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Development of Spreadsheet-Based Integrated Transaction Processing Systems and Financial Reporting Systems

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Abstract. Development of spreadsheet-based integrated transaction processing systems and financial reporting systems is intended to optimize the capabilities of spreadsheet in accounting data processing. The purpose of this study are: 1) to describe the spreadsheet-based integrated transaction processing systems and financial reporting systems; 2) to test its technical and operational feasibility. This study type is research and development. The main steps of study are: 1) needs analysis (need assessment); 2) developing spreadsheet-based integrated transaction processing systems and financial reporting systems; and 3) testing the feasibility of spreadsheet-based integrated transaction processing systems and financial reporting systems. The technical feasibility include the ability of hardware and operating systems to respond the application of accounting, simplicity and ease of use. Operational feasibility include the ability of users using accounting applications, the ability of accounting applications to produce information, and control applications of the accounting applications. The instrument used to assess the technical and operational feasibility of the systems is the expert perception questionnaire. The instrument uses 4 Likert scale, from 1 (strongly disagree) to 4 (strongly agree). Data were analyzed using percentage analysis by comparing the number of answers within one (1) item by the number of ideal answer within one (1) item. Spreadsheet-based integrated transaction processing systems and financial reporting systems integrate sales, purchases, and cash transaction processing systems to produce financial reports (statement of profit or loss and other comprehensive income, statement of changes in equity, statement of financial position, and statement of cash flows) and other reports. Spreadsheet-based integrated transaction processing systems and financial reporting systems is feasible from the technical aspects (87.50%) and operational aspects (84.17%).

1. Introduction

An accounting information system (AIS) is a collection of resources, such as people and equipment, designed to transform financial and other data into information [1]. An AIS collects, and processes transaction data and disseminates the financial information to interested parties. Accounting information is useful for a wide variety of decision makers in the decision making process [2,3]. Typically an AIS is composed of three major subsystems: transaction processing systems (TPS), general ledger/financial reporting systems (GLS/FRS), and management reporting systems (MRS) [4,5,6].

The heart of company's accounting informations systems is its accounting software. Accounting software is an application that records and processes accounting transactions within functional modules such as accounts payable, accounts receivable, payroll, and trial balance. Accounting information systems software to accomplish the functions of accounting, generating accounting reports, and using accounting reports. The use of accounting software can improve the efficiency of information collection, processing, storing, transformation, and distribution [7,8,9].

Spreadsheets remains entrenched in business processes, largely because it has been a part of the enterprise for so long. Its used as accounting software or only supplement of inadequate accounting software.[23] As accounting software, its used to to collect, process, and store, transform, and distribute accounting information. As supplement of accounting software, its used with other tools for efficient financial processes [10,11].

Previously, spreadsheet-based financial accounting application use journal approach. At the journal approach, the transactions is recorded in journals (general journal and special journals), so users must understand about the journal function and the way to record transactions in a journal. Spreadsheet-based accounting applications using the journal approach have disadvantages such as: difficulty of use, duplication of data entry, the lack of data integrity, lack of security, and lack of the report types that can be generated [10,12].

Development of spreadsheet-based integrated transaction processing systems and financial reporting systems is intended to optimize the capabilities of spreadsheet in accounting data processing. Spreadsheet-based integrated transaction processing and financial reporting systems using transaction cycles approach have advantages such as: more detail data, recording transactions through the transaction cycles is easier and faster, better application control, can generate more report types, and makes it easier when switching to more complex accounting software [13,14,15].

Spreadsheet-based integrated transaction processing and financial reporting systems must meet technical and operational feasibility [16,17,18,19]. The technical feasibility include the capabilities of hardware and operating systems to respond the accounting application, simplicity and ease of use. Operational feasibility include the user's ability to use accounting applications, the ability of accounting applications to produce information, and application controls of the accounting application [13].

This study focus on developing of spreadsheet-based integrated transaction processing systems and financial reporting systems. This study aimed to describe the spreadsheet-based integrated transaction processing systems and financial reporting systems, and to test its technical and operational feasibility.

2. Methods
This study type is research and development. The main steps of study are: 1) needs analysis (need assessment); 2) developing spreadsheet-based integrated transaction processing systems and financial reporting systems; and 3) testing the feasibility of spreadsheet-based integrated transaction processing systems and financial reporting systems. The technical feasibility include the ability of hardware and operating systems to respond the application of accounting, simplicity and ease of use. Operational feasibility include the ability of users using accounting applications, the ability of accounting applications to produce information, and control applications of the accounting applications. The instrument used to assess the technical and operational feasibility of the systems is the expert perception questionnaire. The instrument uses 4 Likert scale, from 1 (strongly disagree) to 4 (strongly agree). Data were analyzed using percentage analysis by comparing the number of answers within one (1) item by the number of ideal answer within one (1) item.

3. Result and Discussion
Spreadsheet-based integrated transaction processing systems and financial reporting systems should be able to meet the needs of users include: 1) input the initial data such as company information, accounts, vendors, customers, and inventory information; 2) special journals such as purchasing, sales, cash receipts, cash disbursements and general journal; 3) ledger and sub-ledger such as general ledger and sub-ledger of debt, receivables, and inventory, 4) trial balance and the work sheet, 5) financial statements including statement of profit or loss and other comprehensive income, statement of changes in equity, statement of financial position, and statement of cash flows; and 6) closing trial balance. In addition, the system should also be able to generate other reports required by the user.

3.1. Spreadsheet-based integrated transaction processing systems and financial reporting systems
In fact the spreadsheet-based integrated transaction processing systems and financial reporting systems consists of three parts: transaction processing systems, general ledger systems, and financial reporting systems.

In this study, general ledger systems is combined in financial reporting systems. The description of each parts are as follows:

3.1.1. Transaction processing systems. Transaction processing systems support the recording of daily financial transactions. Transaction cycle consists of the revenue cycle, purchase cycle, payroll cycle, the production cycle and financial cycle [20,21]. The revenue cycle includes activities related to the receipt of orders, delivery of goods, and cash receipts. Purchase cycle includes activities related to purchase orders, goods receipts, and payments for purchases. Payroll cycle include activity to calculate the gross payment, reduction and net payments to employees. The production cycle includes the activities associated with the processing of raw materials and labor into finished goods [20]. The results of the transaction cycle process will be processed further in the cycle of financial reporting [22].

In this studi, transaction cycle refers to a service and trading company. Transaction cycle consists of sales cycle, purchase cycle, and cash cycle. The purchase cycle is used to record purchases, purchase returns, purchases discount, and cash disbursements to pay the debt. The sales cycle is used to record sales transactions, sales returns, sales discounts, and cash receipts of accounts receivable. Cash cycle is used to record cash transactions other than cash receipts from the payment of receivables from sales on credit, and cash disbursements for the payment of debts from purchases on credit.

In this system, transactions are inputted in the appropriate transaction cycle. Special journals are not used to record transactions because special journals are the output of the system. Only general journals are used to record transactions that can not be recorded in special journals. In the journal approach, the way of recording transactions is relatively different. Transactions are recorded in the appropriate special journal. Transactions that can not be recorded in special journals are recorded in general journal. Recording transactions directly on special journals is more difficult than recording transactions on the transaction cycle.

3.1.2. General ledger/financial reporting systems. General ledger/ financial reporting systems produce ledger and traditional financial statements [4]. Ledger includes general ledger and sub ledger of debt, accounts receivable, and inventory. In this system, general ledger and sub-ledger are automatically generated in accordance with the data inputted on the transaction processing systems. System can produce general ledger and sub-ledger globally and detailed according to user needs. The balance of the ledger is automatically entered in the trial balance and worksheet.

Financial statements including statement of profit or loss and other comprehensive income, statement of changes in equity, statement of financial position, and statement of cash flows [23]. Financial statements format is prepared in accordance with the rules of the financial accounting standard. Financial statements are generated based on the results of the general ledger systems and worksheet. In addition, the system also generates other reports required by the user such as cash, receivables, inventories, fixed assets, debt and equity reports. At the end of the period, a closing trial balance is made to close temporary accounts so that the systems is ready for use to record transactions in the next period.

3.2. [22] Technical and operational feasibility of systems
Testing of technical and operational feasibility of the spreadsheet-based integrated transaction processing systems and financial reporting systems, performed by accounting and computer experts. [22] Based on expert perception questionnaire, the technical and operational feasibility of systems are as follows:

3.2.1. Technical feasibility. The technical feasibility include the ability of hardware and operating system respond to the accounting application, simplicity and ease of use. The results of technical feasibility test are presented in Table 1.

Table 1. Technical feasibility test results.

Technical Aspects	Score (%)
Ability of hardware and operating system.	
CPU (Central Processing Unit) can respond to all requests quickly.	90.00
The operating system supports accounting application.	92.50
Simplicity and ease of use.	
Accounting application is easy to learn.	87.50
Accounting application is easy to use.	90.00
Accounting application provide the dialog guidance that directs the user during data entry.	82.50
Structure of menu facilitate users accounting application.	82.50

Based on the result of technical feasibility test of the system, can be seen that the average percentage of technical feasibility assessment is 87.50%. This shows that spreadsheet-based integrated transaction processing systems and financial reporting systems is feasible to use. The ability of the hardware and the operating system are very capable to support systems. Ability hardware and operating system can be seen from the ability of CPU (Central Processing Unit) to respond all requests quickly and the ability of operating system to supports accounting application. Simplicity and ease of usage can be seen from accounting application is easy to learn, accounting application is easy to use, accounting application provide the dialog guidance that directs the user during data entry, structure of menu, facilitate users accounting application

3.2.2 Operational feasibility. Operational feasibility include the ability of users using accounting application, The ability of accounting application to produce information, and control applications on the accounting application. The results of operational feasibility test are presented in Table 2.

Table 2. Operational feasibility test results.

Operational Aspects	Score (%)
The user's ability to use accounting application.	
Users can quickly use accounting application.	87.50
Users can overcome its own difficulties in the use of application.	85.00
Ability of accounting application to produce information.	
Accounting application can produce financial reports.	92.50
Accounting application to generate detailed information.	82.50
Accounting application can generate information that can be displayed on the monitor.	87.50
Accounting application can produce information in the form of paper documentation (print).	90.00
Application control.	
Applications include adequate password.	85.00
Application has a input control (validation test, a test of accuracy, fairness, completeness etc.).	72.50
Application has a output control (output reconciled with other parts).	75.00

Based on the result of operational feasibility test of the system, can be seen that the average percentage of technical feasibility assessment is 84.17%. This shows that spreadsheet-based integrated transaction processing systems and financial reporting systems is feasible to use. The user's ability to use accounting application, and ability of accounting application to produce information are very capable to support systems. Control applications on spreadsheet-based integrated transaction processing systems

and financial reporting systems are good but with relatively low scores. This means that control applications on systems are not yet optimal. Control applications related to input and output controls need to be improved.

The ability to use accounting application can be seen from users can quickly use accounting application and users can overcome its own difficulties in the use of accounting application. The ability of accounting application to produce information can be seen from the ability of accounting application can produce financial reports, accounting application to generate detailed information, accounting application can generate information that can be displayed on the monitor, and accounting application can produce information in the form of paper documentation (print). Control applications can be seen from the adequate password of applications, application has a control (validation test, a test of accuracy, fairness, completeness etc.), application has a control output (output reconciled with other parts).

4. Conclusion
Spreadsheet-based integrated transaction processing systems and financial reporting systems integrate sales, purchases, and cash transaction processing systems to produce financial reports (statement of profit or loss and other comprehensive income, statement of changes in equity, statement of financial position, and statement of cash flows) and other reports. Spreadsheet-based integrated transaction processing systems and financial reporting systems is feasible from the technical aspects (87.50%) and operational aspects (84.17%).

5. Acknowledgment

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