

Management of Motorcycle Workshops of SMEs Scale Based on Information System

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ABSTRACT

The good workshop management must also be supported by a properly administration, in order to record all the resources that become workshop assets. Moreover, the motorcycle workshop also conducts spare parts sales to complete the replacement needs of broken vehicle spare parts. This study aims to analyze and design a workshop information system for Small and Medium Enterprises (SMEs) engaged in the field of repairing of motorcycle. Generally, the SMEs scale of motorcycle workshops in this research still uses a simple management system and manually in presenting the data required by the workshop. This it make difficult and inconvenient for the owner of a SMEs scale of motorcycle workshop. Sequence, it is necessary to optimize the management system from the simpler manual system to be computerized. Stages of the method in this study: (1) survey of general workshop management SMEs scale, (2) do analysis of data obtained during the survey and provides input for workshop management based on 5S method, (3) to design and create information systems and databases using PHP (Hypertext Preprocessor) as the programming language and MySQL as the database. The approach of the 5S (Sort, Straighten, Shine, Standardize, Sustain) and creating an information system can manage equipments and properly administration in SMEs scale of motorcycle workshops. Therefore, they can help to optimize streamline the services and administration activity of SMEs scale of motorcycle workshops.

KEY WORDS: *Workshop Management, 5S Method, PHP, MySQL, Information System.*

1.0 INTRODUCTION

According to [1], the motorcycle workshop of SMEs scale is engaged in repair services. According to [2], the workshop service is divided into two, namely the public workshop and the authorized workshop (dealer). The public workshop can provide all types of vehicle brands such as Honda, Suzuki, Yamaha, Kawasaki, and so on in one place. The authorized workshop (dealer) is a workshop that only serves maintenance (service) for a particular motorcycle in accordance with the recommendations of the manufacturer of the vehicle [2].

Legal entity of enterprise consists of a large, medium and small business. The business entity of a workshop, there is a large, medium, small business workshop. Where the big workshop is a productive economic enterprise that stands in organizational and many open branches, facilities workshop has complete facilities. The overall management uses a computerized system and has a lot of manpower. Medium workshop business is a stand-alone productive economic enterprise, conducted by an individual or business entity, which is not a subsidiary or a branch of company, part directly or indirectly of a small business or a large business with a net worth or annual sales results. While a small workshop is a stand-alone productive economic enterprise, carried out by an individual or a business entity that is not a subsidiary or not a branch of a company owned, controlled, or becomes part of either a direct or indirect business of a medium or large business that meets the criteria small business [2].

In general motorcycle workshop requires a management strategy of the overall operation and resources to achieve optimal workshop performance. Besides, the workshop also requires workflow and workshop layout, as well as good equipments and workshop equipment management. The method used to improve performance in this company is such as the 5S method (Seiri, Seiton, Seiso, Seiketsu, Shitsuke). According to [3], 5S is a systematic approach method for organizing work areas, in accordance with rules and standards and maintaining discipline to do a good job tailored to the circumstances of the company with the ultimate goal of getting the best benefits from the workplace. The application of 5S in the motorcycle workshop is an essential

element for good management through 5S, employees learn and practice self-discipline. More, the motorcycle workshop should have good administration systems to do activity in the services and repairing as well as spare parts inventory. Hence, the implementation of information systems for management provides many benefits [4-5].

Therefore, in this research proposes design and developing a management of the motorcycle workshop for SMEs scale based information system. Also, analyze the utility of the motorcycle workshop using the 5S approach. The 5S (Sort, Straighten, Shine, Standardize, Sustain) method and creating an information system may advantage to improve efficiency and effectiveness in the motorcycle workshop activity or operational for services, repairing as well as administration and spare-parts inventory management.

2.0 LITERATURE REVIEW

2.1 Public Motorcycle Workshop

The public motorcycle workshop standard have service such as spark plug check, carburetor cleaning, air filter cleaning, replacement of broken motor spare parts, patching of leaking tires, and repair of motorcycles that have small till severe problems. The public motorcycles workshops of SMEs scale serve maintenance for all types of vehicle brands. A criteria of the public motorcycles workshops of SMEs scale is equipment management at workshops still use manual, provision of spareparts of various types of brands, products and services still negotiable price [2].

2.2 Organizational Structure

According to [1], a good motorcycle workshop that is able to run the business requiring a good organizational structure. The organizational structure is the relationship between managerial and people position/responsible in a motorcycle workshop. An organizational structure is determined by Owner; Finance Manager, Marketing, Human Resources, Administration, Secretary Etc; Chief technician; and Team or technician.

2.3 Management of Service Workshop

According to [6] reliability of service workshop is the ability to provide promptly, accurately and satisfactorily promised services. It should serve a best serving to repairing of motorcycle by not delaying the workmanship; quickly respond to handle by the technician to minimize the time wasted of customer. Good tangibles include physical facilities, the availability of adequate equipment for the service process and sparepart authenticity for the replacement of the original spare parts with the suitability of price and quality. Also, personnel assist customers in good manner and provide responsive services.

2.4 Spare Parts

According to [7], the spare parts are a goods consisting of several components that form a unity and have certain functions. Each tool is composed of many components that are also inside of some small components, i.e. engines that have components in it that is fuel injection pump, waterpump, starting motor, alternator, oil pump, compressor, powersteering pump, turbocharger, and others. In general, spare parts can be divided into two, namely: (1)

new spare parts, components that are still in new condition and have not been used at all except when testing and (2) sparepart of second hand is a component that has been used for a certain period with conditions still worth wearing [7].

2.5 Asset Management

According to [8], every organization of private and government companies must have tangible or intangible assets. Every asset held must be managed effectively and efficiently so that the asset can provide the highest benefits for the company. The term asset management includes 4 (four) basic functions, namely: planning, organizing, leading, and controlling, whereas the asset in general is wealth.

The purpose of asset management can be determined from different points of view. In general, the purpose of asset management is to make the right decisions for the assets to be managed effectively and efficiently. Effective is the achievement of results in accordance with the objectives as predetermined. Based on [8] the efficiency is always inherent in every stage of asset management especially in order to achieve high efficiency in using time, effort and cost. The asset management objectives to minimize the whole life cost of assets; can generate profit maximum and can achieve optimizing the utilization of assets.

2.6 Concept of 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke)

According to [9] 5S comes from the Japanese word, which is further adopted to be applied and translated in various countries with various terms:

- 1) Seiri or Short means removing items that are not needed in the workplace, either against raw materials, semi-finished goods, goods and also damaged goods.
- 2) Seiton or Straighten means organizing the necessary items in the workplace in accordance with the function or group with the correct and efficient layout to be easy to find, easy to get, and easy to restore.
- 3) Seiso or Shine means cleaning the workplace, floor walls, hallways, ceilings, and machinery and equipment from inherent dust and dirt, puddles, oil spills, debris, cobwebs, and damage or degradation, etc., so that it is clean, shiny and constantly maintained.
- 4) Seiketsu or Standardize is to maintain what has been achieved during the implementation of seiri (seal), seiso (resik) so as not to return to its original position, by making and setting the standards of cleanliness in the workplace.
- 5) Shitsuke or Sustain means ensuring everyone is to be disciplined and adhere to the way and rules that have been made (work according to systems and procedures). At this stage personal attitudes and discipline begin to form without any element of compulsion on each individual.

This method can be applied in a public motorcycle workshop in order to organize the work environment including the arrangement of workshop resources. In addition, the implementation of 5S in public motorcycle workshop is also expected to have a positive impact on the safety of employees with the creation of a safe working environment and avoid potential hazards.

2.7 Information System

According to [10] Management Information System (MIS) is an information system at the management level that serves to assist

planning, control and decision making by providing a summary of routine and specific reports. The MIS takes raw data from Transaction Processing System (TPS) and turns it into a collection of data that managers need to carry out their responsibilities [10]. To develop a MIS, a good understanding of what information managers need and how they use the information that employed the Database and Programming Language.

According to [11], databases are interconnected data logic and designed to meet the information needs of an organization. In addition, almost all computer applications are supported by database facilities. Database management is not physically done by the user directly, but handled by special software (system). This software can determine how data is organized, stored, modified and retrieved. According to [12], the database is the most important component in the information system, as a place to accommodate and organize all existing data in the system. Database is a set of a group of interrelated data, which is processed and organized so that it becomes useful information. Databases are indispensable because data can be translated into a program application, rather than separate or processed respectively and also extensive access control and manipulation of data can be performed by a program application. The working principle of the database is the data/archive arrangement. According to [13] MySQL is a database server program capable of receiving and sending data very fast, multi user and using basic SQL commands (Structured Query Language). SQL (Structured Query Language) is a structured database query language.

According to [14] programming language is the words of instruction or commands that usually consists of many lines that can be understood by computer. The example programming language is PHP stands for Hypertext Preprocessor that is a script-shaped programming language, which placed inside the web server [13]. The PHP program is open source, so it can be used freely, and able to cross platform, which can run on Windows operating system and Linux. The PHP is also built as a module on apache web server and as a binary that can run as CGI (Common Gateway Interface) [15].

3.0 METHODS

In this research is adopted descriptive analysis method, which to make management system of motorcycle workshop of the SMEs scale. The stages of the research methodology are divided into 3 stages:

- 1) Conduct the survey for management system to the motorcycle workshop of the SMEs scale.
- 2) Analyze the motorcycle workshop management system based on the 5S method.
- 3) Designing data management systems, revenue and spare parts expenditure and create a computerized information system.

3.1 Survey Method of Motorcycle Workshop Management for SMEs Scale

The flow chart of survey stage of motorcycle workshop management for the SMEs Scale can be seen in Figure 1.

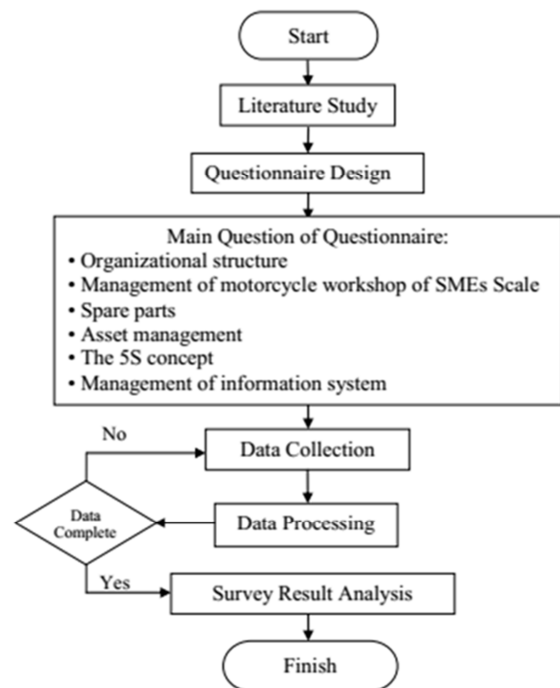


Figure 1: Flow Chart of Research Phase 1

3.2 Analyze the Management System of Motorcycle Workshop on SME Scale based on 5S Method

The stages of analyzing motorcycle workshop on SME Scale of management system based on 5S method that can be seen in Figure 2.

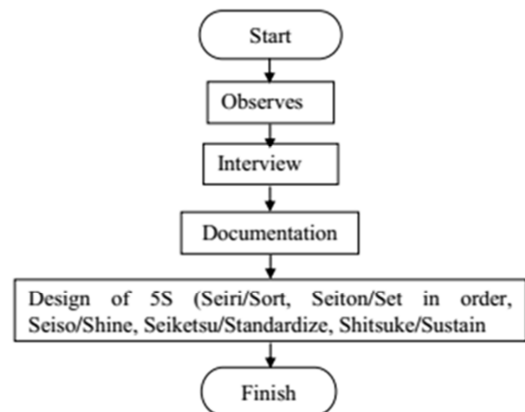


Figure 2: Flow Chart of Research Phase 2

3.3 Design of Data Management System, Spare Parts Administration and Creating Computerized Information System

The design and development of management information system and equipments for motorcycle workshop SMEs scale are depicted in Figure 3.

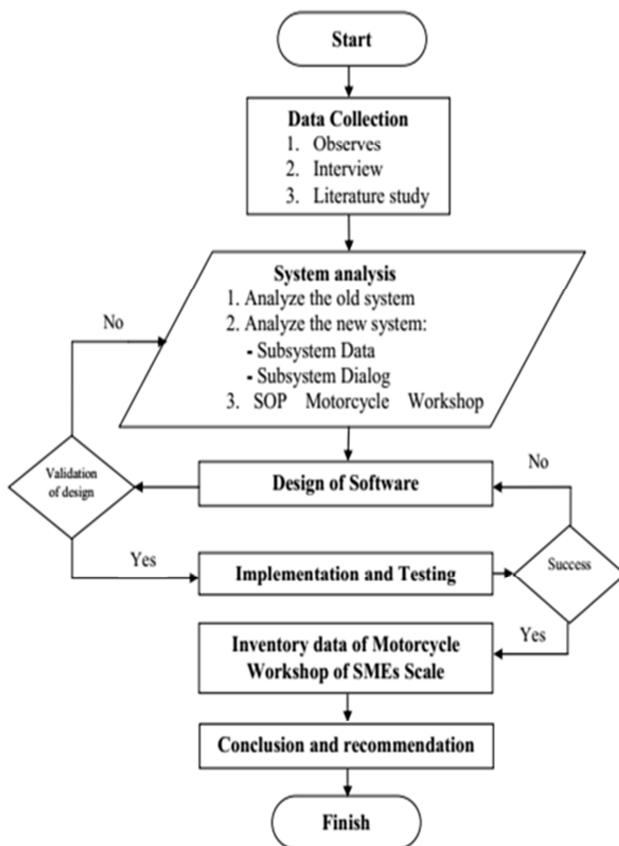


Figure 3: Flow Chart of Research Phase 3

1. Data Collection: the required data was obtained from the stages of observation, interview and study literatures.
2. System Analysis: the system analysis was done by discussing processing of system used that was divided into two parts, namely the old system analysis and the latest system analysis.
3. Standard Operational Procedure (SOP) of the Motorcycle Workshop: in this stage the motorcycle workshop was divided into customer service, mechanics, spare part and administration.
4. Designing Software: in this stage was formed system architecture based on predetermined requirements. It was also identified and described the basic abstraction of the software system and its relationships. Data subsystem was a database overview that contains data relevant to the situation and the database analysis was illustrated in the form of Entities Relational Diagram (ERD), which become the reference in designing the database. The dialog subsystem was a system to communicate with users. The analysis of the dialog subsystem was illustrated by the Data Flow Diagram (DFD).
5. Implementation: the process of system implementation was creation of modules that have been designed previously in accordance with the programming language used in the system to be built. In this stage, the result of the software design was realized as a set of programs or program units. Each unit was tested whether it meets its specifications.

Implementation was performed with the following specifications:

Operating System	: Windows 7
Processor	: Intel Core i3-370M
Memory	: 2 GB
Programming language	: PHP
Database	: MySQL (My Structure Query Language)

6. Testing: this testing stage was the application of the system runs in accordance with the goal.

4.0 RESULT AND DISCUSSION

4.1 Result

4.1.1 New Layout for Motorcycle Workshop of SMEs Scale

The survey of five public motorcycles workshop of SMEs scale revealed the management systems and layout design of workshop were less effective and less efficient. Therefore, it was necessary to implement the 5S method and re-layout of the workshop to improve the productivity, increase the safety and eliminates the various wastes in the workplace. Then, it was made layout design of the room and new facilities with the condition of land and buildings in the form of vertical and horizontal. The new layout design for SMEs-scale of motorcycles workshops that condition the land and building in form of the vertical and horizontal perspectives can be seen in Figures 4 - 9.

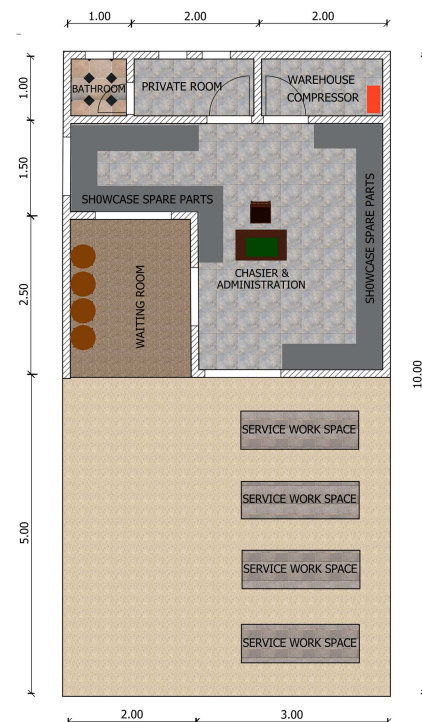


Figure 4: Workshop Lay-out in Vertical Perspective

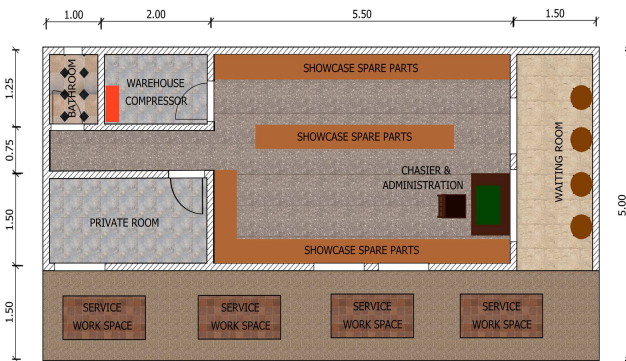


Figure 5: Workshop Lay-out in Horizontal Perspective

4.1.2 Condition of Equipments and Building of Motorcycle Workshop of SME Scale

There is a major change from the current SMEs motorcycle workshop's layout conditions with new designs of room layouts and facilities created. Design was drawn using *SketchUp* application software. The layout design of motorcycle workshop of SME scale facilities with horizontal land and buildings can be seen in Figure 6, and then the workshop design completing with roofing can be seen in Figure 7. While, the workshop design with the land and building in the form of vertical can be seen in Figure 8 and the workshop design completing with roofing is illustrated in Figure 9.

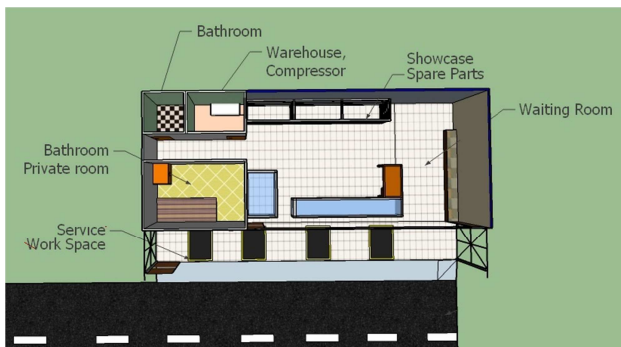


Figure 6: Workshop Design with Horizontal Perspective of Land and Building

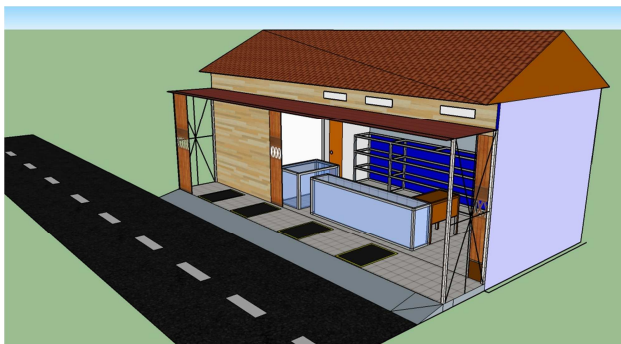


Figure 7: Proposed Workshop Design in Horizontal Perspective

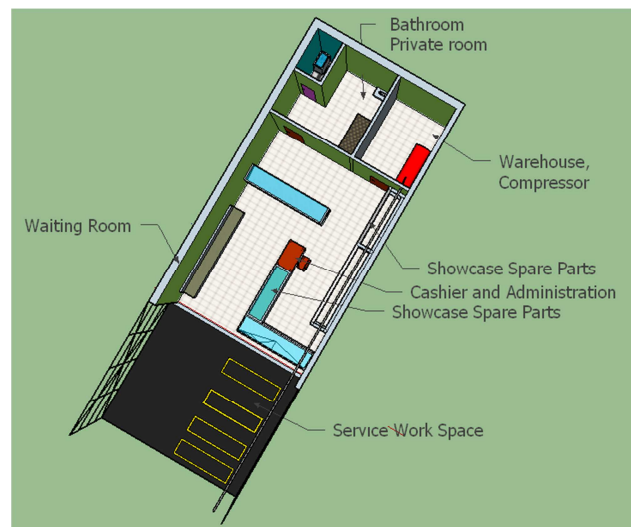


Figure 8: Workshop Design with Vertical Perspective of Land and Building

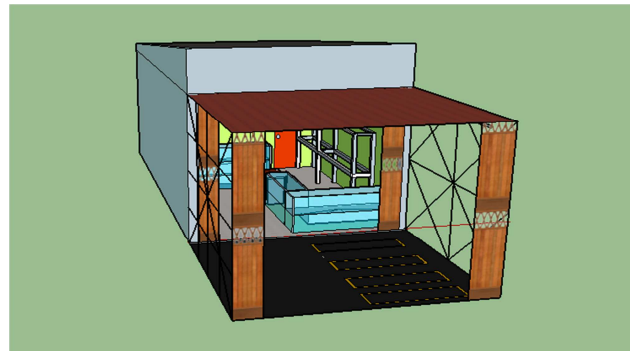


Figure 9: Proposed Workshop Design in Vertical Perspective

4.1.3 Implementation of 5S Concept in the Motorcycle Workshop of SME Scale

The application of 5S method in public SMEs motorcycle workshop should be followed by all levels according to the organizational structure that has been made by each workshop. The following is minimal application of organizational structure in SMEs scale of the motorcycle workshop:

- 1) Owner, as the person who controls the workshop business.
- 2) Administration (cashier), someone who receives money from consumers for payments and record the data needed.
- 3) Mechanics, as a person who performs motorcycle service and repairing.

To improve operational effectiveness and efficiency in the SMES scale of motorcycle workshop needs workflow in the workshop. A workflow in the motorcycle workshop can be seen in Figure 10.

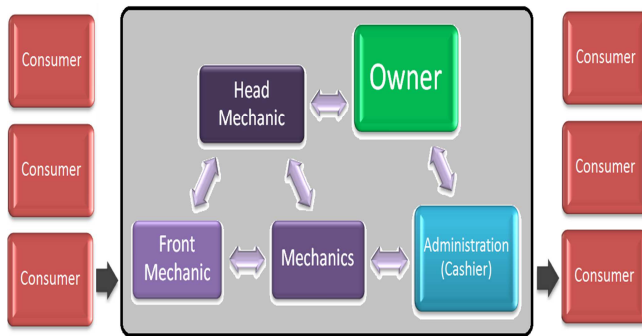


Figure 10: A Motorcycle Workshop Workflow

4.1.4 Management of Information System and Data Collection Equipments for Motorcycles Workshop of SMEs Scale

Based survey result, process of activities in the data collection of consumers and the calculation of financial statements were still done manually in the motorcycles workshop samples of survey. Example recording workshop equipment manually can be seen in Figure 11.

Subsequencies, the management system in the motorcycles workshop samples of survey was less accurate and that has not been able to accommodate recording and reporting histories of the consumer data and financial data. Therefore, it was necessary to design and create a management system that facilitates and accelerates management in motorcycles workshop of SMEs scale. The design of information management system in this research consist of users management; workshop management, consumer and financial data management; usage management. The web-designed system used the PHP programming language with MySQL database, which can be used for all types of web browsers with different operating systems.



Figure 11: Manual Data Collection

A. Design of Management System

For the current condition, the management of motorcycles workshop of SMEs scale was still not well-documented and still uses a simple/manual system that caused difficulties in

preparing reports of consumer data and financial data. These processes can take considerable time. Furthermore, it was needed a designing and creating management information system based on computerize.

B. Design of Information System

The information system design on SMEs-scale of the motorcycle workshop needed the requiring of data and information:

1. Required data:

- Data needs of small-scale motorcycle workshop equipments.
- User data of workshop management (users).
- Data from the head of the workshop (owner).

2. Information to be generated include:

- Information needs of SMEs-scale of motorcycle workshop equipments.
- Users information of SMEs -scale motorcycle workshop equipments.

There are several system requirements to be able to run this application includes:

- Hardware, the hardware requirements can be seen in Table 1.

Table 1: The Hardware Requirements

Hardware	Spesification
Processor	> Intel Core i3-370M
Ram	>2 GB
Hard disk	> 320 GB

- Software, the software requirements can be seen in Table 2.

Table 2: The Software Requirements

	Software	Utility
Platform	Multi Platform	As an operating system to run another system/application
Language Program	> PHP	Processing data from users in web server
DBMS	MySQL	As data server, which the data can be employed
Web Server	Xampp	As a stand-alone web server-based interface to serve and perform website functions
Othres	Web Browser	Displays data and interacts requests to the web server

- User Requirement, the user requirements are in the form of access rights that information needs can be seen in Table 3.

Table 3: The User Requirement

Access Rights	Information
Owner	As the person who controls the workshop business and know all the workshop management
Administrator	As the primary admin of the system, which maintains the data as well as manage all data on the system

4.2 Discussion

In setting up system requirements is to create a system design diagram. There are several design diagrams of this system, among others:

1. Flowchart

Flowchart is a picture in the form of flowchart of the algorithms in a program, which states the direction of the program flow. This chart explains the sequence of procedures in the system.

2. Context Diagram

Context diagram is a diagram that consists of a process and describes the scope of a system. The context diagram is the highest level of the DFD that describes all inputs to the system or output of the system. It gives an overview of the whole system. The system is limited by the boundary. In the context diagram there is only one process.

3. Data Flow Diagram (DFD)

The DFD is a diagram that uses notations to describe the flow of system data, whose is helpful to understand the system logically, structured and clear.

4. Entity Relationship Diagram (ERD)

The ERD is a description of a data storage needs by the workings of a company or organization. The ERD is used to identify data to be stored processed and changed to support the business activities of an organization.

Furthermore, the testing and evaluation of implementation of information system data collection and data equipments needs can describes as following:

1. Login and logout

User login is divided into 2 types: the owner as the person who controls the workshop business and knows all the workshop management. Admin is the primary person to manage the system, which maintains data and organize/operate all data on the system.

2. Master Data

The master data menu contains consumer data, services and charge entered on the system by the users. In this menu form the user can perform the operation of inserting, modifying, deleting, and searching data. Users who can access this master data only the admin and the owner of the workshop.

3. Transactions

Transactions included into transaction data is a menu containing a list of services and tariffs performed by the workshop on consumer vehicles. In this transaction the data services is inputted into transactions menu.

4. Transaction Report of Service Activities

This menu contains all reports of transactions activities and revenues in the SMEs-scale of motorcycle workshop. The person can access this menu only the owner/leader of the workshop.

5.0 CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

From the research results are obtained some conclusions from the condition of workshop equipment and from the management of information systems in motorcycle workshop of the SMEs scale. The condition of equipments and workshop are obtained conclusion as follows:

- The existence of a new layout for SMEs-scale of motorcycles workshop that is useful to accelerate the work of the employees due to better the workflow of the workshop.
- The design of the layout of SMEs-scale of motorcycles workshop facilities using the 5S method produces the better arranged room and facilities such as more neat, clean, orderly, safe and comfortable.

The result of management information system is following conclusion:

- Facilitate the processing of consumer data and financial data of SMEs-scale of motorcycle workshop operational to quickly and accurately.
- The proposed system can improve efficiency and effectiveness in records administration and processing, more economical as it minimizes the use of time, it is easy to take corrective action at the right time and facilitate access to equipment details.

5.2 Suggestions

Since estimation the equipment of motorcycle workshop of SMEs scale will increase rapidly, then, it is necessary to do further design, with the addition of room and size of land and building. The good information management system is needed to manage the workshop. Therefore, the database based need to be developed in management system of motorcycle workshop of SMEs scale.

The application software that has been built should be developed in advance both display and functionality. More menus should be added due to the management information system of motorcycle workshops a very broad system that including the consumer data processing, monthly income report, daily incoming and outgoing data spare parts, service tariff data and others. In addition, the application can facilitate the minimum limit of inventory (equipments, spare parts) to prevent void in stock inventory.

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