materials needed for tasks are too much

f. Service Analysis

To assess the quality of a system, we can only look at its service. In the library information system, improving services to members is part of the primary purpose of holding an information system. According to Al-Fattah[20], to assess the impact of information systems on the quality of service from a system, it can be seen from the following criteria:

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[17]KhoirulMaslahah, "Analisis Sistem Informasi Perpustakaan IAIN Surakarta Dengan PIECES." *EduLib* (2011): 127-141 pp. 5.

[18]Khoirul Maslahah, "Analisis Sistem Informasi Perpustakaan IAIN Surakarta Dengan PIECES, pp. 5.

[19]HanifAl-Fattah, *Analisis dan Perancangan Sistem Informasi: untuk Keunggulan bersaing Perusahaan dan Organisasi Modern,* pp.54.

[20]HanifAl-Fattah, *Analisis dan Perancangan Sistem Informasi: untuk Keunggulan bersaing Perusahaan dan Organisasi Modern.* pp.54.

1. The system generates inaccurate information
2. The system produces inconsistent information
3. The system generates untrusted information
4. The system is not easy to learn
5. The system is not easy to use
6. Awkward system to use
7. Inflexible system

III. RESEARCH METHODOLOGY

The type of research used is descriptive research with a qualitative approach. The approach used in this research is a phenomenological approach where the purpose of this approach is to study in depth about the state of the Postgraduate library of UIN Alauddin Makassar.

IV. RESEARCH RESULTS AND DISCUSSION

a. *Performance Analysis*

The researchers perform calculations by using a stopwatch to calculate the response time required to find out the management system's performance and know whether the system has worked effectively and efficiently based on the standard operating procedures (SOPs) applied in the Postgraduate Library of UIN Alauddin Makassar. The results of the researchers' calculations are as follows:

Picture 4.1 stopwatch borrowing 4 books

Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above shows the time required by the circulation service section system (borrowing/returning services) in serving the borrowing of 4 library materials by users where the researcher is directly involved as a user and involves other users to help researchers calculate the system performance time using a stopwatch.

Picture 4.2 stopwatch borrowing 3 books

Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above shows the time required by the circulation service section system (borrowing/returning services) to borrow three library materials by users. The researcher is directly involved as a user and involves other users to help researchers calculate the system performance time using a stopwatch.

Picture 4.3 stopwatch borrowing 2 books

Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above shows the time required by the circulation service division system (borrowing/returning services) to borrow 2 library materials by users where the researcher is directly involved as a user and involves other users to help researchers calculate system performance time using a stopwatch.

Picture 4.4 stopwatch borrowing 1 book

Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above shows the time required by the circulation service section system (borrowing/returning services) to serve the borrowing of 1 library material by a user. The researcher is directly involved as a user and involves other users to help researchers calculate the system performance time using a stopwatch.

Picture 4.5 Bibliographic Data Input
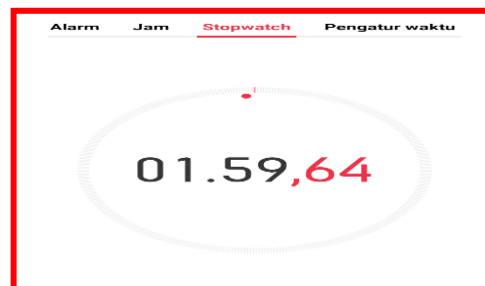
Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above is the time required by the information system for the processing section to input bibliographic data 1 library materials carried out by the Postgraduate librarian of UIN Alauddin Makassar on the management information system application (SLIMS 7), where the researcher calculates using a stopwatch.

Picture 4.14 Membership Data Input.

Source: The Library of Pascasarjana UIN Alauddin Makassar

The picture above is the time required by the information system for the Membership section to input membership data by the Postgraduate librarian of UIN Alauddin Makassar. The user who registers as a library member first fills out the form manually. Then the data on the form is inputted into the information system by the librarian, then the researcher. Perform system performance calculations using a stopwatch.

Based on the Standard Operating Procedure (SOP) applied by the postgraduate library, the time required by the management information system to serve borrowing library materials, input bibliographic data, and input membership data is 5 minutes. Based on the study results, researchers found that the time required by postgraduate management information systems is less than 5 minutes.

It can be concluded that library management information systems have a short response time. However, it is also influenced by constraints such as networks and electricity both in the graduate library and at the postgraduate library database storage center, *Pusat Informasi dan Pangkalan data* (PUSTIPAD) UIN Alauddin Makassar.

b. *Information*

Information is a data collection where information is vital because the management (librarian) and users can determine the next step with information. Suppose the ability of the management information system is good. In that case, the manager, in this case, the librarian, and also the user will get information that is accurate, timely, and relevant as expected.

Based on the results of interviews with librarians at the postgraduate library related to the analysis of information generated by the library management information system that was applied to informant A, they were as follows:

"It is beneficial and very influential regarding the information generated by the application used in building a management information system. Why? Because the data input system is only done once, the benefits can spread to the circulation, OPAC, Reporting, etc."

Informant A's statement above was added by informant B, which stated that:

"The information produced is beneficial for librarians and libraries. The librarian in the processing section only performs one-time inputting of the data and information produced, including several sections of library activities related to information, for example, the circulation section (borrowing/returning library materials), OPAC, and reporting and the process of making library cards."

To find out in more detail about how the information generated by the management information system implemented by the postgraduate library of UIN Alauddin Makassar, the researchers conducted interviews with informant C, who stated that:

"The information generated by the search engine or OPAC engine in the library makes it easier to find information where the desired book is located and find out information about the status of the book, whether it is on the bookshelf or temporarily borrowed by other students."

Based on the interviews with the three informants above, the researcher can conclude that the information produced by the management information system is very effective and efficient for library managers, librarian heads, and users.

c. *Economic Analysis*

Economic analysis is an analysis of the budget used in implementing the management information system in the postgraduate library, whether it has met the regular use of the library budget or is below the standard for the use of the existing budget, where informant A stated as follows:

"The use of the budget on the application is very cheap. Why is it because the application itself is free, only downloaded on the official Slims website, but the implementation of the application in the library itself is carried out by a team headed by Mr. Azwar Muin, so the librarian continues what Mr. Azwar has done."

Informant A's statement above was added by informant B, which stated that:`

"The implemented management information system saves many budgets because the application used is free and easy to learn. You have to provide other supporting devices such as computers and scan tools, etc."

Based on the interview results above related to the economic analysis of library management information systems, it can be concluded from an economic point of view that the implementation of library management information systems saves the library budget. It is also straightforward to use by postgraduate library managers.

d. *Controlling Analysis*

Control is part of management where control is used in management information systems to avoid data from things that interfere with library information systems, control analysis on postgraduate library management information systems, where informant A stated as follows:

"We are controlling in order to avoid interference with existing data. The database is stored on a library server; then, during the pandemic, our data storage system or database cooperates with the Pustipad or UIN Alauddin Makassar database because there are demands to online all services center so

that the existing data can be accessed. well-controlled, data input is also done online, the library visitor control section was initially installed with a visitor or library visitor list, but due to frequent library transfers, the currently installed system is not installed due to frequent postgraduate library buildings changing places due to frequent library buildings postgraduate changing places."

Informant A's statement above was added by informant B as follows:

"Control so that there is no interference with existing data, the database used is stored on one server, the application used is beneficial in controlling library activities quickly and easily in the management of library materials, borrowing and returning as well as library visitors but for attendance lists present library visitors now not in use."

The statements of informants A and B above were added by informants C and D in this case, one of the users in the postgraduate library of UIN Alauddin Makassar, as follows:

Statement by informant C:

"From the first semester until the present (the fourth semester), I have never filled out the attendance list of visitors either manually or computerized. In addition, I have never seen the attendance list of visitors at the graduate library or library staff who have never directed students to fill out the attendance list of visitors at the postgraduate library."

Statement by informant D:

"As far as I know, there is no visitor attendance list for the library here. Nothing at all, so whoever goes in and out, there is no data to measure how many visitors are every day in contrast to other faculty libraries with visitor attendance lists."

Based on the interview results above, the researcher conducted interviews with two librarians regarding the control of management information systems. Specifically, the control of information systems in the reporting section, the input data of library visitors or visitor counters which are part of the library management information system used by the postgraduate library of UIN Alauddin Makassar, and two users or visitors to the postgraduate library. The researchers can conclude that the analysis of control/control of the postgraduate library management information system is very effective in protecting data from interference from outside the library in collaboration with the Alauddin Makassar UIN database center, as well as in controlling the parts of the application library's core activities that are very helpful for controlling activities that exist in the library automatically through the computer.

However, in the implementation of the reporting section, in this case, the input of library visitor data, the library has not implemented a visitor attendance list manually or the Visitor Counter (computerized library visitor attendance), which has been integrated with the Postgraduate library management information system, so the researcher concludes that there is no input data in the reporting section of the library visitor attendance list at the Postgraduate Library of UIN Alauddin Makassar.

e. *Efficiency Analysis*

Efficiency analysis is an analysis carried out to determine whether the library management information system has been used optimally, while the efficiency analysis

of the postgraduate library management information system of UIN Alauddin Makassar, as stated by informant A, is as follows:

> *"The information generated from the application depends on the data input process carried out. The data entered in the system will also appear both in the OPAC search engine and on borrowing library materials."*

The statement from informant A above was also added by informant B, as follows:

> *"The tasks given are under the existing workload, by standard operating procedures, how much is the number of library changes data input, it is all contained in the library SOP."*

The indicators that a system can be said to be inefficient according to Al-fattah are as follows:

a. Much time is wasted on human resource activities,
b. Machines and computers, data is inputted or copied excessively,
c. Data is over-processed, Information is over-generated,
d. The effort required for the tasks is too excessive.
e. The materials needed for the tasks are too excessive.

Based on the interview results above, the researcher can conclude that the postgraduate library management information system of UIN Alauddin is far from an indicator of the inefficiency of the library management information system.

f. Service Analysis

Service analysis is used to find out specifically the library management information system in the service section, while the postgraduate library management information system services according to informant A are as follows

> *"The application applied to the information system is very easy to use. The system is also straightforward to learn and develop. For example, attaching the library's website address on the start page, adding information for users, and the resulting information is very accurate according to what was input at the time of data collection."*

The statement from informant A above was also added by informant B, which stated as follows:

> *"The slims application that is used is beneficial for library management. The librarian only needs to do one entry, but the data is spread to various library activities that are integrated with the library management information system; for example, making a library report only takes a few minutes to print it without having to type again. because they are in sync with each other, besides that the information generated is very accurate and saves energy and time."*

To be more specific about service analysis, the researcher's library management information system conducted interviews with informants C and D, in this case, one of the postgraduate library users of UIN Alauddin Makassar, who stated as follows:

> *"The information produced by OPAC is beneficial because I can find out where the books I need are located without looking one by one on the bookshelf. In my*

conclusion, this OPAC is very petrified, and the information it produces is very accurate."

Based on the results of the interviews above, the researcher can conclude that the analysis of postgraduate information system of library management services has good service quality, which, according to Al-Fattah, to assess the impact of information systems on the service quality of a system can be seen from the following criteria: The system produces information that does not become accurate; The system produces conflicting information; The system produces information that is not trusted; The system is not easy to learn; The system is not easy to use; The system is awkward to use; and The system is not flexible. Meanwhile, the library management information system is far from the above criteria.

V. CLOSING

Based on the explanation above, it can be concluded that the PIECES (Performance, Information, Economy, Control, Efficiency, and Service) analysis of the library management information system Postgraduate UIN Alauddin Makassar is is using software has met the needs of library management where the library management information system has worked. By existing standard operating procedures, the information produced is high-speed and accurate. From an economic point of view, the software used is free and easy to learn and developed by postgraduate library librarians. Library Management Information System services have been efficient and very helpful both for library managers and library customers, in this case, the users. However, in the control section of the library management information system, in this case, the reporting section on the number of library visitors, the Postgraduate Library of UIN Alauddin Makassar does not implement visitor attendance at the library either manually or automatically by the management information system (visitor counter service) so that there is no data input process. in this section so that the output process for reporting visitors does not exist.

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