The Development of web-based Cashier and Inventory Information Systems using Prototyping Model on Micro, Small, and Medium Enterprise (MSMEs) in Indonesia

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Abstract

One example of information technology that has been widely applied is a web-based information system. Micro, Small, and Medium Enterprises (MSMEs) are productive businesses supporting the country's economy and individual companies. This research focused on MSME namely Putra Anugrah Sejahtera, which sells premium spray paint for wheels with more than 100 colors. There will be around 15-20 customers make a purchase every day. In running the business, there are several obstacles faced by Putra Anugrah Sejahtera, such as incorrect information when checking the stock of goods and recording sales transactions. This research aims to develop a web-based cashier and inventory information system to minimize errors and simplify sales and inventory transactions. System development is applied by using prototyping model with RDBMS MySQL. The result of the developed web-based information system will be validated using User Acceptance Test (UAT). The result of the conducted test showed that web-based information system was suitable and met the user requirements. This result expected to solve the problem faced by Putra Anugrah Sejahtera in improving its business performance.

Keywords: msme, cashier, information systems, inventory, prototyping

Abstrak

Salah satu contoh teknologi informasi yang telah banyak diterapkan pada proses bisnis suatu usaha bisnis adalah sistem informasi berbasis web. Usaha Mikro, Kecil, dan Menengah (UMKM) merupakan usaha produktif penunjang perekonomian negara dan perusahaan perseorangan. Salah satu UMKM yang akan menjadi objek penelitian kali ini adalah UMKM Putra Anugrah Sejahtera, dan UMKM ini menjual cat semprot premium untuk velg dengan lebih dari 100 warna. Sekitar 15-20 pelanggan setiap harinya melakukan transaksi langsung di UMKM tersebut. Dalam proses bisnis yang berjalan terdapat beberapa kendala seperti kesalahan informasi saat pengecekan stok barang dan pencatatan transaksi penjualan. Penelitian ini bertujuan untuk menghasilkan sistem informasi kasir dan persediaan barang berbasis web untuk meminimalisir kesalahan dan mempermudah transaksi penjualan dan persediaan barang. Perancangan sistem menggunakan model Prototyping dengan RDBMS MySQL berhasil dilakukan. Hasil pengujian sistem menggunakan User Acceptance Test (UAT) menunjukkan bahwa sistem yang dihasilkan sesuai dengan kebutuhan pengguna dan menjawab kendala yang dihadapi UMKM Putra Anugrah Sejahtera.

Kata kunci: umkm, kasir, sistem informasi, inventori, prototyping

1. INTRODUCTION

Many companies offer their products online to their customers in this digitalization era, increasing the need for accurate product descriptions in the form of technical specifications, images, and videos. Product information is available through various channels, including web pages, mobile phones, tablets, stores, and printed catalogues. Different information technology (IT) systems sometimes provide information for other sales channels, resulting in inconsistent data across these systems. To overcome the issue of inconsistent data, many businesses use product information management systems, primarily concerned with centrally managing customer-oriented product information [1]. To maximize flexibility, companies in highly competitive environments frequently use project management practices to manage their processes and activities [2]. A computerized system will make it easier for users to manage inventory data, making work more effective and efficient. This system will search for inventory items and produce inventory data reports quickly and accurately, preventing data duplication [3].

According to previous studies, information systems have some essential characteristics. Accuracy, reliability, contextuality, completeness, and timeliness are essential information quality characteristics in information systems. A user-friendly information system is essential to maintain the quality of information [4]. Based on the evaluation results of related research on web-based information systems, enterprise business processes are superior to traditional processes as they are integrated through websites, can prevent the spread of sensitive data, and are more secure. It is recorded and stored in a database, making calculations more accurate and eliminating manual calculation errors [5].

The Implementation of System Development Life Cycle (SDLC) Model allows us to develop applications that can be applied on multiple platforms [6]. Additionally, other studies have also found solutions to problems that can be overcome by using sales information systems with integrated capabilities to track and process sales transaction data and also inventory items. Information systems can minimize errors in collecting and processing sales transaction data and inventory. The reporting features available in the system allow you to store transaction data, generate transaction reports, and print completed transaction reports to prevent data corruption or loss compared to physical paper [7]. Information systems can also consolidate data for easy access anytime, anywhere [8]. UML modelling diagrams can be used to describe the needs of the information system you are designing [9],[10].

In Indonesia, Micro, Small, and Medium Enterprises (MSMEs) - UMKM, are productive businesses that support the country's economy and individual companies. One of the MSMEs selling motorcycle wheel paint is Putra Anugrah Sejahtera in Yogyakarta. This MSMEs sells premium spray paint for wheels with more than 100 colors. Besides that, these MSMEs also provide paint needs for vehicles. Around 15-20 customers daily make direct transactions at these MSMEs. In the business processes that run at Putra Anugrah Sejahtera, there are several obstacles, such as incorrect information when checking the stock of goods and recording sales transactions. This obstacle occurs because the business processes is still using paper based as a medium for sales transactions and stock data collection. Using paper-based report has many risks, such as losing notes on paper, getting wet or damaged, and errors in writing.

Based on the literature studies carried out and described previously, this study aims to overcome the obstacles in MSMEs Putra Anugrah Sejahtera through a website-based information system for cashiers and inventory. The method used in designing information systems is prototyping model. After the web-based information system has been successfully developed, a User Acceptance Test (UAT) testing will be carried out to validate system functions with MSMEs Putra Anugrah Sejahtera's requirements.

2. RESEARCH METHOD

SDLC with prototyping model has been applied in several studies to design information systems, such as simulation and forecasting information systems [11], medical information systems for clinic diagnostic centers [12], and decision support systems in employee rankings in a company [13]. Based on the related researches, prototyping model has an excellent success rate in several conditions and criteria that require a short design time and user requirements that can be added during system development. This prototype model as shown in Figure 1 is used to develop the system as a physical model that users can use and operate, interacting with the functionality of each created function [14]. Figure 1 showed the life cycle of prototyping model i.e., (1) communication, (2) quick plan, (3) modelling quick design, (4) construction of prototype, and (5) deployment delivery and feedback.
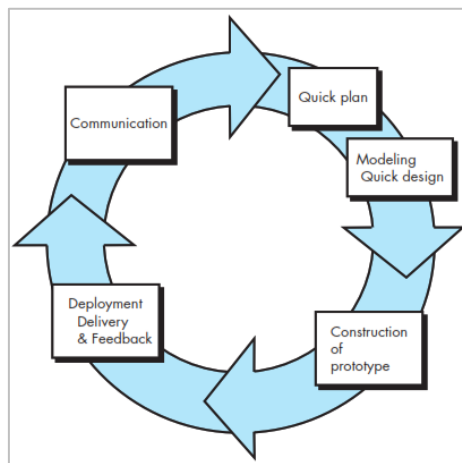

Figure 1. Prototyping Model

a) Communication

Communication is made with the owner of MSME Putra Anugrah Sejahtera. Observation and analysis also take place during this communication phase, and also data preparation to support the requirements of the developed solution. We conducted surveys based on the plans we have made, identified problems, and derived solutions.

b) Quick Plan

The system development process requires brief planning and preparation. Planning included choice of programming language, coding tools, web framework, and relational database management system (RDBMS).

c) Modelling Quick Design

After the quick design, the next step would be a design process that is designed by using Unified Modeling Language (UML) diagrams to describe the main functions of the system based on the user requirements [9].

d) Construction of Prototype

This stage is carried out to produce user interface design. All features and functional requirements are based on the quick plan and design modelling results [13].

e) Deployment Delivery & Feedback

At this final stage, the results will be validated using User Acceptance Testing (UAT) method to measure the system's functionality [15]. The system has been developed, and the user has confirmed its suitability for the user's requirements. The users performed tests and feedback on the system that has been developed [16].

3. RESULTS AND DISCUSSION

Based on the interview with the owner of MSMEs Putra Anugrah Sejahtera, we found that there were several problems related to cashier and inventory management as shown in table 1. Table 1 explained the problems and proposed recommendation to improve the business performance of MSMEs Putra Anugrah Sejahtera.

Table 1. Problem Analysis and Recommendations

No	Problem Analysis	Recommendations
1	Risk of using paper-based transaction reports (such as losing notes on paper, getting wet or damaged, and errors in writing).	Transform the media from paper-based to the website-based cashier and inventory information systems.
2	MSMEs Anugrah Putra Sejahtera do not have a RDBMS to store transaction data and reports.	Provide the RDBMS on the proposed information systems.
3	The recording of sales transaction reports is still using conventional method, from daily transaction receipts and then transferred to the transaction report book every day. This process takes much time, resulting in data redundancy.	Add the required feature on the proposed systems, such as an input transaction, integration data, and more secure transaction data.

At the stage of quick plan, web-based information system is designed by using Visual Study Code (VSCode) with Hypertext Preprocessor (PHP) programming language and bootstrap framework. Furthermore, the database storage will be used RDBMS MySQL. System modelling is applied using Unified Modeling Language (UML) diagrams. UML is a standardized visual modelling language to represent and design software systems. It provides a set of graphical notations that allow developers, designers, and stakeholders to communicate and understand system requirements, behavior, and structure. UML design in this system design included use case diagram (figure 2) and class diagram (figure 3).

Figure 2 showed use case diagram to capture and visualize the system's requirements and the interactions between actors and use cases. Three actors have their respective roles in using the inventory cashier system: Admin, Cashier, and warehouse. In this design system, the two actors will be divided into three levels based on their user type.
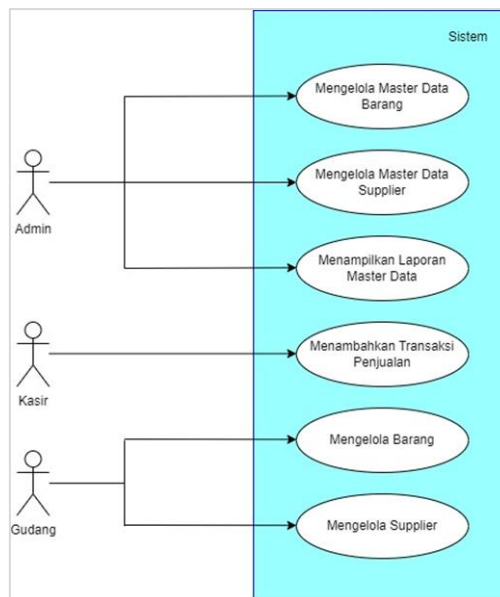

Figure 2. Use case diagram of web-based cashier and inventory system

Admin has three prominent use cases: "Manage Product Master Data" allows Admin to add, update, and delete information related to the product catalogue. This includes product names, descriptions, prices, and stock levels. Admin can "Manage Supplier Master Data," enabling them to maintain information about suppliers, including their contact details and payment terms. Admin can "Display Master Data Reports," which allows them to generate and view reports based on the master data, such as product inventory reports or supplier performance reports.

Cashier has one primary use case named "Add Sales Transaction". In this use case, cashier is responsible for entering and processing sales transactions including scanning or manually entering product details, calculating the total amount due, and generating a receipt for the customer.

Warehouse staff has two primary use cases. Firstly, "Manage Inventory" allows warehouse staff to handle the stock of products. They can update stock levels, mark products as received or sold, and generate reports related to inventory status. Secondly, warehouse staff can "Manage Suppliers" by maintaining information about suppliers, such as contact details and order history, and managing supplier relationships. The use case diagram visually represents the functionalities and interactions between the system's actors. It showcases the capabilities of Admin to manage product and supplier master data and generate reports. The Cashier's primary role is to add sales transactions, while the Warehouse staff focuses on inventory and supplier management.

Based on figure 3, there are five entities in class diagram i.e., user as a generalization of Admin, Cashier and Warehouse. Another class are items, cart, and report entities.
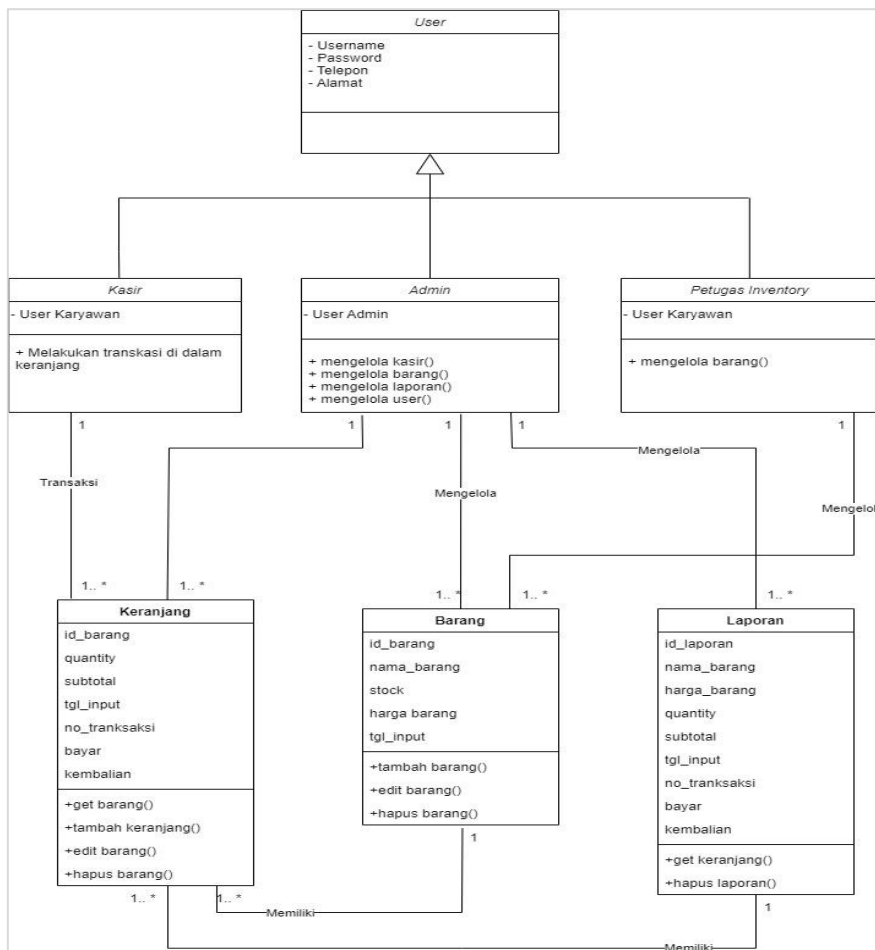

Figure 3 Class Diagram of web-based cashier and inventory system

Construction stage of prototyping mode is carried out by designing a user interface design and a website-based information system with the Bootstrap framework. In addition to the PHP programming language, JavaScript is also used to provide functional or logic to the information system. User interface design consisted of dashboard menu for Admin (figure 4), master items menu (figure 5), inventory page (figure 6), cashier menu (figure 7), transaction menu (figure 8),
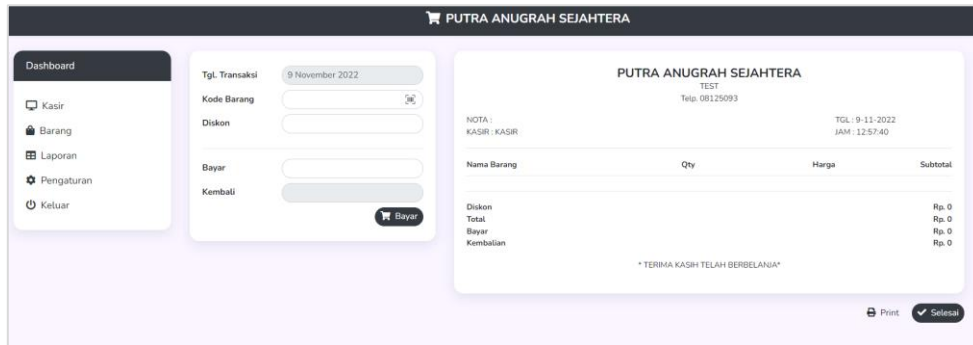

Figure 4. Dashboard menu of Admin

Figure 4 showed the dashboard display for the admin user, where the initial show is the cashier page. The sidebar contains the requirements needed for the sales system, such as cashier, inventory, reports, user settings and logout.
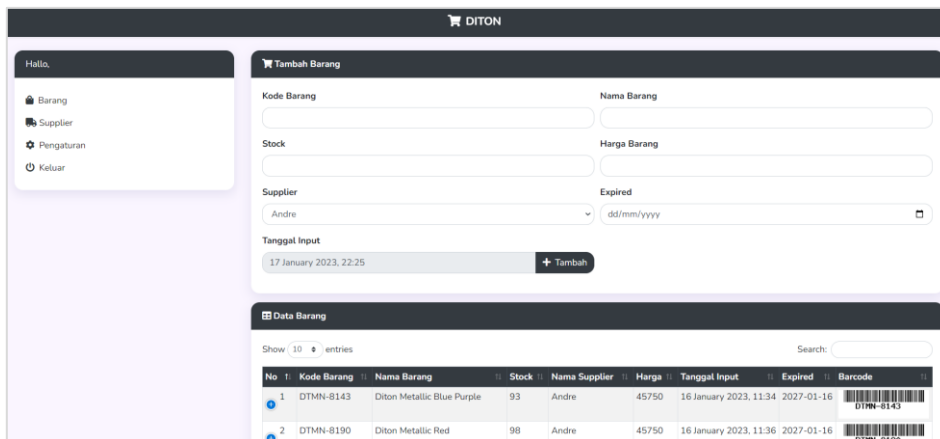

Figure 5. Master items menu

In figure 5, the admin user can fill in the added item section. In the item code section, the admin inputs according to the code that is already listed in the product section, the price of the item is the price per item, then in the Expired area so that later the admin user can delete or edit data to separate products that are almost expired that have been registered with UMKM Putra Anugrah Sejahtera.
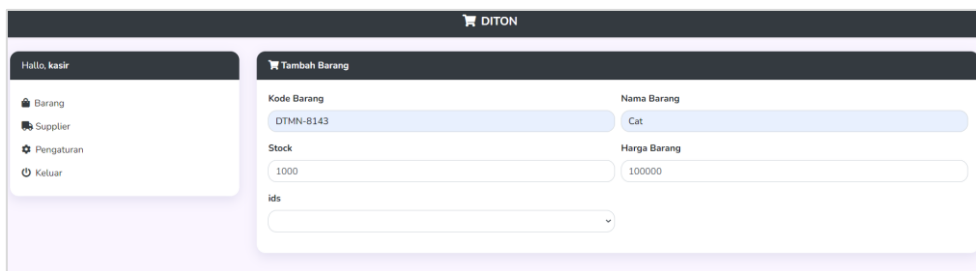

Figure 6. Inventory page

Figure 6 showed the warehouse user page. In the added item section, the user inventory can input the item code, item name, stock, item price, item expired, and item input date so that it is registered in the RDBMS inventory of UMKM Putra Anugrah Sejahtera.
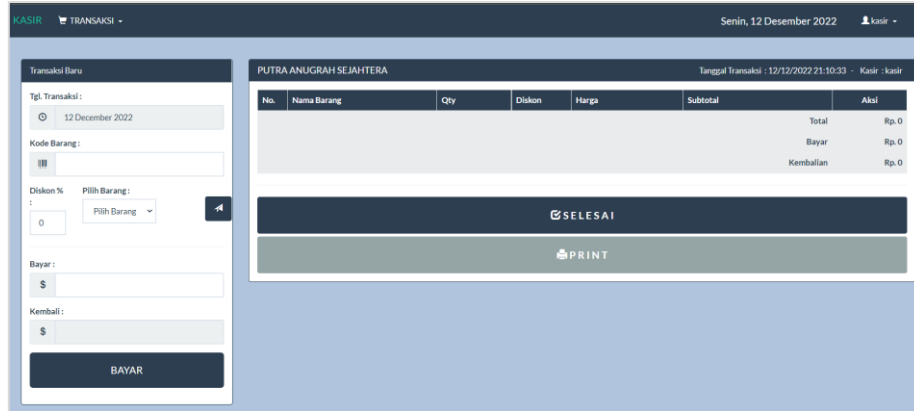

Figure 7. Cashier menu

Figure 7 showed the cashier display where the user can add the name of the product item and the quantity of the product. Then automatically, the right side showing the invoice will be filled in automatically. Figure 8 showed the transaction display on the cashier user. When the user has entered the goods and then made a payment filled with the amount paid, the system will automatically read and display the invoice along with the change or vice versa. Cashier users can also print physical invoices if needed.
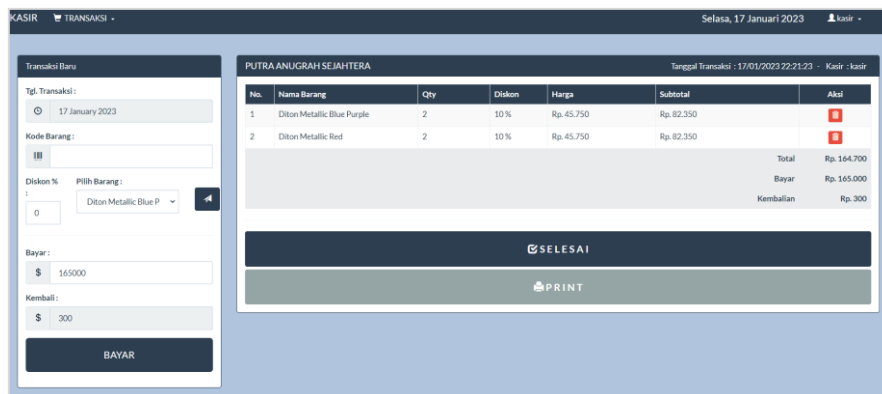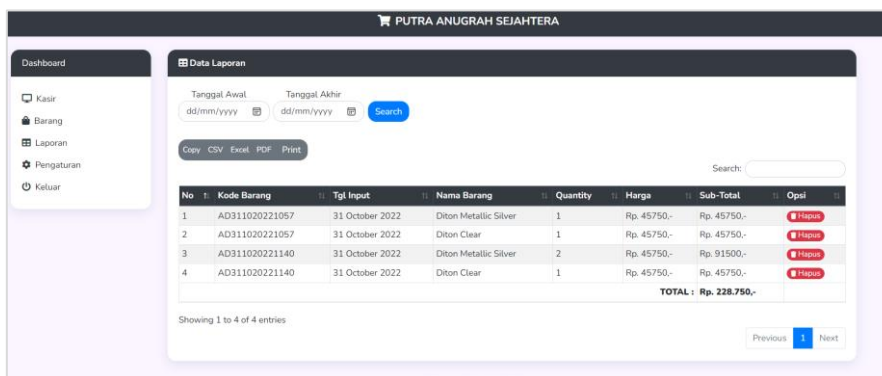

Figure 8. Transaction menu

Figure 9. Report menu

In figure 9, you can see the transaction report page, which can be viewed per day, month or year based on invoices from transactions every day. This transaction report data can also be printed.

After the Construction of the Prototype stage has been completed, then the last stage of this research is the Deployment Delivery & Feedback stage, which is carried out to test the suitability of the system to user requirements using the User Acceptance Test (UAT) method. This test was carried out by three users who will use the system, namely admin as the owner of MSMEs Putra Anugrah Sejahtera, cashier, and warehouse keeper. The results of the UAT can be seen in Table 2. Based on UAT results in table 2 we concluded that all the testing cases were successfully conducted. It means that the developed web-based cashier and inventory system is acceptable and meet the user requirements.

Table 2. Results of UAT

No	Testing case		Result	
	Process description	Expected results	Success	Failed
1	Users Log in and Log out	If the username and password are correct, the login will be successful. The data you entered will appear correctly if the username and password are correct. If the process is successful, it will appear "Are you sure you want to exit?"	☑ 16.66%	
2	Add Purchasing Data on Cashier user	If only the item's name is entered and the quantity is not entered, "Please fill out this field" will appear. The invoice will increase if the item name and quantity are filled in.	☑ 16.66%	
3	Delete Purchasing Data on Admin user	If there are items that you want to delete, click the X button on the invoice, and the "Delete Item Data?" will appear.	☑ 16.67%	
4	Search Items Data	If successful, the data of the item you are looking for will appear. If not successful, will appear "No matching records found."	☑ 16.67%	
5	User Account Setting	If the user only enters the name, telephone number and address, an alert will appear "Please fill out this field." If the process is successful, a warning will appear "YES! Data updated successfully.	☑ 16.67%	
6	Proceed transaction data or reports and print	if the invoice is complete, the user can click the print button, and then it will go to the print page.	☑ 16.67%	
	Total in Percentages		**100%**	

4. CONCLUSION

Based on the constraints on MSMEs Putra Anugrah Sejahtera, this research has developed a website-based cashier and inventory information system via localhost. The implementation of the prototyping model in the design of this information system is considered entirely appropriate because it follows the conditions and criteria when the plan will be carried out, namely short duration, limited team and direct involvement of users when system design is carried out from the initial stage to the final stage. The selection of a website-based platform with the PHP programming language and bootstrap framework has also proven capable of producing a system with a simple and user-friendly interface and functions that suit user needs. System testing is applied by using UAT with six testing cases shows that all the requirements of Putra Anugrah Sejahtera MSMEs system users have been provided according to the communication stage (with results 100%).

5. RECCOMENDATION

For future development, some recommendations that can be given that system access is not only via localhost but can be accessed online using hosting and domain services. Database security is improved using better algorithms such as SHA 512 Encryption. Development of database backup and restore features. Periodic maintenance is carried out so the system can continue to run optimally. In addition, the application of the prototyping model is also recommended to other researchers for website-based information system design because it has been proven to simplify the system design process with clear flows and stages.

5. ACKNOWLEDGEMENT

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