Atma Jaya Accounting Research (AJAR)
Volume 8 Issue 2, August 2025
P-ISSN: 2654-590X, E-ISSN: 2656-0410

Analysis of the Effectiveness of Cooperative Accounting Information Systems with the PIECES Benchmark

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Abstrak*:* Penelitian ini bertujuan untuk mengetahui efektivitas penerapan sistem informasi akuntansi Koperasi. Lokasi penelitian adalah Koperasi Wastralingga yang berlokasi di Purbalingga, Jawa Tengah. Penelitian dilakukan dengan menganalisis alur kerja dan komponen sistem informasi akuntansi sebelum dan sesudah perbaikan, serta menganalisis efektivitas sistem informasi akuntansi sebelum dan sesudah perbaikan. Sistem informasi akuntansi (SIA) yang digunakan Koperasi Wastralingga terdiri dari dua bagian utama yaitu sistem keuangan koperasi dan sistem komisi koperasi. Data yang digunakan dalam penelitian ini adalah data primer yang diperoleh dari wawancara dan observasi, serta data sekunder yang bersumber dari dokumentasi. Data dianalisis melalui reduksi, penyajian, penarikan simpulan, dan verifikasi dengan menggunakan teknik triangulasi dan sumber. Analisis yang dilakukan dengan menggunakan benchmark framework PIECES menunjukkan bahwa SIA Wastralingga bermanfaat dalam meningkatkan efisiensi dan keakuratan pembukuan dan pelaporan keuangan, namun masih terdapat ketidakefektifan pada aspek pengendalian keamanan sistem. Rekomendasi perbaikan untuk sistem informasi akuntansi koperasi Wastralingga antara lain adalah standarisasi dokumentasi, pelatihan pengguna, dan peningkatan fitur keamanan. Selanjutnya, evaluasi dan pemeliharaan berkala juga diperlukan untuk memastikan kinerja sistem yang optimal. Hasil penelitian ini memberikan kontribusi dalam hal uji coba pengembangan sistem informasi akuntansi di koperasi dan menjadi acuan untuk penelitian selanjutnya yang sejalan dengan hal tersebut.

Kata-kata kunci: sistem informasi akuntansi, koperasi, benchmark PIECES

Article Info:
Received: *May 30, 2025*| ***Revised:*** *June 21, 2025*| ***Accepted:*** *July 29, 2025*

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Analysis of the Effectiveness of Cooperative Accounting Information Systems with the PIECES Benchmark

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Abstract: *This study aims to determine the effectiveness of the implementation of the Cooperative accounting information system. The location of the study is the Wastralingga Cooperative, located in Purbalingga, Central Java. The study was conducted by analyzing the workflow and components of the accounting information system before and after the improvement, and analyzing the effectiveness of the accounting information system before and after the improvement. The accounting information system (AIS) used by the Wastralingga Cooperative consists of two main parts: the cooperative financial system and the cooperative commission system. The data used in this study are primary data obtained from interviews and observations, as well as secondary data from documentation. Data were analyzed through reduction, presentation, drawing conclusions, and verification using triangulation techniques and sources. The analysis conducted using the PIECES framework benchmark shows that the Wastralingga AIS is useful in improving the efficiency and accuracy of bookkeeping and financial reporting, but there is still ineffectiveness in the aspect of system security control. Recommendations for improvement for the Wastralingga cooperative accounting information system include documentation standardization, user training, and improving security features. Furthermore, periodic evaluation and maintenance are also needed to ensure optimal system performance. The results of this study provide a contribution in terms of piloting the development of accounting information systems in cooperatives and serve as a reference for further research in line with this.*

Keywords: accounting information system, cooperative, PIECES benchmark

1. INTRODUCTION

The development of technology has facilitated the management of business operations. The benefits of this technological development are information technology that has a significant impact on productivity, administrative management, and cost savings for companies. Information technology includes processing, retrieval, storage, and compilation of data with the aim of producing relevant, accurate, and timely information. The development of information technology facilitates the process of managing this data through an information system.

An information system consists of various integrated components to collect, store, manage data, and provide the necessary information. This system is useful for increasing the efficiency of business processes and optimizing employee performance. One of the cooperatives that has adopted an accounting information system is Wastralingga, which is a collection of batik craftsmen from Purbalingga and its surroundings.

This study aims to analyze the various benefits resulting from the implementation of an accounting information system at the Wastralingga Cooperative. In addition, this study also analyzes the workflow and components of the accounting information system before and after the improvements. Then, the evaluation of the effectiveness of the use of the accounting information system is carried out by comparing the conditions before and after the improvements are implemented.

The Wastralingga Cooperative uses an accounting information system that is divided into two main parts: a financial system and a commission system. The financial system records all transactions, including batik sales and inventory, as well as the purchase and sale of batik tools. The commission system calculates the accumulated batik sales and calculates the commission agreed between the craftsmen and Wastralingga. The system ran smoothly during the initial testing, but several obstacles such as irregular workflows and data synchronization bugs that caused duplication and inaccuracy in financial reports began to be detected.

One of the problems found in the accounting information system is that journaling rules are not included in the documentation or system guide when an unusual transaction occurs. An example of such a transaction is a gradual debt repayment or carried over to the next period. The absence of documentation can make it difficult for system users to find the information needed to deal with the obstacles that arise. Apart from the system guidance issues, minor bugs were also found in data synchronization. Bugs in data synchronization can increase the probability of duplicate data occurring due to repetition of information from two parts of the system.

The scope of this study includes an analysis of the Wastralingga accounting information system in the financial system and cooperative commission sections. Problem investigations include the user experience of Wastralingga administrators and other parties who have a relationship with the Wastralingga accounting information system. Analysis of the Wastralingga information system is limited to problems found in application performance, output and availability of information, and costs incurred while the administrators use the accounting information system.

Problems with user control over the accounting information system used, efficiency, and services provided by the system are also analyzed to be useful for maintaining the accounting information system. This research is expected to provide benefits for the development of theory and practice, especially in the evaluation and improvement of accounting information systems in cooperatives.

This study uses PIECES analysis (Performance, Information, Economic, Control, Efficiency, and Services) because this analysis technique is often used in assessing and evaluating the performance of information systems through interviews, observations, and documentation (Fatoni et al., 2020:2). PIECES analysis is an analysis technique first introduced by James Wetherbe for the purpose of identifying and solving problems in the system along with an assessment of its effectiveness. PIECES analysis identifies and solves problems in the system by analyzing six main points in the use of information systems, namely performance, information, economic, control, efficiency, and services (Wetherbe and Vitalari, 1994).

2. LITERATURE REVIEW

Accounting information systems (AIS) is a combination of three words, namely system, information, and accounting. According to Romney and Steinbart (2015:3), a system is a series of components that have relationships and interactions with each other to achieve a goal. Systems are generally divided into small subsystems in order to support the larger system as a whole. The system has the main purpose of managing massive information. This information is data that has been managed, processed, and interpreted for use in the decision-making process (Romney and Steinbart, 2015:3). Information is a competitive advantage for an organization because it is important for the sustainability of the organization (Herwiyanti, 2015:11).

The decision-making process carried out in an organization comes from consideration of accounting aspects. Accounting is the process of identifying, collecting, and storing financial information (Romney and Steinbart, 2015:10). Therefore, AIS refers to a system that is the result of a combination of integrated components to process accounting data into useful information for decision making (Putri and Maghfiroh, 2022:84).

Integration between components in AIS aims to fulfill three important business functions. The first function is to collect and store data, internal control, and transform data into useful information, and the second function of AIS is to accommodate adequate controls to secure organizational data (Muda et al., 2017). The process of collecting, storing, and securing data is a step towards the third function of AIS, namely converting data into information. AIS plays a role in converting data that has been collected and stored into information that is useful for the organization (Muda et al., 2017). Therefore, organizations that have sensitive and important data must have an information system that can fulfill these three functions.

The main components of AIS that can help manage data are divided into three, namely brainware, hardware, and software that are integrated in connecting and processing data (Ramadhona et al., 2023:67). Brainware in an accounting

information system is the user who operates the system (Ramadhona et al., 2023:67). Users of accounting information systems are generally accountants, bookkeepers, administrative staff, and managers. Accountants, bookkeepers, and administrative staff use accounting information systems for accounting activities related to their organizations.

Hardware is needed in the system so that the information system can process data provided by brainware (Manikandeshwar, 2013). The essential parts of hardware are the keyboard, CPU, and monitor. The keyboard is useful for the CPU to receive input from the user. The input obtained from the user is then processed by the CPU and displayed back to the user via the monitor. These three parts are needed so that the hardware can receive, process, and display data. Software in an accounting information system is a program found on the hardware (Ramadhona et al., 2023). Software consists of command lines which are then translated (compiled) by the programming language into binary code so that it can be run by the hardware. Software consists of three parts, namely input, database, and output. Therefore, the accounting information system must have brainware, hardware, and software that are well connected in order to run optimally (Ramadhona et al., 2023). These three components must have services that are in accordance with user needs, effective, and have minimal obstacles or bugs so that they are reliable for use (Muda et al., 2017).

The components of an accounting information system consist of several elements that are integrated with each other. These components can be assessed as effective based on their purpose in meeting the needs of the organization. System effectiveness can be explained as the extent to which a job is successfully completed according to plan, both in terms of time, cost, and quality. If the system can meet its objectives in helping the organization, then the system can be assessed as effective (Hadi et al., 2019). Ineffective AIS components require time, resources, or space, but have minimal or even insignificant impact on achieving organizational goals. Eliminating these ineffective components will have little or no impact on the system. The system helps organizations manage their activities. The system can store, process, and transform data into information that is useful for the organization. System implementation helps organizations store and manage data more efficiently using the help of computer automation. One of the benefits of this efficiency is the reduction of the workload of brainware so that system users have free time to work on other tasks to achieve organizational goals. In addition to efficiency, computer workflows that follow orders and minimize the possibility of overwork help reduce possible errors that arise from human error. Efficiency and minimization of errors due to human error can result in optimal decision-making because the information produced does not come from a less than optimum process. In addition to the technical aspect, the system also helps companies save by reducing expenses that occur if carried out without the help of the system.

PIECES is a tool to identify and evaluate problems that allow the preparation of system maintenance plans. The PIECES framework was first used by James Wetherbe in analyzing system effectiveness. This framework has a checklist of points that must be owned by an information system so that the system can be used optimally. PIECES helps developers analyze information systems at six

points, namely performance, information, economics, control, efficiency, and services.

Assessment of performance points evaluates the performance of the information system. This evaluation is useful for assessing the extent to which an information system is able to carry out its processes to achieve the desired goals. Assessment using the PIECES framework at performance points is measured through the response time indicator. Response time refers to the duration of the response given by the system to complete a series of processes or activities to produce a certain output (Wetherbe and Vitalari, 1994). One example of a response time assessment is the duration of loading an information system in processing a data set. The duration is measured from the pop-up throbber and the time it takes for the data to be optimally synchronized. Throbber is an icon that indicates that the computer is processing data (Branwyn, 1997). One example of a throbber can be seen in Figure 1.

Figure 1. Throbber

Information point assessment measures the quality of information provided by the system. The quality of information provided must have useful value. Assessment of information is measured to ensure that the information provided by the system has optimal accuracy and quality (Wetherbe and Vitalari, 1994). The assessment is divided into two parts, namely input and output assessments.

The input assessed using PIECES includes the quality of data reception from users for the system. The system sometimes provides a warning error when the user enters incorrect data because the system does not understand the format of the information. Therefore, input assessment is measured on the effectiveness of information reception by the system from the user so that the warning error given by the system can be minimized. The output assessed is the quality of data provided by the system. The quality of the data is measured from the availability of sufficient, useful, and accurate information. In addition, the information produced must also be ensured not to be excessive or information overload.

Analysis of economic points is carried out to evaluate economic aspects. The assessment includes the amount of costs used so that the system can operate (Wetherbe and Vitalari, 1994). Analysis of the amount of costs for using an information system aims to ensure that the expenditure to support the system used is comparable to its benefits.

Analysis of control points is useful for preventing and detecting system misuse (Wetherbe and Vitalari, 1994). These errors are misuse of the system by parties other than information system users which are the result of minimal administrative access control. Therefore, the system must have sufficient access control so that it can prevent the use of the system by parties who do not have access permission. Although information systems need to have sufficient control, excessive security can also be an obstacle in operating the system. Therefore, an

indicator in assessing a good information system is that the system must have sufficient and not excessive access control.

The efficiency expected from an information system is a system that can operate optimally with minimal effort or resources. Assessment of efficiency is also carried out on the complexity of the system so that an effective system is a system that suits the needs of its users. Therefore, if the system is too complex for the needs of a simple company, then the system is not efficient in helping the company manage its business. The indicators used in this assessment are analysis of excessive and unnecessary system features, as well as the quality of integration between components as stated by Wetherbe (1994) regarding the assessment using the PIECES framework.

The level of ease of use of a good information system must be in accordance with the needs and scale of the company. Therefore, service analysis aims to evaluate the quality and ease of service provided by the system. The assessments carried out include the ease of the system to be learned and used (ease of use), and developed (Wetherbe and Vitalari, 1994). Indicators in the ease of use section are assessed from user accessibility to the information system as a whole. Other assessments that focus on ease of development are assessed from the quality of the code used to build the system.

3. RESEARCH METHOD

The type of research used in this research is qualitative research with an intrinsic case study approach. Research conducted through intrinsic case studies has a single case source to explain an issue. The purpose of collecting data through a specific source is an in-depth understanding through one source. Therefore, this study uses a case study approach so that the focus of the research can be directed at one object, namely the accounting information system used by the Wastralingga Cooperative, and provides an in-depth understanding of the issues that occur from the case of the object. The object of this study is the accounting information system used by the management of the Wastralingga Cooperative. The analysis of the information system to be carried out in this research focuses on the effectiveness of the main components of the system, namely brainware, hardware, and software.

The primary data used in this study is data obtained through direct interviews with informants. The informants interviewed were the management of the Wastralingga Cooperative and other parties who received financial reports from the cooperative, namely the Purbalingga Cooperative and SME Service. In addition to interviews, primary data in this study were also obtained from observations of the accounting information system used by the management of the Wastralingga Cooperative. Secondary data used in this study were scientific journals and programming language documentation. The two data sources were obtained from other parties, namely previous research using the PIECES framework and program documentation used in running the Wastralingga Cooperative accounting information system. This study uses indirect and structured observation methods with the aim of observing the accounting information system used by the management of the Wastralingga Cooperative. Observations were made by

observing the operational activities of the system and analyzing components in accordance with the PIECES checklist. Observations of the accounting information system to be studied have PIECES checklist guidelines in observing the effectiveness of the system and making observations according to the checklist on the three components of the Wastralingga Cooperative accounting information system, namely brainware, hardware, and software.

This study uses unstructured interview techniques. Unstructured interview techniques are used by researchers to obtain initial information regarding the problems that exist in the research object (Sugiyono, 2021:140). This study uses unstructured interview techniques to find out the views of informants (user acceptance), namely the management of the Wastralingga Cooperative and other parties who have a correlation with the system regarding the information system used. The contents of the interview regarding the views of informants in this study include user satisfaction and the components that cause these obstacles. Documentation techniques are used to complement the research by utilizing various types of documents as reference materials (Murdiyanto, 2020:64). Documents act as a source of information that supports research by providing indirect data such as program documentation, photos, organizational documents, and financial reports. The documents used in this study are system component documentation and Wastralingga Cooperative documents. This study analyzes data using the Miles and Huberman Model. There are three activities in analyzing data using the Miles and Huberman Model, namely data reduction, data presentation, and drawing conclusions and verification (Sugiyono, 2021:246).

The data reduction process is the activity of making a summary, selecting the main components, and looking for patterns from the data (Sugiyono, 2021:247). The results of the data reduction help researchers understand the data, make it easier for researchers to collect further data, and make it easier to find information if needed. Presentation in qualitative research is carried out using descriptions, charts, flowcharts, and the like (Sugiyono, 2021:249). The presentation of data that will be provided in this study is in the form of a flowchart to briefly describe the integration flow between system components used by the Wastralingga Cooperative. The presentation of data in this study also uses tables and descriptions to describe the results of the analysis using the PIECES framework on the effectiveness of the accounting information system used by the Wastralingga Cooperative. Verification of data from collection and analysis in qualitative research is carried out through a validity test. The validity test aims to ensure that the data that has been collected and analyzed is valid. Valid data is data that can be accounted for and trusted. Validity is the level of accuracy between the data recorded in the study and the facts that actually occur in the research object. Data that is considered valid is data that is consistent and in accordance with the actual reality without any significant differences with the data reported by the researcher (Sugiyono, 2021:267). The data to be collected and analyzed in this study were tested for validity using source and technique triangulation. Source triangulation aims to assess the credibility of the data by checking the data obtained through several sources (Sugiyono, 2021:274). Data obtained by the researcher from one source is rechecked through other sources related to the research object. Validity testing using source triangulation in this study was carried

out by conducting member checks of data from the management of the Wastralingga Cooperative and other parties who received financial reports from the cooperative.

Technical triangulation is a data validity test by verifying the credibility of the data through several techniques such as interviews and observations (Sugiyono, 2021:274). Researchers need to discuss with data sources if the data obtained using technical triangulation produces different information. Therefore, technical triangulation of interviews, observations, and documentation is used in this study so that the data obtained from the research object can be checked for credibility. The assessment of system effectiveness using the PIECES framework is measured based on the checklist requirements that a system must have. Therefore, system components are considered effective if they meet all the requirements of the PIECES framework according to research conducted by Putri and Indriyanti (2021). The PIECES requirements benchmark that must be met can be seen in Table 1.

Table 1. The PIECES Requirements Benchmark

No	Checklist		Benchmark	Methods of Data Collection
1.	*Performance*	a. *Response time*	a. *Response time more optimal than before improvement*	a. *Observation*
2.	*Information*	a. *Doesn't contains errors* b. *Has necessary, relevant, and useful information* c. *Information not overload*	a. *No error found* b. *System provides necessary and relevant information regarding Wastralingga's financial statements* c. *No unnecessary information generated*	a. *Observation and interview* b. *Interview* c. *Interview*
3.	*Economics*	a. *Costs are known*	a. *Detailed information regarding system's operation cost*	a. *Interview*
4.	*Control*	a. *Enough security or control*	a. *Access to system only available for system user(s)*	a. *Interview and observation*
5.	*Efficiency*	a. *Resources required is optimal*	a. *No excessive resources used*	a. *Interview and observation*

6.	*Services*	*a. The system is easy to learn and use* *b. The system is flexible to change*	*a. User can learn and use the system easily* *b. Adaptability for further development and readable code*	*a. Interview* *b. Observation and documentation*

Source:

The benchmarks obtained through interviews in this study include user satisfaction or assessments of users and parties who have an interest in the Wastralingga Cooperative's accounting information system towards its system. Other sources for analyzing the effectiveness of the system used by the Wastralingga Cooperative are obtained from observations and collections of researcher documentation regarding the system. Components that meet benchmark standards can be assessed as effective components.

4. RESULTS AND DISCUSSION

Wastralingga Cooperative is a production cooperative led by Mr. Eka Mulyono. One of Mr. Eka's duties, apart from managing all activities of the Wastralingga Cooperative, is to establish partnerships between the cooperative and external parties. Mr. Eka manages the cooperative with the assistance of Mrs. Titis and Mrs. Tri. The duties of Mrs. Titis, who is the secretary, are to record the members of the Wastralingga Cooperative and manage internal and external events related to the cooperative. Meanwhile, Mrs. Tri, who is the main user of the Wastralingga Cooperative's accounting information system, holds the position of treasurer. Mrs. Tri's duties as treasurer are to prepare bookkeeping and report financial reports to the Purbalingga Cooperative and SME Office. The organizational structure of the cooperative can be seen in Figure 2.

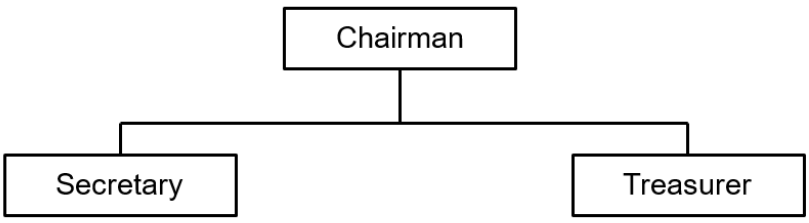

Figure 2. Organizational Structure of Wastralingga Cooperative

The Wastralingga Cooperative earns profit from commissions on sales of consignment batik sold. In addition to consignment commissions, the cooperative also receives orders for mass production of batik for the needs of government and private employee uniforms. Meanwhile, the operations of the Wastralingga Cooperative are supported by contributions from members of the cooperative. All economic activities of the Wastralingga Cooperative are arranged with the help of an accounting information system.

LPPM Unsoed provides hardware and training for qualified hardware and brainware so that the operation of the Wastralingga Cooperative's accounting information system can run optimally. Meanwhile, software to simplify the process was developed by developers using Python and Microsoft Excel considering that the cooperative's accounting needs are not too complex so that they do not require general bookkeeping applications such as Accurate or Zahir.

The hardware used by the Wastralingga Cooperative is an ASUS VivoBook A416MAO-FHD426 laptop which has an Intel Celeron N4202 processor with 4 GB of RAM. Data inputted into the general ledger in Excel is synchronized to the ledger until the cash flow statement is automatically with the help of macros and Python via buttons located on the initial interface. Therefore, the brainware's task is only to input transactions in the general ledger and then send financial reports in PDF (Portable Document Format) to Dinkop UKM. The informants from the internal side of Koperasi Wastralingga are Mr. Eka, Mrs. Titis, and Mrs. Tri. Meanwhile, the informant from the external side of Koperasi Wastralingga is Mrs. Umi Nurnaningsih who is the head of the UMKM division of Dinkop UKM Purbalingga. The list of informants can be seen in Table 2.

Table 2. Informant Biodata

No	Name	Age (year)	Level of Education	Institution	Position
1.	Eka Mulyono	39	Senior High School	Koperasi Wastralingga	Chairman
2.	Titis Nurika	23	Bachelor	Koperasi Wastralingga	Secretary
3.	Tri Kusnaeni	52	Senior High School	Koperasi Wastralingga	Treasurer
4.	Umi Nurnaningsih	53	Master	Dinas Koperasi UKM Purbalingga	Head of MSMEs Division

Source: data processed (2024)

Informants were selected based on their relationship as recipients of information and users of the Wastralingga Cooperative accounting information system. The management of the Wastralingga Cooperative has an understanding of the accounting information system used and understands the operations of the cooperative. Meanwhile, the Dinkop UKM understands the regulations regarding cooperative financial reports and has the authority to assess the quality of the reports produced. Data obtained from informants can be categorized manually using coding.

The benefits of time and energy efficiency were felt to have increased by informants after the system was repaired. The absence of obstacles such as warning errors and bugs accelerated the bookkeeping process carried out by Mrs. Tri. In addition, the integration between data that is neater in the system after repair minimizes machine errors in carrying out automation so that the information produced by the system shows more accurate and easier to understand results.
Another benefit of the system implementation stated by the Purbalingga Dinkop UKM is regarding the annual profit and loss report of the Wastralingga Cooperative.

The Dinkop can understand the format of the information presented by the system. Therefore, both parties agree with the benefits of the accounting information system for the Wastralingga Cooperative. The benefits mentioned are effective and efficient bookkeeping management.

The four informants agreed that AIS provided benefits that facilitated the operations of the Wastralingga Cooperative. The statements of the four informants were in accordance with Sarosa's (2017) explanation regarding AIS, namely a system that collects, records, stores and processes data to produce information that is useful in making decisions. Mrs. Tri, who is a system user, said that automation and data management in AIS made the bookkeeping process time-saving, neat and instant. Mr. Eka and Mrs. Titis, who are Mrs. Tri's colleagues and reviewed the financial reports prepared by Mrs. Tri, were of the opinion that AIS was helpful and easy to run so that it was beneficial for the Wastralingga Cooperative. Mrs. Umi, as the party who received the financial report of the Wastralingga Cooperative prepared with the help of AIS, felt that the report was neat so that it was worthy of being reported to the Purbalingga Cooperative and Small and Medium Enterprises Office. The system workflow data from observations that had been carried out on the Wastralingga Cooperative accounting information system can be seen in Figure 3 for the system before the repair and Figure 4 for the system after the repair.

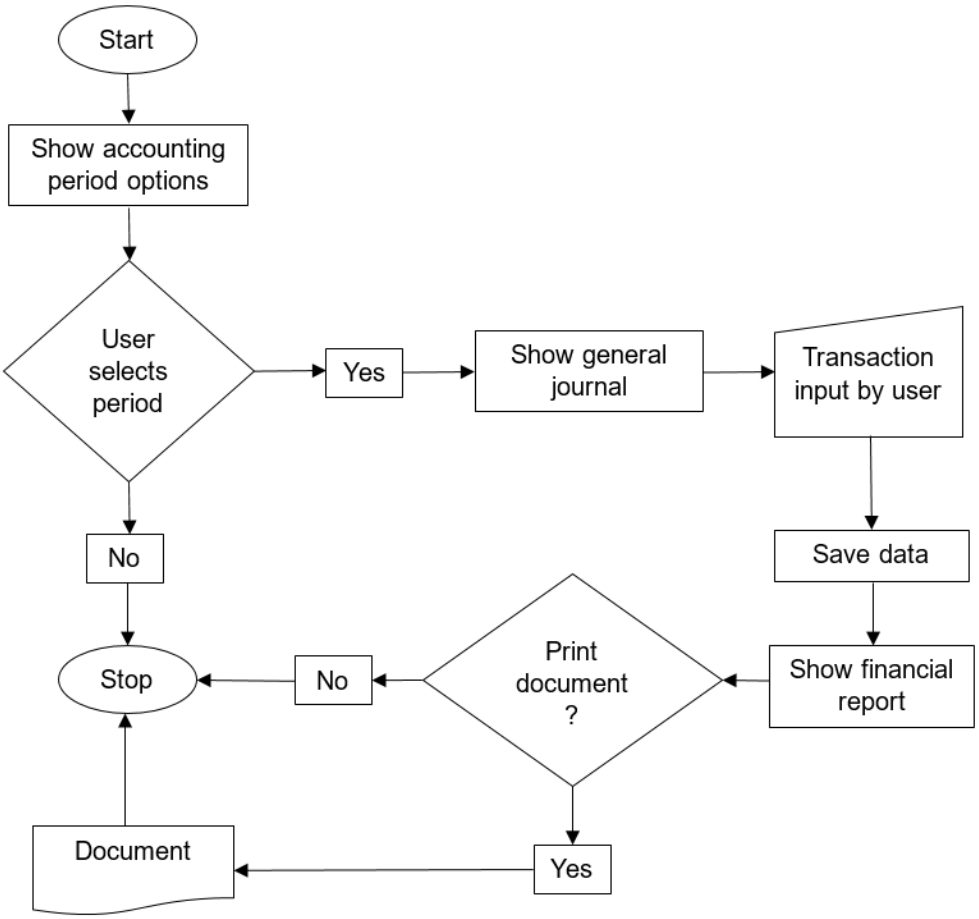

Figure 3. System *Workflow* Before Repair

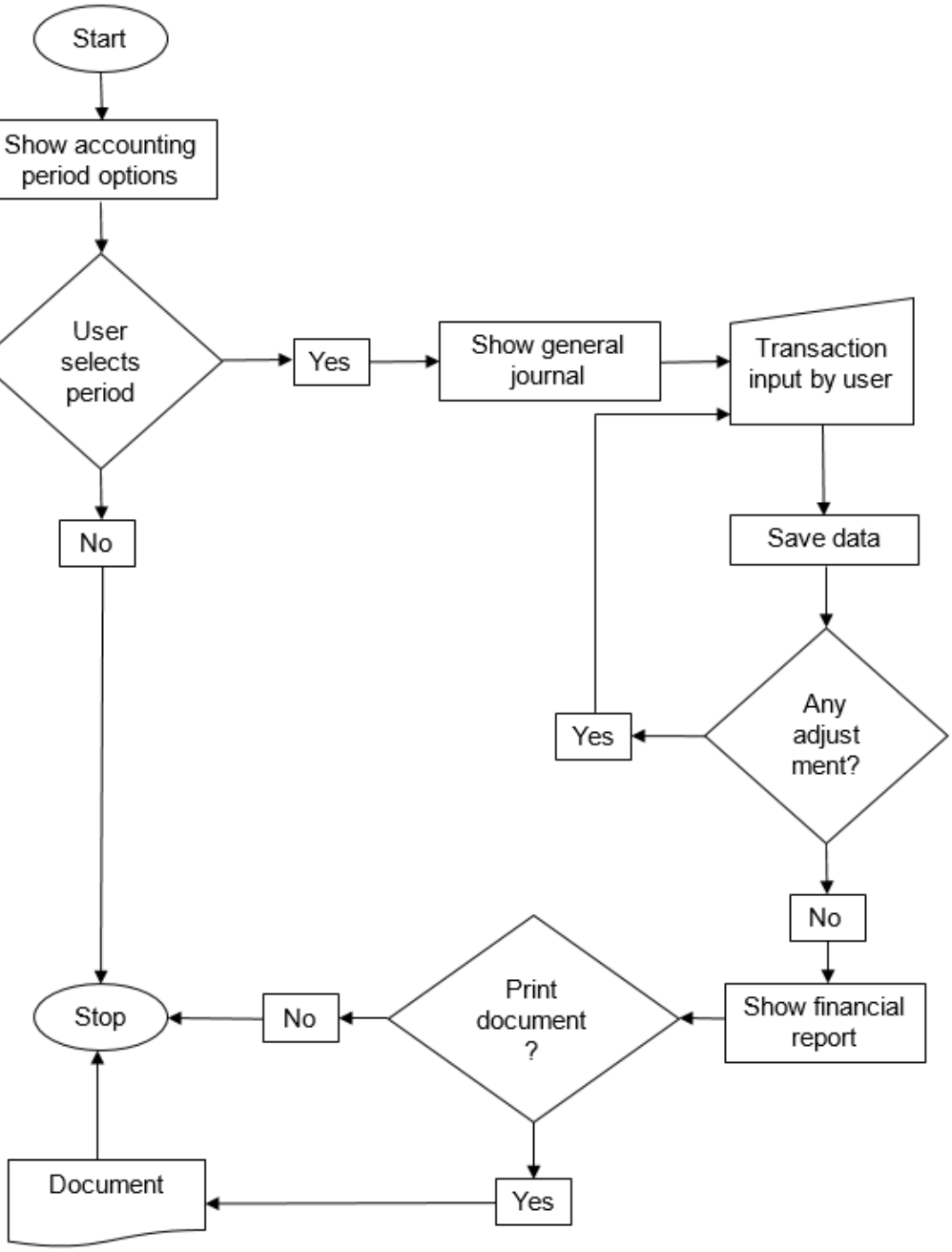

Figure 4. System *Workflow* After Repair

The analysis of the effectiveness of the system used by the Wastralingga Cooperative includes six main points, namely performance, information, economic, control, efficiency, and services. Data on the effectiveness of the six points analyzed in the system were obtained through interviews with parties who have a relationship with the system, observations on the system, and documentation of relevant internal and external documents.

The assessment of performance includes the response time required by the system to process Wastralingga's bookkeeping data. Observations made by the researcher compared the system's response time before and after repairs. The dataset used for this test is Wastralingga's bookkeeping data in 2023. The data consists of 89 transactions that occurred including sales of batik and batik equipment and payment of expenses. The system before and after repairs was tested in five trials each using the same dataset and process. The results of testing the system before and after repairs can be seen in Table 3 using seconds to measure response time.

Table 3. Response Time System

Testing Order	Response Time before Repair (in second)	Response Time after Repair (in second)
1.	4.8	2.1
2.	4.7	2.2
3.	4.8	2.2
4.	4.8	2.1
5.	4.9	2.2
Average	4.8	2.1

The system response time after the repair has an average of 2.1 seconds to process data. The system response time is faster compared to the system before the repair which can process the same dataset in an average of 4.8 seconds. Therefore, the system after the repair can compile bookkeeping more effectively compared to the system before the repair.

Filling in through the input box also does not require capitalization or writing a specific date because the system automatically corrects writing errors. The system before the repair gives the user a run time error '13' if the transaction is not inputted. The results of the documentation on the VBA documentation, the researcher obtained information that run time error 13 is a warning when VBA does not receive the data type that matches its code command. One example of this case is the cancellation of a request from the user so that the VBA which should receive a string data type only gets a blank.

The warning error experienced by the Wastralingga administrators and developers during the use of the system before the repair was only run time error 13. Therefore, the developer fixed the VBA code used in the transaction input box to accept the data type that matches the question and ignore the empty input box. The warning error no longer appears in the system after the repair so that requirement A of the information point can be met.

The coding results from the interview regarding the Information point of the system before the repair have three points of view based on each informant's relationship with the system. Mr. Eka, who received the financial report from Mrs. Tri, assessed that the information generated by the system before the repair often contained incorrect, inappropriate, or even missing data. Then, the repairs made to the system changed Mr. Eka's response to the system.

Mr. Eka as the chairman of the Wastralingga Cooperative assessed that the information generated by the system was accurate and appropriate. Then, the

information generated by the system was appropriate and there was no data loss. So, Mr. Eka assessed that the system after the repair was useful and effective compared to the system before the repair. Mrs. Titis, who is the secretary of the Wastralingga Cooperative, also reviewed the financial report generated by the system. Mrs. Titis assessed that the information presented was difficult to read. So, after the system was repaired, Mrs. Titis felt that the information generated by the system was easier to understand by Mr. Eka, Mrs. Tri, and Mrs. Titis herself.

The same narrative was also expressed by Mrs. Tri who felt that the information from the system before the repair did not contain the data required by the Purbalingga Cooperatives and SMEs Office. However, Mrs. Tri felt that the system after the repair produced clear information for the purposes of reporting financial reports.

The accounting information system used by Wastralingga includes three parts, namely brainware, hardware, and software. However, the analysis used in brainware cannot be presented in this study because this part is data that is not open to the public.

The hardware used by Wastralingga is an ASUS VivoBook A416MAO-FHD426 laptop. The laptop has a market value of Rp4,500,000.00. The laptop used by Wastralingga is a grant from the LPPM Unsoed community service program so it is not included in Wastralingga's operational costs in running the accounting information system.

The software used by Wastralingga is built using Python which is an open source license language so it does not require additional costs to use it even though it is used for commercial purposes. The results of the cost analysis at the Economics point are information regarding the details of the operational costs of the system and these points have been met so that the system is considered effective in terms of Economics.

The system improvement at the Control point is the addition of password protection for users who want to access data files. The accounting information system used by Wastralingga can be accessed by one person as its user, namely Mrs. Tri. However, the informant said that the sheet lock on the system after the repair which implemented two stages of locking was less effective because users needed to input a password every time they recorded a transaction. This obstacle was explained by Mrs. Tri in an interview in June 2024: "If it's safe, it's pretty good, because this laptop is sometimes also held by interns, PKL, or those who do research here. But what if the password is only used when opening the file, Mas? It's complicated, Mas, if every time you input a transaction you are asked for a password."

The ineffectiveness of the Control point on the Wastralingga accounting information system was not only felt by Mrs. Tri. The two-stage authentication applied to the system after the repair caused users to experience a less than satisfactory experience because it was considered difficult to input transactions. Mr. Eka also expressed similar things to Mrs. Tri regarding the Control system. Mr. Eka and Mrs. Titis, who are not the main users of the system, considered excessive authentication to be complicated and hinder Mrs. Tri's work, so the system was considered less effective. The results of the interview coding with Mrs. Tri also had

the same conclusion. Mrs. Tri considered the Control system more effective when the system had not been repaired and felt safe even without a password.

The information system used by the Wastralingga Cooperative has a function to summarize transactions that occur in the cooperative. The difference between the system flowchart before and after the repair lies in the system workflow process. The system flowchart before the repair which can be seen in Figure 7 has a flow that does not contain the entire actual workflow of the system, especially in the Wastralingga Cooperative's bookkeeping cycle. Meanwhile, the results of the observation show that the system flowchart after the repair shown in Figure 8 shows the stages of activity used to carry out its duties. This development resulted in a system after the repair that had a neat, clear, and open workflow compared to the system before the repair.

The clear workflow was confirmed by Mrs. Tri in an interview conducted in June 2024. Mrs. Tri explained that the clear workflow design in the system after the repair made it easier for brainware to understand how to manage the system. An excerpt from the interview with Mrs. Tri regarding the quality of the workflow is as follows.

The results of observations and interviews conducted in June 2024 with informants from internal Wastralingga resulted in conclusions regarding the Efficiency point. The conclusion is that the quality of integration between components and features provided by the system is more effective in the system after the repair compared to before the repair. Therefore, the Wastralingga Cooperative accounting information system meets the Efficiency PIECES benchmark points.

Assessment of usability in the system is needed because effective system maintenance is repairs that are carried out immediately if needed. Therefore, the Wastralingga accounting information system code must have effective readability so that system maintenance can be carried out periodically.

The system studied in this study has code from two languages, namely Python and Visual Basic. The naming of variables and functions in the Wastralingga Cooperative accounting information system after the repair uses camel case which is an unofficial agreement of the developer as a form of facilitating readability. Camel case consists of capitalization starting from the second word of the variable or function name and is used without spaces. Figure 5 contains camel case with an example of naming a function in Visual Basic Applications to call the command to open a file, namely openExcelFile.

```
def openExcelFile(month):
    if month in filePaths:
        filePath = filePaths[month]
        os.startfile(filePath)
```

Figure 5. Case of *Camel* Python

The difference in the system before the repair is snake case. Snake case is a type of variable naming without using capitalization and replacing spaces

between words with underscores (_). An example of snake case is open_excel_file. Snake case is rarely used by developers because the programming language can misinterpret variables as a form of command such as screen_height to set the height of the graphic user interface using the os library in Python. Therefore, the use of camel case is more popular and has become an unofficial guideline for program developers. Changing the type of variable naming in the Wastralingga Cooperative accounting information system from snake case to camel case can make it easier for other developers to review, check, research, and edit the code that has been written. An example of naming variables and functions using snake case in Visual Basic Application is shown in Figure 6.

```
for month in file_paths:
    button = tk.Button(window, text=month, width=12,
    button.grid(row=row, column=col, padx=5, pady=5)
    col += 1
    if col > 2:
        col = 0
        row += 1
```

Figure 6. Case of *Snake* Python

Another form of effort to optimize readability in the Wastralingga Cooperative accounting information system is the addition of comments in the code. The form of comments used in Python is the hash symbol (#), while Visual Basic uses single quotation marks (‘). The color of the comment line in the code arrangement is generally marked with green. An example of a comment in the code can be seen in Figure 7.

```
'Pilih worksheet
Set ws = ThisWorkbook.Worksheets("Jurnal")

'Sortir data
Dim row As Long
row = ws.Cells(ws.Rows.count, "A").End(xlUp).row + 1
```

Figure 7. Comments in *Code*

The system before the repair did not have comments for each different command in the code line so that it could confuse other developers who edited the code. Meanwhile, the system after the repair has a neat comment line explaining each line of code used. Therefore, the system after the repair meets adaptability for further development and readability because the guidelines follow the commonly used developer standards. The system also meets the Services effectiveness point because the code used is sequential according to the program flow expected by the initial developer.

The informant's assessment which tended to be negative towards the system before the repair became more positive when the system was repaired. Mr. Eka

and Mrs. Titis who received information periodically, and used the system after the repair for testing said that the system interface after the repair was neat, good, and easy to learn so that it was effective to use. Meanwhile, Mrs. Tri emphasized more on the functionality of the system. The system functionality that was felt to be positive after the system was repaired was that there was no more double data generated by the system. Triangulation of data collection techniques on the Wastralingga accounting information system produced data that the system met all the Services checklist points based on observations, documentation, and interviews that had been conducted.

The PIECES framework used to analyze the Wastralingga Cooperative's accounting information system has a benchmark to assess system effectiveness. This effectiveness is assessed based on information obtained through data collection that has been carried out in May and June 2024 regarding the components of the system being analyzed. The system is considered effective if it meets all the PIECES analysis points carried out on the system. The results of this analysis can be seen in Table 4.

Table 4. Results of PIECES Benchmark Analysis

No	*Checklist*		*Benchmark*	*Effectiveness*
1.	*Performance*	a. *Response time*	a. *Response time more optimal than before improvement*	a. *Fulfilled*
2.	*Information*	a. *Doesn't contains errors* b. *Has necessary, relevant, and useful information* c. *Information not overload*	a. *No error found* b. *System provides necessary and relevant information regarding Wastralingga 's financial statements* c. *No unnecessary information generated*	a. *Fulfilled* b. *Fulfilled* c. *Fulfilled*
3.	*Economics*	a. *Costs are known*	a. *Detailed information regarding system's operation cost*	a. *Fulfilled*

4.	*Control*	*a.*	*Enough security or control*	*a.*	*Access to system only available for system user(s)*	*a. Not Fulfilled*
5.	*Efficiency*	*a.*	*Resources required is optimal*	*a.*	*No excessive resources used*	*a. Fulfilled*
6.	*Services*	*a.*	*The system is easy to learn and use*	*a.*	*User can learn and use the system easily*	*a. Fulfilled*
		b.	*The system is flexible to change*	*b.*	*Adaptability for further development and readable code*	*b. Fulfilled*

5. CONCLUSION

The workflow analyzed in this study compares the system workflow before and after the repair. The workflow used by the system after the repair has a flow and process that can be understood by the user. The optimal flow and process in the system workflow after the repair supports the effectiveness of the components. The effectiveness of the components analyzed includes brainware, hardware, and software used to support the system. However, the results of data collection and triangulation show that the system has ineffectiveness at the Control analysis point. This ineffectiveness is the impact of excessive system authentication, making it difficult for users to use the system. Therefore, the elimination of two-stage authentication in the Wastralingga accounting information system is needed so that the system can be categorized as an effective system for use by the cooperative.

Data collection and validation carried out through technical triangulation can be used in further research so that the data obtained in the field is more varied and valid. In addition, the analysis method and research results that produce conclusions regarding the ineffectiveness of one of the PIECES assessment points can be a topic of further research for further researchers.

The results of the data collection and analysis are information about the system workflow, system source code, and the ineffectiveness of the software components. The information obtained from the results of this study can be used by Wastralingga and Dinkop UKM Purbalingga to understand the accounting information system used by the cooperative. Eliminating sources of ineffectiveness can help Wastralingga optimize its bookkeeping and financial reporting processes. Therefore, this study can be useful information for developers in evaluating the maintenance of the system used by Wastralingga.

The limitations of this study are obstacles in programming language documentation such as the absence of standardization of variable naming that can

affect the reliability of the analysis results. Developers of the Wastralingga accounting information system have the potential to use different rules in system maintenance so that the results of the component analysis that are considered effective in this study can be considered ineffective by other parties.

Further research can use a different approach to determine the standardization of system preparation. This approach can be in the form of a questionnaire regarding the standardization of code preparation for other developers who use the same programming language and type of system. A questionnaire on code compilation standardization can complement researchers' references so that they can be used as a reference for analyzing the effectiveness of the code used by developers.

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