

Inventory and Sales Information System Design on Clothing Store (Case Study: X Fashion, Jakarta)

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ABSTRACT

The progress of time continually accompanied by the development of technology. It leads to the competition among industries that require them to have superiority to attract more consumers. X Fashion is one of the fashion industries which sells various apparel products for people in the sale of large or small scale. The business processes of X Fashion is procuring products, managing inventory, sales, and managing finance. A lot of variations and number of products in the store are not in balance with a good management because all forms of recording are done manually. It causes potential error so that the information disseminated is inaccurate. Based on this consideration, a research is conducted as inventory and sales information system design on X Fashion clothing store to identify business process also to design an inventory and sales information system on X Fashion clothing store. The method used is Systems Development Life Cycle which consists of systematic steps for developing, designing, and maintaining the system to meet the needs of users, including supervision, recording, and reporting. Information system is designed to provide stock data, expense, and income reports automatically. Testing of the system includes system testing, function testing, learnability, logic testing, memorability, and measurement of satisfaction. Based on the test results, the information system was stated feasible and can be used to support business processes on X Fashion clothing store. Suggestions for further research on information system design are development of system design in order to be compatible on smartphone, also an addition of brief information on every control or using user guide in order to describe system function

A. INTRODUCTION

In the development of technology, a company demanded to implement technology to build their business process. X Fashion is a developing business unit in selling various apparel products. Based on the information from the owner, they have difficulty to manage stock due to lots of product variations. During this time, every sort of information was noted manually, which spend longer time. Moreover, collected information is not accurate because of manual documentation.

Based on this problem, research is conducted to design an inventory and sales information system to help and quicken activity in the side of collecting and processing product information, selling, also financial. The method used is Systems Development Life Cycle (SDLC) which consists of systematic steps for developing, designing, and maintaining the system to meet the needs of users. This method provides a good quality of system design, following user needs.

The type of developing system design used is prototype model to create a model of program to visualize software components as what the user needs.

Designing this information system using MySQL software and PHP programming language which flexible on the operation system, fast in execution, also easy to interact with the database.

B. RESEARCH METHODOLOGY

1. Preliminary Studies

The initial stage is done by an interview with the owner and every department. An observation also conducted to find out the actual condition of the company that caused the problems. Based on the interview and observation, the condition or the business process of the company is discovered.

a. Business Process

According to Weske (2007), business process consists of a collection of activities carried out in a coordinated manner in an organization. These activities are combined to achieve a business goal. According to Dumas, Rosa, Mendling, and Reijers (2017), business process is carried out by the company when providing service or product to consumer. The way the business process is designed and carried out affects the quality of service perceived by consumer and the efficiency of the service.

b. System Planning

According to Dennis, Wixom, and Roth (2012), system design is the determination of the overall architecture that consists of a collection of physical, hardware, software, human, and communication processing components. The design of a new system must meet all aspects by prioritizing the needs of consumers, selecting and evaluating potential products, applying technology, planning product life cycles, and designing products to make it easier to use.

c. Systems Development Life Cycle (SDLC)

The methodology of system analysis and design referred to System Development Life Cycle (SDLC), which includes the development of processes and ongoing maintenance processes. The methodology of analysis and design of the system was originally prepared for software development so that it only focuses on programming. In the analysis phase, the main focus is on understanding the needs of the organization. On the other hand, the design phase focuses on the physical aspect of a system to support specific organizational needs. But in its development, the process is always followed by the operation phase and the implementation phase (Ramakrishnan, 2012). According to Barjtya, Sharma, and Rani(2017), System Development Life Cycle is a collection of systematic steps for the development, design, and maintenance of a system to ensure that user needs are fulfilled by using minimal resource. The methodology seeks to provide good quality products under the wishes of the consumers.

d. Data Flow Diagram (DFD)

Data Flow Diagram describes the business process along with the data involved in the process, which focuses on the activities involved (Dennis et al., 2012). According to Rosenblatt (2014), Data Flow Diagram shows the movement of data through the information system but not show a logical model of how the system works. Data Flow Diagram uses symbols that represent the process, data flow, data storage, and entity.

e. Entity Relationship Diagram (ERD)

According to Dennis et al. (2012), Entity Relationship Diagram is an illustration that displays information that is created, stored, and used by a business system. The purpose of reading ERD is to find individual pieces of information in the system and find out how the information is organized and related to one another. Meanwhile, according to BaguiandEarp (2012), Entity Relationship Diagram is a method of mapping data to be stored in a database system. In ERD, the same information is placed in a box called an entity. The lines between entities indicate the relationship between data. The illustration of ERD is not sequential even though entities related to each other are placed closely.

f. CRUD matrix

A tool used to describe the relationship between the process and data modelling is CRUD matrix. CRUD (Create, Read, Update, Delete) matrix is a table that illustrates the system process that uses data contained in the system. CRUD matrix helps the early stage of process and data modelling. It also contains important information for program specifications because showing the formation of data and its use in the system. It can identify attribute locations that might be missing from data storage or entity. Moreover, it can verify attributes that are created, read, updated, or deleted in the modelling process (Dennis et al., 2012).

2. Problems Identification

The problem identification from the research is obtained by the research background which carried out from the preliminary studies. The problem of the research is the information system still manual and not integrated that causing some problems.

3. Data Collecting

The data collecting stage starts from obtaining primary data form interview and also observation. The data includes the present business process, information needs analysis, also system user identification.

4. Designing and Building System

After collecting data, designing and building system can be done by creating the information system flowchart, context diagram, Data Flow Diagram, Entity Relationship Diagram, making CRUD matrix, present the design of the information system, then do the system construct.

5. Testing and Evaluation

At this stage, system testing is conducted directly to the designer and the system user. The testing starts with system testing for the system designer. Then the testing is done sequentially by the users on the first day, which consists of function testing, learnability testing, also logic testing.

The second day with the time-lapse a week, users test memorability of the system, also satisfaction measurement. After testing, evaluation is done against the information system to describe the difference between the proposed system and the system that is being used, evaluation of the testing, also managerial implication from the information system application on X Fashion clothing store.

6. Conclusion and Suggestion

Based on the stage that has been done previously, conclusion can be made in accordance with the research purposes. In addition, suggestion is given as input either for the following research or for the company, also the readers.

Data Collecting

1. Business Process Identification

At present, the business processes in X Fashion clothing store are done manually. All transactions are still recorded manually using books. The business processes in X Fashion clothing store are procurement process, stock management, selling, and financial management. Figure 1 shows the flowchart of business process that occurs in X Fashion Clothing Store for the procurement process, stock management, and financial management in expenses.

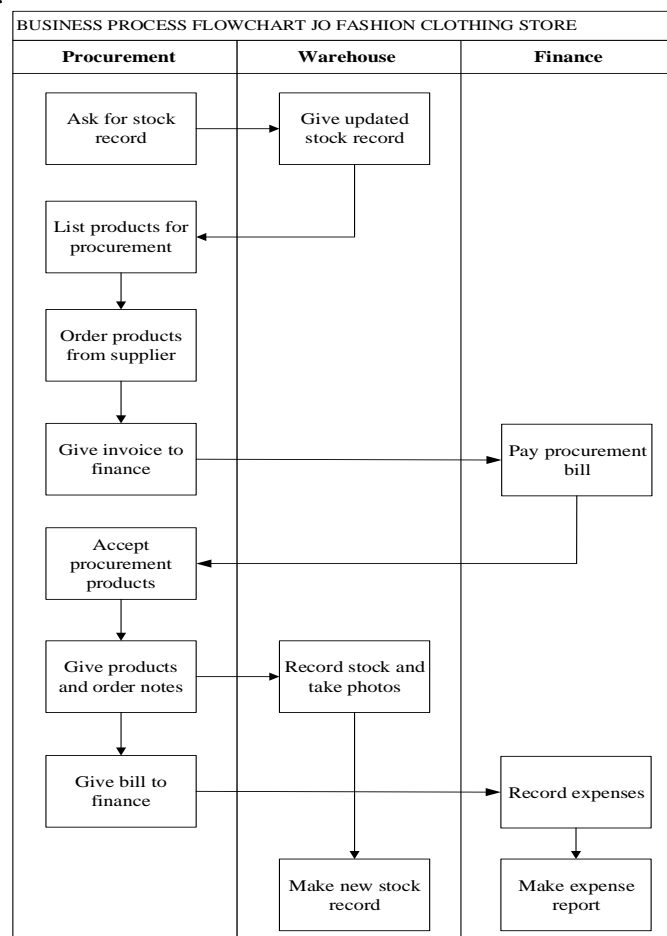


Figure 1.
Business Process Flowchart on X Fashion Clothing Store

From the procurement process, new products are bought and stored in the warehouse. Furthermore, the expenses from the procurement process are recorded to make the expense report.

After that, the business process resumes to the selling process. Figure 2 shows the flowchart continuance of business process that occurs in X Fashion Clothing Store for the selling and financial management in income.

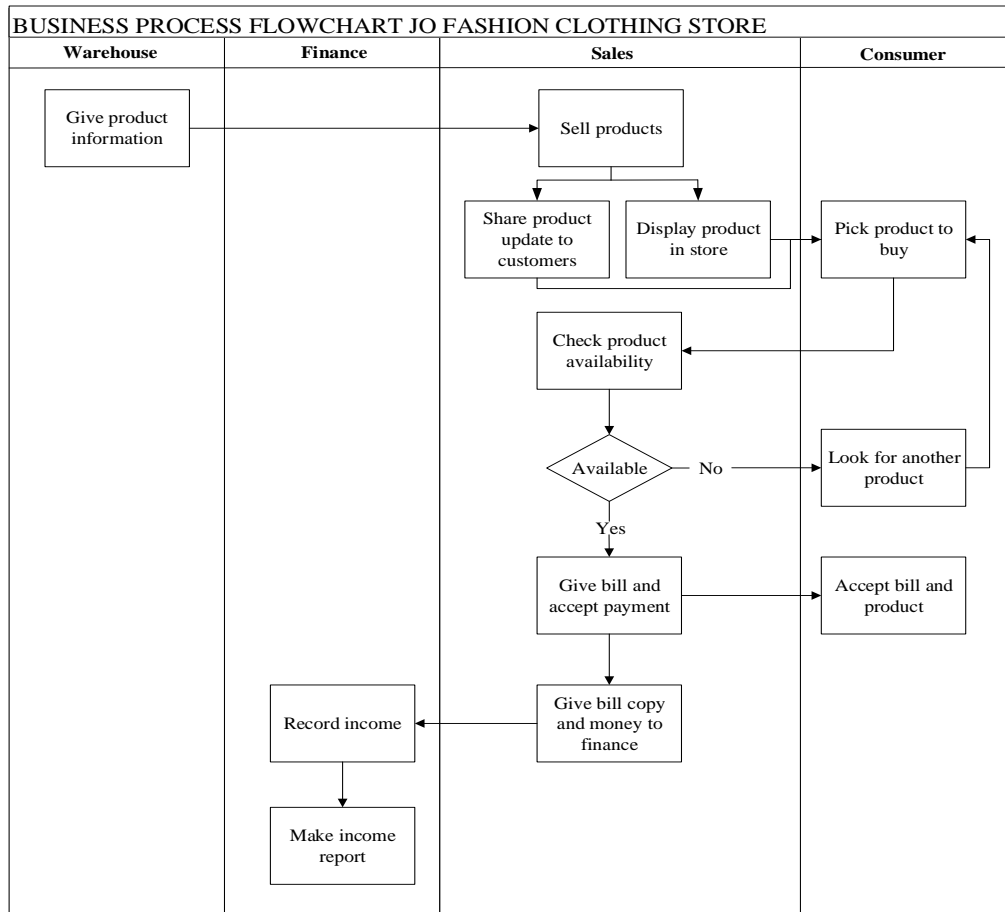


Figure 2.
Continuance of Business Process Flowchart on X Fashion Clothing Store ~~in the Present~~

The selling process in X Fashion clothing store is divided into direct sales at the store and indirect sales through shipping. Sales through shipment are offered to reach consumers who do not come directly to the store or consumers who are outside the city. Orders are recorded and then checked for the availability. When the transaction occurs, the sales department adds up manually the total order along with the shipping cost for the shipment. After accepting the payment, the sales department prepares the product for the consumer.

2. Information Needs Analysis

At this stage, identification of the information that is needed by the system user is carried out. The identification is based on the current system that occurs in X Fashion clothing store. Based on the information needs, the impact of the current system described as follows.

1. Stock Data

Stock data is information that must be maintained by the person in charge of product stock to control the remaining inventory in the warehouse. The problem of the current system is that not all stocks are successfully recorded because there are too many products in the warehouse, also not regularly arranged, thus the stocks that are still in the warehouse are considered non-existent or vice versa. This also because records are not constantly updated, that is, when sales transactions occur, the stock on the record does not automatically decrease but must be updated manually. Besides, it takes a long time to accurately check the stock in the warehouse. Stock data is sought to be updated as soon as the product is sold or purchased because it is needed for the procurement process.

2. Expense Report

Expense report is a record of expenditure information from the procurement process. In the current system, the finance department records expense manually based on the invoice which is often not identified because there are numerous and lost so that the expenditure is not recorded. Thus, the expense report is inaccurate.

3. Income Report

The income report contains a record of income information from product sales. Because the store serves direct sales also shipping sales, receipts are generated more that make it difficult for the finance department for collecting sales information to record income. Besides, sometimes direct sales do not conduct with the transaction bill, so there is no record of the sales.

3. System User Identification

System user identification is done to restrict the authority of every department in using the information system. The users of the information systems in X Fashion clothing store are listed below.

1. Owner, the highest position in the store, decide and determine decisions on business processes.
2. Procure department, do inventory control and plan product orders.
3. Warehouse department, responsible for the products' state of stock.
4. Selling department, tasked with marketing, selling, and ensuring products reach consumers.
5. Finance department, responsible for transactions related to finance.

C. RESULTS AND DISCUSSION

Designing and Building System

1. Information System Flowchart

After getting the data and describing the recent business process flowchart on X Fashion clothing store, the proposed information system flowchart can be created to describe the system flow that occurs in the proposed business process. The system flow contains the database and the result of data processing or output involved in the business process. Figure 3 shows the business process flowchart for the proposed system on X Fashion clothing store.

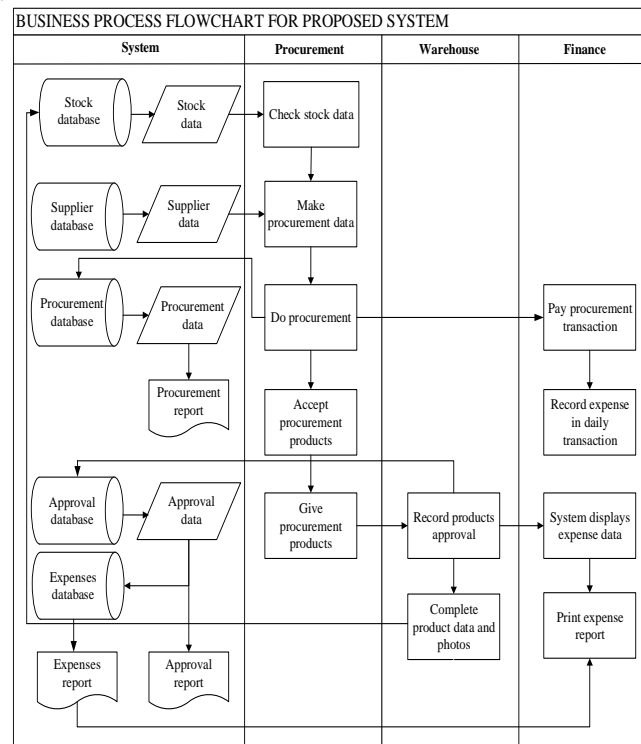


Figure 3.

Business Process Flowchart for Proposed System on X Fashion Clothing Store

The business process flowchart illustrates the proposed system in the application of information systems. There are some process reductions in implementing the information system, such as requesting

stock record from warehouse department, give procurement invoice to finance department, give order notes to warehouse department, making new stock record, and making expense reports. Those processes do not need to be done because all data about procurement is in the system and it can be seen by every department independently from the stock, supplier, procurement, approval, and expense database.

From the previous business process related to the procurement process, it continues to the business process related to selling activities. Figure 4 shows the continuance of business process flowchart for proposed system on X Fashion clothing store.

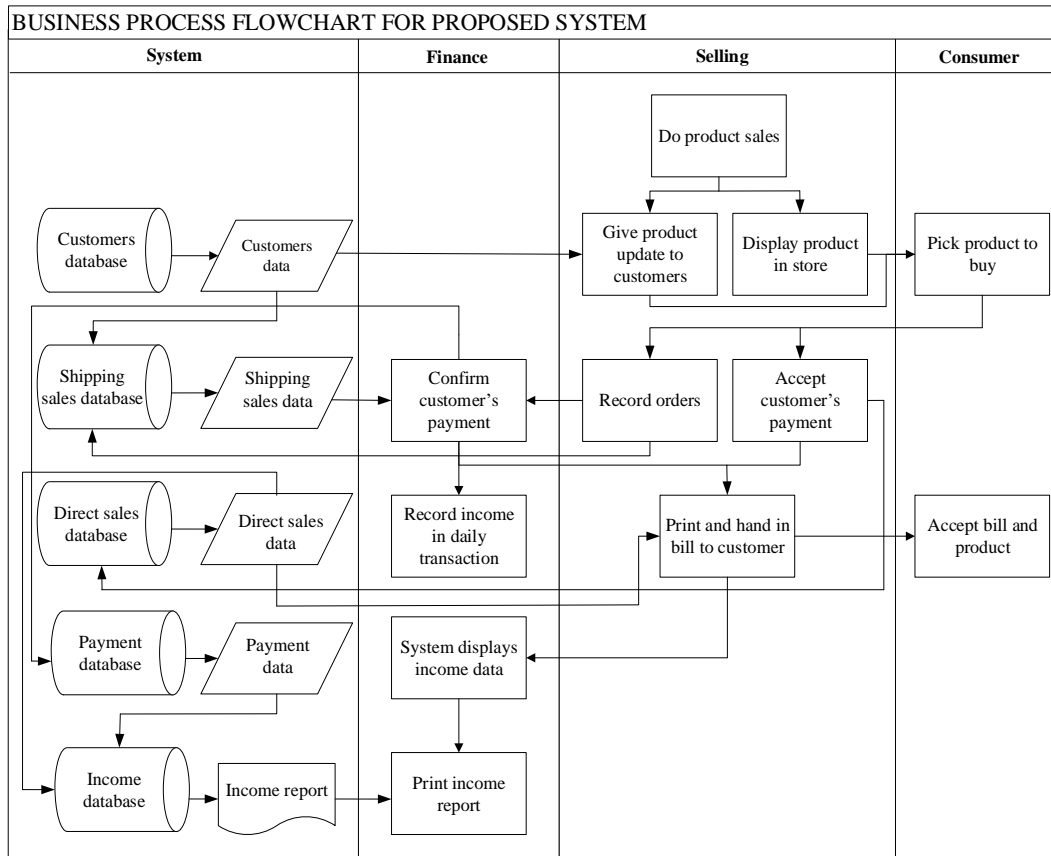


Figure 4. Continuance of Business Process Flowchart for Proposed System on X Fashion Clothing Store

Meanwhile in the selling process, some processes do not need to be done while implementing the information system in business process. Those processes include providing product information, checking product availability and waiting for certainty of stock availability, even asking customer to look for other substitute products. Also, the process of giving sales bills to finance and manually collecting income records. Those processes are reduced because the sales data, customer's payment, and revenue including profit have been found in the information system, so they do not need to be processed manually by the selling department or the finance department. Moreover, the results of data processing by the system can be directly accessed by the owner in realtime, thus speeding up the processing and delivery of information needed by the owner

2. Context Diagram Design

In designing the information system on X Fashion clothing store, a context diagram is designed to show the boundaries and scope of the overall designed information system. Figure 5 shows the context diagram of the information system.

3. Data Flow Diagram

Data Flow Diagram illustrates the movement of data through the information system. The design of DFD aims to describe the flow of data on a system that starts from DFD level 0 as the basic diagram, then described in more detail through diagrams with higher levels. DFD level 0 describes the entities, processes and data storage.

There are several main processes in the information system, including the process of filling in orderproduct data, ordering product, filling in productdetaildata, selling product, and preparing expense and income reports. Data storages shown from DFD level 0 are product data, product colour data, stock data, procurement data, and sales data. Figure 6shows DFD level 0.

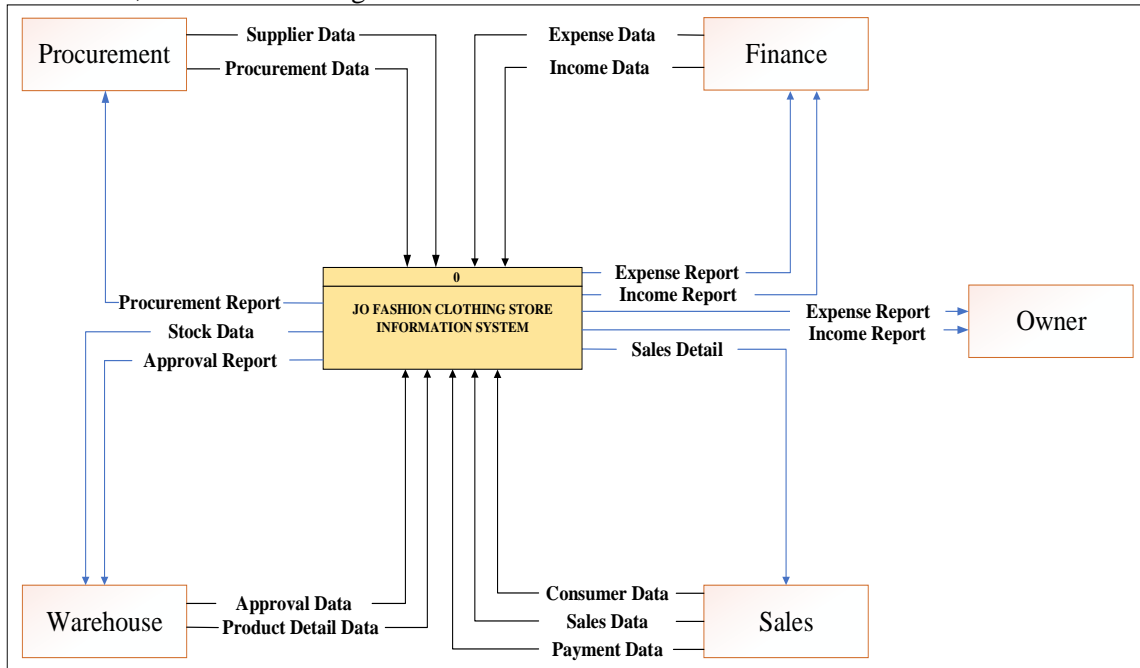


Figure 5.
Context Diagram of the Information System on X Fashion Clothing Store

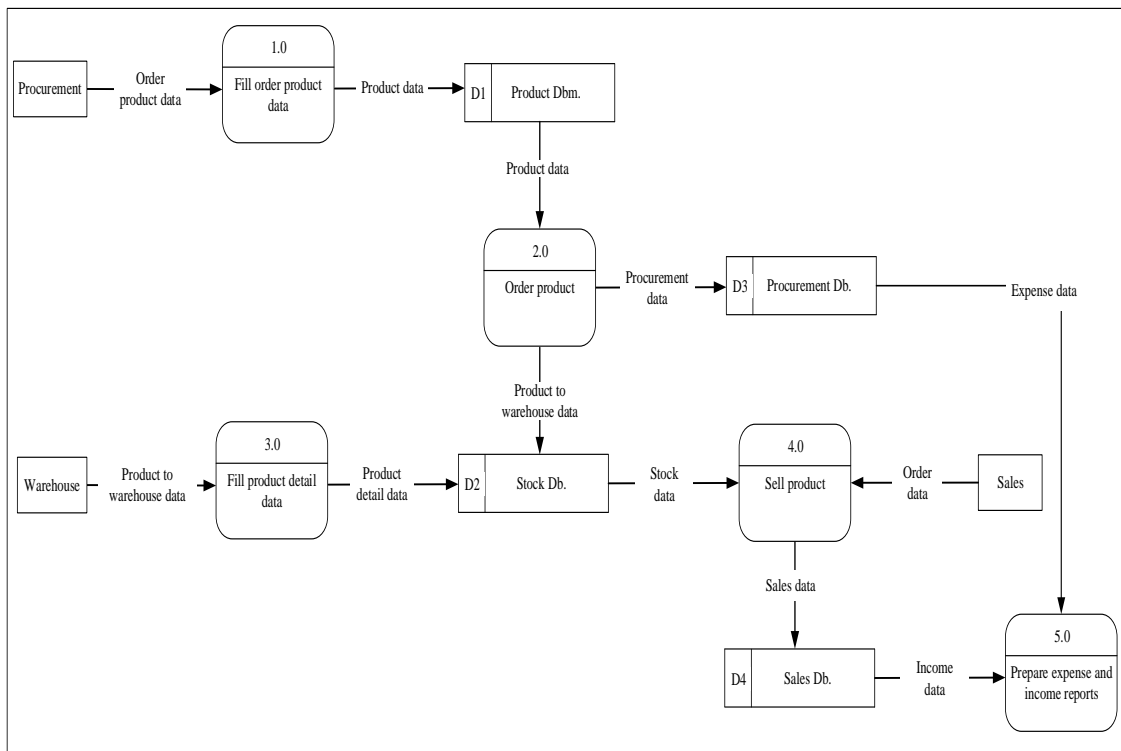


Figure 6.
Data Flow Diagram level 0 of the Information System on X Fashion Clothing Store

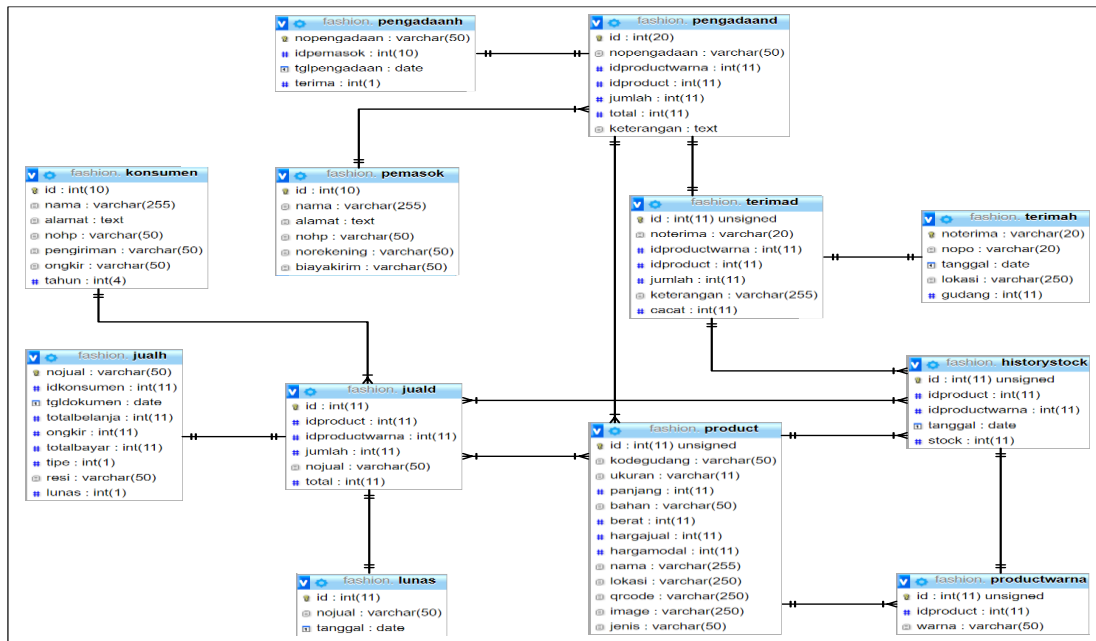


Figure 7.

Entity Relationship Diagram of the Information System on X Fashion Clothing Store

4. Entity Relationship Diagram

The design of Entity Relationship Diagrams can be seen in Figure 7. ERD is made to display information or data on the system that is connected in the form of entities. In implementing the information system to support business process, several related entities are involved in each business process. The relations between entities are described in the form of Entity Relationship Diagrams.

5. CRUD Matrix

CRUD (Create, Read, Update, Delete) matrix is a table that illustrates the relationship between process modelling and data modelling. The table shows the data used in every interaction by the user. The business processes on X Fashion clothing store information system and the related entities are determined so that the interaction of processes with entities can be explained through the activities of creating, reading, updating, or deleting the data. Table 1 shows CRUD matrix on X Fashion clothing store information system.

Table 1. CRUD Matrix

Process	Owner	Procurement	Ware house	Sales	Finance
Master Data					
User data	CRUD				
Supplier data	CRUD	CRUD	R		R
Product data	CRUD	CRUD	RU	R	R
Stock data	CRUD	R	CRUD	R	R
Consumer data	CRUD			CRUD	
Sales data	CRUD			CRUD	R
Finance data	CRUD				CRUD
Procurement					
Fill procurement data	CRUD	CRUD	R		R
Report procurement	CRUD	CRUD	R		R
Warehouse					
Fill entry product data	CRUD	R	CRUD		R
Fill product detail data	CRUD	R	CRUD	R	R
Report stock	CRUD	R	CRUD	R	R
Sales					
Fill sales transaction data	CRUD			CRUD	R
Report sales	CRUD			CRUD	R
Report shipping order	CRUD			CRUD	R
Finance					
Fill expense data	CRUD				CRUD
Fill income data	CRUD				CRUD
Report expense	CRUD				CRUD
Report income	CRUD				CRUD

Testing and Evaluation

1. Testing

Testing on the information system begins with system testing conducted by the system designer. System testing is done before the program is tested by the user to ensure that all programs can operate smoothly as expected in the design. Testing by end users begins with function testing. Function testing is done by asking every user to fill out a questionnaire which contains several statements following the system display as a result of operating the program. Based on the result, all functions of each test performed by the users run well. It indicates that the system can operate following the design.

While testing the function, users are also asked to assess the appearance of the information system. The assessment is carried out using a Likert scale questionnaire that weighted from 1 (very bad) to 5 (very good). The rating given by each user to the display has a scale of 4 to 5. Thus, the information system is feasible and can be used in carrying out the functions of a clothing store and supporting business processes on X Fashion clothing store.

The next test is learnability to test the ability of the system to be learned and used by the user in completing a process at the first time the system is displayed to the user. Learnability testing measures the time required by users to perform certain processes under the experimental scenario. The scenario used is real data that occurs on X Fashion clothing store. From the available data, an experimental scenario is made which consists of balanced process variations so that there is no time lag between a testing process and another. The system is said to be learnability if the user can complete a process faster than the initial experiment to the next experiment, so that the time required for the last experiment is smaller than the time of testing on the first try. The results of the time measurement in the last experiment for every user are smaller than the results of the initial trial measurement. It indicates that users are more capable and adapt to doing the processes given. Thus, the information system is said to be easy to learn and meet the learnability component.

Logical testing is conducted to check the accuracy of calculation on the system. There are several calculations to produce value as output including the calculation of the total price of procurement products, warehouse stock data update, total consumer spending, also the total expense and income that is calculated automatically by the system. Testing is done by the users after performing several experimental scenarios in the learnability test, by filling out the questionnaire contains several outputs of calculation. Based on the logical testing of all scenarios given, the calculations produced by the information system are following the expected calculations result that stated on the questionnaire. It means the information system can provide and accommodate precise calculation result for various transactions on X Fashion clothing store.

After those tests, testing continues a week later to test the memorability of the program and to measure the user satisfaction of the information system. Memorability test is conducted to test the ability of the system to be remembered and operated again by the user after not being used for a certain period. The scenario used is similar with the scenario in the learnability test because the measurement time on the memorability test is compared with the result of the learnability test which is used as the target time of the memorability test. The system is memorable if it can be remembered and operated again by the user without assistance with the process completion time is no more than the process completion time on the first day of testing. Based on the testing, all the users can complete the process faster than the first day, even though they have not used the system in a week. It can be concluded that the users can complete both processes faster on the second day because the information system is easily remembered. Thus, the information system fulfils the memorability component.

At the end of the test, user satisfaction is measured against the information system used. Measurement is made after the users complete all tests to measure the level of satisfaction with the use of the overall information system. Measurement of satisfaction is done by filling out the System Usability Scale questionnaire. From the calculation according to the System Usability Scale rules, the average score obtained is 86 that indicates the users are very satisfied with the information system on X Fashion clothing store.

2. Evaluation

Inventory and sales information system on X Fashion clothing store is designed to meet the needs of each user regarding the distribution and acquisition of information related to the business process in the store. The designed information system can simplify and speed up users in running the business process on X Fashion clothing store. It is proven based on the comparison of the current situation with the improved

situation in the implementation of the information system. The improvement consists of the user's work methods which become more effective and processing time which had decreased due to the use of information system in running the business process. Thus, the information system can meet the needs of every user both the owner and every department of X Fashion clothing store.

Managerial implications for the implementation of the information system are powerful servers to process user request and display data to other computers so that the database and information can be distributed to every department. The database available on the system must also be unlimited so it can support the business process of clothing stores that have a large amount of data related to sales products. Also, for every business that implements the information system, an Information Technology expert is needed to repair a crash on the operating system. The most important thing in implementing an information system is computers in every department of the store to access the information system and printers to print invoices or reports. This information system can be accessed on the computer, but it cannot be accessed through smartphone because the display system has not been designed to adapt smaller screen. For further research, it can be considered to design display on a smartphone, while remain maintaining the level of security through restrictions of access because the information system may contain private data. In designing an information system, data mining concepts can also be applied to support users in decision making based on data processing results that display important data related to the business process.

D. CONCLUSION

Based on the research, some conclusions can be taken:

1. The business process on X Fashion clothing store consists of product procurement, stock management, selling, and financial management.
 2. Circumstances occur at this time are the number of variation and product, but all forms of records are done manually which takes time and raises the potential for errors so that the information obtained is inaccurate.
 3. The needs of the owner are the integration of stock, sales, and financial data so that the delivery of information can be done quickly, therefore the information obtained is accurate.
 4. The application of information system technology can answer all the needs of every department.
 5. Based on the testing, the information system is declared feasible to be used in supporting the clothing store business process because it can accommodate all needs of the owner as well as every department on X Fashion clothing store.
 6. Adding brief information on each menu and button or making a manual book, so users can find out the function of each control in the information system.
1. The development of design in further research to access information system via smartphone so the display can adjust the smaller screen.
 2. The application of data mining in the development of information system to produce information that supports decision making.

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