Design of Al-Husna canteen inventory and Sales System Uses User Centered Design

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Abstract

The Al-Husna School canteen provides food and other supplies that are ready to assist and serve students and teachers according to their needs. The school canteen members consist of seven people who provide food and other items to ensure that the needs of students and teachers are met. Sometimes, there are members who are not registered as official canteen members, and this can be considered illegal as they provide food without the knowledge of the canteen manager. Each canteen member is only allowed to supply their food once in the canteen for sale. If their stock runs out, they are not allowed to restock their food so that the remaining food from other members' supplies can also be sold out. The issue with this situation is that not only are there members who are not registered as canteen members and are unfair in providing food stock in the school canteen, but also errors in the canteen's records, such as input mistakes, forgetting to record canteen activities, and errors in the canteen's financial reports. Therefore, there is a need to develop a web-based program using PHP and MySQL programming languages. The method used for evaluating this website is the User-Centered Design method, which includes several indicators for providing feedback. Using this method, there is one sample or user, the canteen manager, who evaluates the website based on the User-Centered Design indicators. The results from data processing with a direct calculation show a score of 370, indicating that the system is feasible.

I. INTRODUCTION

The development of the globalization era, which is inseparable from digitalization, has led to the use of technology in almost all trading activities, particularly in the sales and purchasing of goods. This technology is implemented in hardware devices such as calculators, smartphones, and computers. The calculation model through these devices in transactions is useful for reducing fraud and keeping a record of how many products have been received and how much has been sold. Therefore, relying only on hardware is not enough without software that will form the foundation of the user interface experience, enabling users to input and record the transaction process transparently. [1] The Al-Husna Islamic Education Foundation School in Rangkasbitung, which consists of three institutions, including Raudhatul Athfal (Kindergarten), Elementary School (SD), and Diniyah Takmiliyah, has been increasing in the number of students every year. The school also has a canteen that sells food, drinks, and school supplies to meet the needs of students and teachers. The canteen has seven members who supply goods. However, there is inequality among the members when selling their goods, which violates a rule that prevents a member from restocking once their initial stock of food has sold out. This issue causes friction with other members if their stock hasn't run out yet, and they may bring back unsold goods. The records maintained by the canteen manager regarding the inventory and income from other members are often damaged, misplaced, or forgotten, which creates uncertainty about how the canteen's profits will be managed without proper bookkeeping. Therefore, this research aims to replace manual record-keeping with a web-based system designed to register canteen members legally and transparently, as well as manage the goods they supply and their valid stock levels.[2] The canteen manager will easily generate reports on profits, income, inventory, and sales based on the transaction records made through the web. This system will make the members feel that the process is fair, as all data on goods entering the canteen is recorded through the web, which can be accessed via a computer or smartphone. The canteen manager will transparently inform members if any issues arise with other members, which will facilitate the analysis of the canteen's profits and the percentage of income generated. [3] The design of this inventory, input, and sales system uses PHP programming language and a database, [4] supported by the

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User-Centered Design method. This method tailors the web system to the needs of the users based on their age, selects appropriate menus, creates a web design that is easy for the canteen manager to understand, and evaluates the design based on its usability. The result of using this method greatly helps in feasibility. When there is a deficiency, it is quickly fixed using the User-Centered Design method, where the feasibility result of the web is a score of 370 through the use of the admin user, the canteen manager, in operating the web. The result of using this method greatly helps in feasibility. When there is a deficiency, it is quickly fixed using the User-Centered Design method, where the feasibility result of the web is a score of 370 through the admin user, the canteen manager, in operating the web. The programming language used to design this web is PHP and MySQLi, with the advantage that when an issue occurs, it is easy to identify and fix the problem[5], and errors can be easily located.

II. RELATED WORKS/LITERATURE REVIEW

After conducting observations and reviewing several related studies on the selected theme in comparison with other research, the author found connections with the following processes:

The first study, titled "Analysis and Design of a Web-Based Inventory Information System," discusses an inventory information system using a manual concept, which led to discrepancies in stock records in the warehouse. This study then developed a web-based inventory application using PHP programming language and MySQL and tested the inventory information system, proving that it was 100% valid and suitable for use. [6]

The second study, titled "Design and Development of a Web-Based Sales and Inventory Management System for Food Products Using Bootstrap and Codeigniter Framework," describes issues in the record-keeping process, such as problems with financial reports that do not align with food income and expenses. The study aims to create a web-based program using Bootstrap and the Codeigniter Framework. [7]. The third research titled 'Designing a Web-Based Inventory Information System Using the FAST Method' still involves recording inventory in managing incoming goods, sales requests, and outgoing goods for reporting, often leading to errors in data retrieval. The solution in this research is to design a web-based system using the FAST method, which stands for Framework for the Application System Thinking. It includes stages of scope, definition, problem analysis, requirements analysis, logical design, and physical design to address these issues using the programming languages PHP and HTML[8] The fourth research, 'Implementation of the Laravel Framework in Designing and Building a Website for Palangka Raya Using the Prototype Method,' focuses on the delivery of information in Christianity, where print media and social media are still less effective. This research develops a website using Laravel 8 and Framework 5 to make information delivery easier and faster in accordance with technology. Eventually, the website becomes more responsive, allowing for a more dynamic layout that can be managed and presented in real-time according to the needs of the community [9] The fifth research, 'Warehouse Inventory Information System in Controlling Warehouse Goods Inventory in the Study: PT. Alaisys Sidoarjo,' addresses issues faced by distributors in inventory recording, which still relies on manual systems such as email and Excel, leading to errors in data entry. This research develops a web-based system to facilitate the creation and viewing of inventory reports, allowing the inventory to be easily and accurately viewed through the web.

[10] The sixth research, 'Sales Information System for Building Materials at Berkah Building Store,' faces an issue of errors in paper-based recording. This leads to inaccurate data on incoming goods and inefficient profit calculations. Therefore, this research requires a web-based system that can handle stock data search, goods reports, and inventory transactions. The research uses the waterfall method, with PHP as the programming language, data stored in MySQL, and designed using the CodeIgniter framework. This web system uses the black-box method with a questionnaire, collaborating with the SUS (System Usability Scale) to evaluate the system, resulting in a score of 75, indicating that it is feasible to use [11] The seventh research, 'Analysis and Design of a Web-Based Purchase, Inventory, and Mortar Sales Information System,' focuses on the developing digital era by designing an e-commerce website analysis to integrate sales, inventory, and purchasing, in order to improve sales and increase data accuracy and information precision. The result of this system is the increase in mortar sales through the e-commerce website, as well as better inventory management [12] The eighth research, 'Comparison of FIFO and Moving Average Methods in Accounting Information Systems for Inventory in Determining Cost of Goods Sold (Case Study of Satrio Seputih Agung Store),' addresses the issue of inaccurate stock data, leading to inventory pile-up and delayed report creation. The researcher conducted a comparison by combining two methods: the average method and FIFO. The design of this system uses UML for the user interface design. The result of this design addresses and helps resolve inventory data issues and determines the cost of goods sold in both price increases and decreases. This method also provides information on the inflow and outflow of building materials 4[13]the ninth research, 'Design and Development of a Web-Based Asset Management Information System,' focuses on asset management in managing company assets by monitoring and calculating them optimally. In this research, a prototype is created to generate planning, procurement, receipt, and reports using a use case diagram, activity diagram, and entity relationship diagram [14]

III. METHODS

The steps in this method use the User Centered Design method until data processing with the following arrangement in Figure 1 :
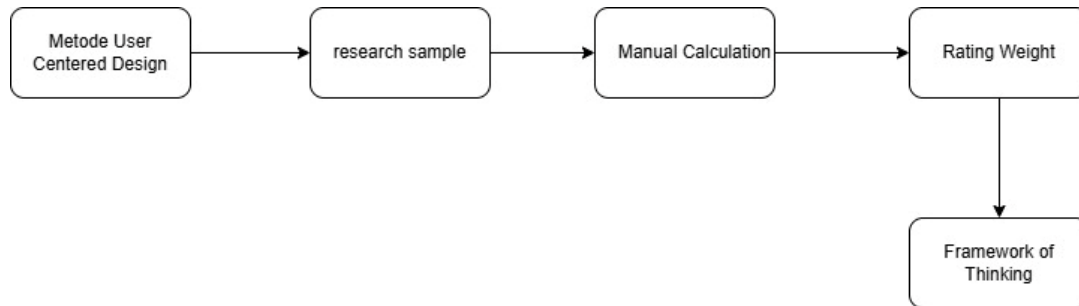

Fig 1 Method Step Designer

The diagram above illustrates the ease with which the author creates research stages to identify the flow of problems and possible solutions through the design step method. The first stage, before determining the appropriate method and deciding to use the user-centered design method, the author reviewed previous research conducted in study [15], where this user-centered method supports every variable of the web page to align with its function based on the underlying problem. Therefore, in this method, the content of the existing indicators can be seen and applied to Table 3, which compares the content of these indicators before and after the web page is developed. Below is an explanation of the meaning of the user-centered design method:been developed. Below is Fig. 2, the User-Centered Design diagram regarding the content of its indicators:

1. User-Centered Design Method
   In this method, User-Centered Design is still used as the standard for system design through the user interface for programs that operate according to each function and account in daily activities. The user approach with this application interface is carried out through several stages: [16][17]
   a. Specify the context of use
      Define who can access this program, the scope and limitations of users who can access the program, and how far they can access it. Additionally, the purpose of creating this program needs to be clarified to ensure that the designers do not waste the structure that has been developed, and the recommended technology and devices to be used should also be determined.
   b. Specify user and organizational requirements
      Ease of use is one of the key requirements for the program to be accessible according to needs and to quickly process functions. Speed is also a desired feature so that the web can respond immediately with actions that align with the context and content.
   c. Produce design solution
      Produce a design that has been created according to user requests and needs. In this phase, designers truly create a prototype that can be understood by users who will use the application.
   d. Evaluate design
      Provide guidance on the functionality of the design created for users to identify weaknesses in the design. This evaluation will focus on the user interface to be used through the web

      Langkah pertama pada metode user centered design di atas di implementasikan melalui tabel 3 yang penggunaannya dapat di sesuaikan melalui fungsi dari setiap halaman web, maka benang merah antara masalah dengan Solusi menggunakan metode di atas dapat saling mendukung hingga memberikan hasil penilaian bahwa halaman web dapat di katakana layak atau tidak

2. ResearchSample
   This research is qualitative, with the web assessment conducted by one person using the User-Centered Design method, manually calculating for one person who also serves as the canteen manager, fully responsible for overseeing the canteen's activities. Canteen transactions are fully monitored through the web by the canteen manager. Below is an illustration of the assessment by one evaluator in filling out the User-Centered Design indicators in Table 1 : [15][18] .

TABLE 1
CANTEEN HEAD ACTORS

No	Name Of Actor	Role	Description
1	Udin	Canteen Manager	Manages The Canteen

The second stage, the canteen manager evaluates the web page based on the condition when trying to use the web page system, to determine whether it is suitable or not.

3. Manual Calculation

The third stage, in calculating the research sample, is done manually by summing the total weight of each indicator of the user-centered design method. This is done by the canteen manager, who evaluates each indicator, which can be seen in Table 2 below, showing the score the canteen manager can give for each indicator.

4. RatingWeight

The fourth stage, in this rating weight, the total score is first calculated by adding the highest and lowest scores, with the lowest weight being 10 and the highest weight being 50 for each statement. Below, Table 2 describes each weight :

TABLE 2
VALUE WEIGHT

Value Selection	Information	Value Weight
10	Not really worth it	120
20	Not Worth It	120-239
30	Decent Enough	240-359
40	Worthy	360-479
50	Very Worth It	480-600

In ordinary calculations that use Likert scale calculations, this research is directly processed manually with the total number being executed immediately and using basic data which will be seen below. The weight explanation is based on the distance and range between two values. The range of score values from 120 to 600 requires the determination of four cutoffs per category. The interval here represents the division of space or range between these values, and the following steps are taken: [19]

Total range:
The range of values from 120 to 600 (600 - 120 = 480)

The range is divided into four:
To divide this range, four boundaries are needed: A, B, C, D, E, so 480/4 = 120

Value distance per category:
A. 480 – 600
B. 360 – 479
C. 240 – 359
D. 120 – 239
E. 120 (The lowest value has already been determined)

With Table 2 above, the details in the description of the weight assessment of the web page can be easily applied clearly by referring to the provided guidelines. Here, the evaluator or canteen manager listed in Table 1 will assess the weights above using the user-centered design method as the indicator. Therefore, the score results in the description table above will later be shown in Table 4 regarding the total score using the user-centered design method.

5. Framework of Thinking

The framework of thinking is the formulation of the problem at the research location, followed by the planning of the system design that has been provided with solutions through several effective schematic representations. This framework helps the authors to understand the concept as a whole so that the goal and purpose of the research can be easily understood, and the direction of the research becomes clear. Figure 2 shows the stages in building the framework of thinking :[20]

Problem
1. How can the canteen chairman know whether the members of the school canteen are legal?
2. How to overcome minimal errors in recording food supplies and student and teacher needs?
3. How can the canteen leader carry out valid and transparent reports?

Theory
1. Interviews
2. Observation
3. System design

Solution
1. Designing the web
2. Use Case Diagrams
3. Entity Diagram Relationship

Method
1. User Centered Design
2. Research Sample
3. Calculation of the value of User Centered

Results
1. Total 370 marks
2. 1 Member
3. Worth it

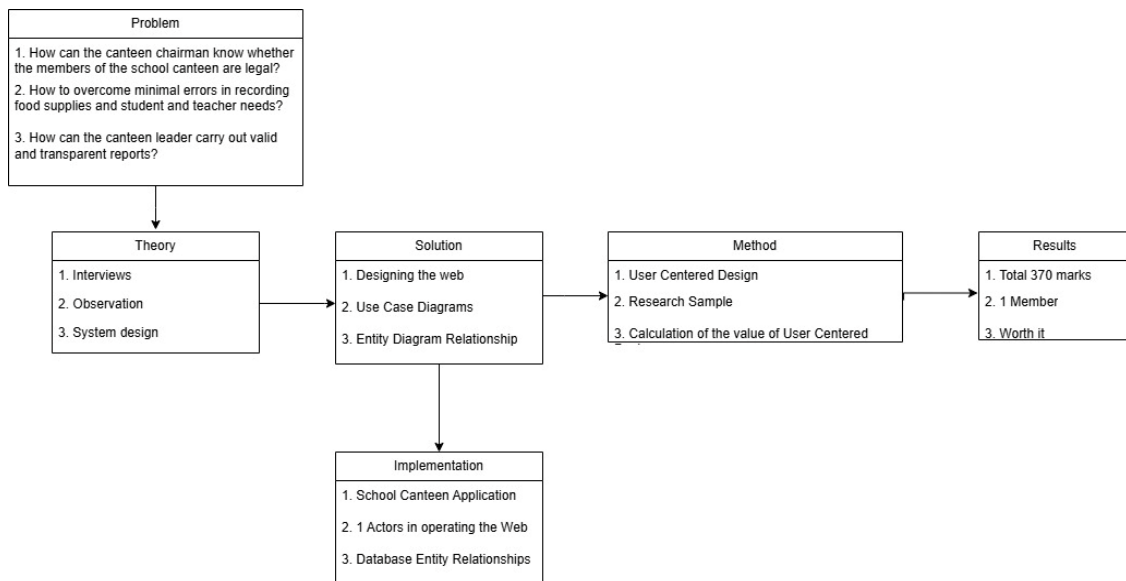| Implementation |
|---|
| 1. School Canteen Application |
| 2. 1 Actors in operating the Web |
| 3. Database Entity Relationships |

Fig. 2 Framework of thinking

In the fifth stage, a series of plans are made to facilitate the connection of the problem's point of origin to the creation of a web-based plan. This framework of thought begins with the problem, which serves as a benchmark when the researcher observes and provides solutions in system design. In designing this system, in addition to providing a system design, it also involves determining the method that supports the system design by creating a web-based school canteen system. After the web design is developed, it is reviewed or tested using standard indicators in the user-centered design method. As shown in Figure 3, the implementation program represents a web page that has been designed as a system using a web page. This web page needs to be reviewed and assessed by the canteen admin, one of the evaluators, using the user-centered design indicators to test the web program with the user-centered design method as shown in Table 1. This assessment also uses the value weights in Table 2, ranging from low to high. Eventually, these values will be processed according to Table 4, which outlines the process for calculating the web score based on the value weights. Thus, in this framework, it forms a unified picture of the problem and the review of solutions with a method that results in a score indicating whether the school canteen web page solution is feasible or not.

IV. RESULTS

The results of this research continue from the method process used, explaining the data utilized, the methods applied in this research as shown in Table 3, the implementation of this research as depicted in Figure 3, and the data processing involved in summarizing all the data entered into the weighting scores in Table 4. Additionally, it explains the overall total score, highlighting the superior value in specific indicators as shown in Figure 4. Below are the results of the research on school canteen inventory and sales:

a. Research Sample

The research sample uses qualitative data, which only evaluates the web page from one actor, the canteen manager, who operates the web page as shown in Figure 4 regarding the program implementation and assesses the indicators in the user-centered design method. Therefore, the data sample refers to the person who directly controls the canteen web and evaluates several aspects of the user-centered design indicators. The results of this research sample can be seen in Table 4, which shows the evaluation process once the weights have been determined through the research sample by the canteen manager.

b. Program Implementation

Canteen members can register as members through the canteen leader via the web page, and inventory recording and food sales can be effectively operated through the web page. Additionally, the creation of canteen food reports can automatically summarize data from inventory and sales, as shown in Figure 3.

Fig. 3 Program Implementation

In the image above, one of the frameworks for implementing a solution to reduce the problems in the school canteen is presented. Therefore, the next stage shown in the image can be seen in the results through Table 3, which discusses the effectiveness before and after implementing the web on inventory, sales, and canteen member registration through the web page system.

c. Effectiveness of the User-Centered Design Method

The results of this study use the user-centered design method as its indicator, which is connected to the assessment focused on the web page. Therefore, there is an explanation for each indicator of the user-centered design method so that the web page can be formed based on the principles of the user-centered design method as an experience and its usage. Table 3 shows the relationship between the effectiveness of the web page and several indicators of user-centered design

TABLE 3
Effectiveness Comparison Before and After Using the Web

Indicators of User-Centered Design	Before Using the Web	After Using the Web
Specify the context of use		
The age of the account users is 18-50 years old.		
The system has account privileges	Does not use an account	Has a special account for the canteen manager to manage the web page
The system can handle inventory and sales		
Specify user and organisational requirement		
The screen is very easy to operate		
The web response is very fast	Recordkeeping and reporting often experience data loss and input errors.	Recordkeeping becomes more effective through the web, which has a responsive interface that is easy to operate, and consists of menus that are easy to learn.
The web menu is easy to learn		
Produce design solution		
The user interface of the canteen website.		
Has an account to access.	The canteen manager has difficulty viewing the inventory and sales activities	The input of inventory and sales data for the canteen is done through the web
Has inventory and sales pages		
Evaluate design		
The web design can be customized by the user.		
The number of accounts can be adjusted.	The canteen manager cannot create financial report designs	The manager can access the canteen sales activity reports through the web design
The inventory and sales content is optimized		

In the table above, the comparison shows how a problem is solved using the user-centered design method. This can be seen before and after the issue is addressed with the web page design solution. The content of the "before" and "after" using the web page here provides an overview, not answering based on each indicator, but answering generally from one of the existing indicators. This refers to previous research in [6], but this study adds and slightly changes the direction of the user-centered design method, which

integrates all the content of the indicators based on user needs in evaluating the web page, such as defining the context of use, filled with the account user's age from 18 to 50 years in operating the web page. This is one example of adding a description of account users based on reality according to the specified criteria to understand the age range in operating the web page and reduce the error rate in operating the web page, or the authority of the account users becoming the canteen chairperson aged 18 to 50 years, thus making this a primary requirement of the user-centered design indicator. Furthermore, the effectiveness of the comparison above needs to involve manual processing of assessment calculations based on the canteen chairperson assessing the aspects of the indicators in Table 3, and then it can be seen in Table 4 how the number processing is done based on the evaluation by the canteen chairperson.

d. User Centered Design Data Processing

The data processing below uses a single sample from Table 1 to evaluate the webpage based on the indicators of the User Centered Design method. Below is Table 4, the data processing process using the User Centered Design method with direct calculation based on the weight determination provided in the method section, Evaluation Test.

TABLE 4
VALUE PROCESSING

No	User Centered Design	Value Weight					Total	Total Value
		10	20	30	40	50		
	Specify the context of use							
1	The age of the account users is 18-50 years old.			1			30	
	The system has account privileges			1			30	90
	The system can handle inventory and sales			1			30	
	Specify user and organisational requirement							
2	The screen is very easy to operate			1			30	
	The web response is very fast				1		40	100
	The web menu is easy to learn			1			30	
	Produce design solution							
3	The user interface of the canteen website.			1			30	
	Has an account to access.			1			30	90
	Has inventory and sales pages			1			30	
	Evaluate design							
4	The web design can be customized by the user.			1			30	
	The number of accounts can be adjusted.			1			30	90
	The inventory and sales content is optimized			1			30	
	Number of Values							370

In Table 4, the canteen chairperson assesses the web page based on the user-centered design indicators, where the calculation is done directly by selecting the weight of each indicator. This table answers all the structures from Table 1 to Table 4, which will later be followed by Table 5, summarizing the overall findings of this study based on the user-centered design method.

e. Testing Results Using User Centered Design

In Figure 4 below, the results of the process from the steps in Table 1 to 3 show the highest, lowest, and overall total values, meaning the highest value is 600, the lowest value is 120, and the overall value represents the results of the research in this title through direct data processing. Below is an overview of the results, which is 370, with the description "worthy".

In the image figure 4, the total score overall based on the indicators is as follows: Specify the context of use 90, Specify user and organisational requirement 100, Produce design solution 90, Evaluate design 90. So, when added together, the total is 370. Referring to the weight description in Table 2, the web page falls into the feasible category. In the image above, the total overall score based on the indicators is as follows: Specify the context of use 90, Specify user and organizational requirements 100, Produce design solution 90, Evaluate design 90. So, when added together, the total is 370. Referring to the weight description in Table 2, this webpage falls into the feasible category. Regarding the use of the webpage, the canteen members have been registered on the webpage. The use for inventory recording and sales can already be done through the webpage, and reports can be summarized transparently through the webpage.
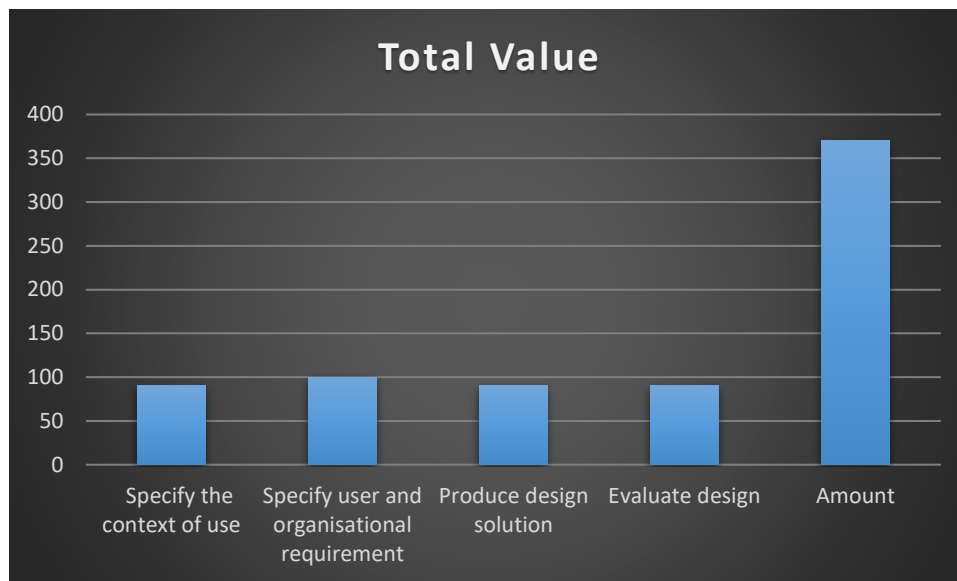
Fig. 4 Overall score using the User Centered Design method

V. DISCUSSION

The problem with the school canteen persists, with several mistakes made by canteen members providing food without the knowledge of the canteen head. This issue is not only related to canteen members who are not registered in the school canteen but also to manual bookkeeping using ledgers, which adds additional problems, making it difficult for the canteen head to compile records efficiently. Therefore, in this discussion, through this research, the author proposes a solution to this problem, where all records and the collection of canteen member data are managed through a web page.

Based on previous research, the issue of manual record-keeping converted into computerized forms and even integrated into systems has several references as the foundation for the conceptual solution, namely the alignment between the problem and a good solution. One study [7] shows that inventory and sales reports often encounter errors due to discrepancies in recording incoming and outgoing food supplies. Furthermore, [6] highlights issues with inaccurate and inefficient stock inventory. Previous research proposed the design of a web-based information system that can be managed via a web interface.

Therefore, the author incorporates collaboration with previous research to address existing problems and implement a program containing canteen food sales, inventory, or school needs that are ready to serve the desires of students and teachers. However, with slight differences in user-centered design method indicators, where each indicator has a general answer to connect the indicator with the web page to adjust value processing with user-centered design indicators, and methods supporting the assessment of indicators to obtain a score of 376, indicating feasibility. This score comprises the following indicators: Specify the context of use (90), Specify user and organizational requirements (100), Produce design solutions (90), and Evaluate design (90).

The limitation of this research is that only canteen members registered through the web are included, and inventory and sales records are made by entering data through the web page, simplifying the canteen head's task in compiling reports.

In the future, the web page can add user accounts for canteen members so that each member has their own account, thereby expanding the use of this school canteen application.

VI. CONCLUSIONS

Canteen members can be legally registered and directly monitored by the canteen leader through the web. Food and beverage inventory records are directly entered into the web to avoid errors in data input. The canteen leader can compile inventory and sales reports through the web in a valid and transparent manner. The evaluation of this web design uses the User Centered Design method, which has obtained a score of 376, indicating that it is feasible, consisting of the indicators: Specify the context of use 90, Specify user and organisational requirement 100, Produce design solution 90, and Evaluate design 90. A suggestion for the future is to add canteen members so that each member has an account, which will expand the use of this canteen application.

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