Analysis and Design of Food Price Data Processing Information System

Salsa Dilah Priska[*1], Syahrullah[2], Deny Wiria Nugraha[3], Nouval Trezandy Lapatta[4], Chairunnisa Ar Lamasitudju[5]
[1,2] Information System, Faculty of Engineering, Tadulako University, Indonesia
[3,4,5] Informatics Engineering, Faculty of Engineering, Tadulako University, Indonesia
E-mail: [*1]**priskadilahsalsa@gmail.com**, [2]syahroellah.ms@gmail.com,
[3]deny.wiria.nugraha@untad.ac.id, [4]nouval@untad.ac.id, [5]nisalamasitudju2@gmail.com

Abstract

Food prices have an important role in maintaining economic stability and public welfare, as price fluctuations can have a direct impact on purchasing power and inflation. However, the manual process of recording and reporting food price data at the Department of Agriculture and Food Security of Palu City results in inefficiencies, inaccuracies, and limited accessibility. This study presents the design and development of a web-based information system using the prototyping method, aimed at improving the efficiency of food price data management. The system was developed through iterative interaction between users and developers, and data collection was conducted through interviews, observations, and documentation. System functionality was tested using black-box testing, while usability was evaluated using the System Usability Scale (SUS). The system achieved an average SUS score of 74, which falls into the "Good" category, indicating that it is easy to use. Key features include daily price input, automatic average calculations, and report submission with approval workflows. This research contributes as the first implementation of a food price information system at the Agriculture and Food Security Office, offering a structured and user-oriented solution for institutional data processing and decision making.

Keywords *— Design, Food Prices, Information System, Prototype, SUS Score 74*

1. INTRODUCTION

Food prices have an important role in maintaining economic stability and public welfare, as price fluctuations can have a direct impact on purchasing power and inflation. Therefore, price monitoring is required as a basis for policy making to maintain price stability. Accurate and up-to-date information on food prices is essential to anticipate price fluctuations that could harm the community [1]. Such information is needed by various parties, including the government, business actors, and the public, for decision-making, inflation control, and price stabilization. With accurate information, price monitoring becomes more effective and supports public welfare [2]. Analysis of food price fluctuations can provide useful data for the government in designing appropriate policies to ensure food security and economic stability [3]. In addition, a comprehensive food price management strategy can strengthen food security and support people's welfare, especially in the face of increasingly complex price fluctuation challenges [4]. As such, effective food price processing and monitoring contribute not only to economic stability but also to the overall improvement of people's welfare.

The Agriculture and Food Security Office of Palu City, specifically the food distribution sector, is responsible for monitoring food prices under the Mayor of Palu City Regulation No. 3/2018 [5]. One of the main tasks of this office is to monitor food price movements in the main markets in Palu City, such as Inpres Market and Masomba Market. However, currently, the recording and reporting of food prices in Palu City is still done manually using Microsoft Excel, where survey officers input data into Excel to calculate the average price of each commodity, which is then stored on a computer or flash drive. This manual method is prone to recording errors, has difficulty in tracking historical data, and risks losing data due to non-centralized storage. This reflects the core problem faced by the institution is the absence of a centralized and automated system for managing food price data efficiently. Therefore, the purpose of this study is to design a web-based food price information system that can streamline the recording, calculation, reporting, and approval processes at the institutional level.

To solve these problems, the proposed solution is a web-based information system using the prototype method. The system is designed to facilitate internal parties in managing, presenting, and reporting food price data. This is in line with the Law of the Republic of Indonesia No. 18/2012, Article 113, which states that the food information system includes the collection, processing, analysis, storage, presentation, and dissemination of food data and information [6]. This research uses the prototype method because user feedback plays an important role in system development. This method is more flexible and responsive to user input, thus enabling the development of more efficient, effective, and user-oriented information systems. With this approach, system evaluation can continue until the prototype is considered to meet user needs [7], [8].

Several previous studies have explored the implementation of information systems in various developing sectors, highlighting their impact and potential for change [9]. A study by [1] states show that food price data management systems help institutions manage data, facilitate searches, and improve reporting accuracy. Research by [10] emphasizes the need for computerized data recording to enhance processing efficiency. In decision-making, research by [11] found that information systems support policy formulation to maintain price stability. Study [12] designed an inventory management system for grocery stores, which helps manage stock more systematically and reduce errors. Research by [13] developed a CodeIgniter-based mail management system, showing that digital archiving improves document handling and speeds up data retrieval. Meanwhile, another study by [14] created a merchant data management information system using the prototype method, which showed that this approach can provide a clearer presentation of information. However, most previous studies have focused on applications in the private sector, such as inventory management, retail operations, or internal administration, and have not addressed the specific operational needs of public institutions in food price monitoring activities. In addition, to date, no studies have been found that specifically examine the design of similar information systems in the context of local government agencies, such as the Agriculture and Food Security Office of Palu City.

Therefore, this study aims to design a web-based food price data management information system using PHP and the CodeIgniter framework. The system supports multiple user roles, automates the calculation of average daily prices, and streamlines the monthly

reporting process. It is expected to enhance the speed and accuracy of data processing and support decision-making within the agency. This research is intended to benefit relevant institutions by improving the efficiency of food price recording and reporting, enabling data-driven decisions, and supporting policies to stabilize food prices. Additionally, it may serve as a reference for developing similar information systems in other fields requiring structured and computerized data management.

2. RESEARCH METHOD

This research uses the prototype method in designing a food price data processing information system. This method was chosen because it allows users to provide feedback during development, thus enabling incremental improvements and giving users a clearer understanding of the system being developed [15], [16]. By constructing an initial model, developers can interact directly with users to better understand their needs and refine the system based on their input [17], [18]. This prototyping approach is further supported by empirical studies, which show that iterative development through prototypes helps explore user requirements more effectively and reduces the risk of developing systems that do not meet user needs [19].

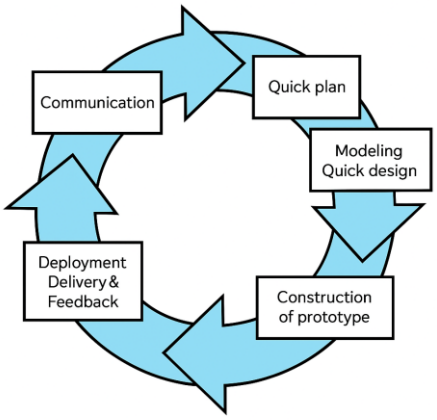

Figure 1. Prototype Method

2.1. Communication

This phase aims to identify user needs through interviews and observations at the Palu City Agriculture and Food Security Office. This process is to find problems in the manual system, such as unstructured recording of food prices. The result at this stage is a list of system requirements that will be the basis for designing prototypes.

2.2. Quick Plan and Modelling Quick Design

In this phase, rapid planning is done to develop an initial prototype by defining key features, system workflows, and tools. Modeling is done using UML, including use case diagrams to represent system functions, class diagrams for data structures, and activity diagrams to describe process flows. Wireframes were also created to provide an initial look at the system interface before development began.

2.3. Construction of Prototype

This phase is the process of implementing the system based on the modeling results in the previous stage. At this stage, the system begins to be developed using the PHP programming language with the Codeigniter framework to produce an initial prototype. The prototype built is not yet the final product, but it can already be tested to obtain feedback from users.

2.4. Deployment, Delivery & Feedback

This final phase involves user testing of the prototype and gathering feedback for iterative improvements until the system meets user requirements. Once the prototype is considered satisfactory, further testing is conducted to ensure the system functions properly.

2.5. Testing Techniques

2.5.1. Black Box Testing

In this study, system testing will be carried out directly by prospective users to try out the system's features. Black box testing is used to evaluate the system's functionality by observing the input and the resulting output [20], [21]. If a feature functions according to the specifications, it is considered successful; otherwise, corrections are required. This method is chosen because it is considered effective for evaluating how the system responds to user actions without requiring knowledge of its internal structure [22]. This makes it suitable for prototype testing, where the focus is on functional behavior from the user's perspective.

2.5.2. Usability Testing

In this study, the system usability was evaluated using the System Usability Scale (SUS) method by involving 20 respondents selected based on their role and involvement in system operations. Respondent consisted of one head office, three survey officers, one administrator, and fifteen representatives from fields directly related to food security. All respondents are potential users from related agencies and represent various levels of access and function within the system, enabling them to provide relevant feedbacl on system usability. This test measures the system's usability based on user experience [23] through a SUS questionnaire developed by John Brooke in 1986. The questionnaire consists of 10 standard statements rated on a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree), and is processed using the standard SUS formula to obtain a usability score [24]. For odd-numbered statements, the score is adjusted by subtracting 1 (final score = score – 1), while for even-numbered statements, the score is subtracted from 5 (final score = 5 – score). The final scores from all 10 statements are then summed and multiplied by 2.5 to produce the total SUS score. According to interpretation standards, SUS scores range from 0 to 100, with scores above 68 considered good, while scores below 50 indicate low usability and the need for improvement [25].

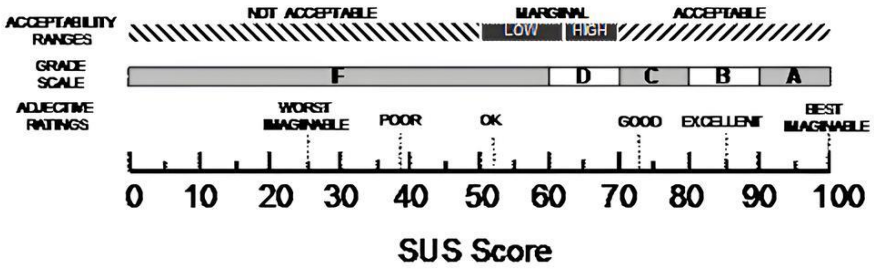

Figure 2. SUS Score

3. RESEARCH RESULTS AND DISCUSSION

3.1. System Analysis

3.1.1. Current System Analysis

The management of food price data is still carried out manually, starting from recording on paper to inputting it into Microsoft Excel. This process is time-consuming, prone to errors, and difficult to track historical data. Moreover, storing data locally poses the risk of data loss and limited accessibility.

3.1.2. Proposed System Analysis

To overcome these issues, a web-based information system is designed to help survey officers directly input food price data. This system automatically calculates average prices, accelerates data processing, and supports digital report submission and approval, making the data more structured and easily accessible.

3.2. System Requirements Analysis

The following system requirements analysis was developed based on the results of the analysis and communication with internal stakeholders. The detailed requirements are presented in Table 1.

Table 1. System Requirements

No	User	Requirements
1	Admin	Add user accounts
		Edit user account data
		Delete user accounts
		Monitor reporting
2	Survey Officer	Input food price data
		Edit and delete food price data in case of errors
		Submit monthly food price reports
		Download report history
3	Head Office	Approve or reject monthly reports submitted by the survey officer
		Download report history
4	Staff	Receive approved monthly reports
		Download report history

3.3. System Design

3.3.1. Use Case Diagram

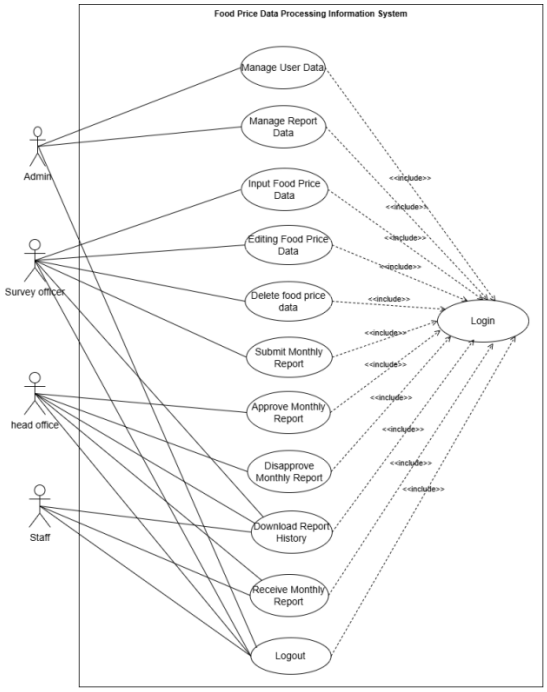

Figure 3. SIPANGAN Use Case

3.3.2. Activity Diagram

a. Activity Diagram User Login

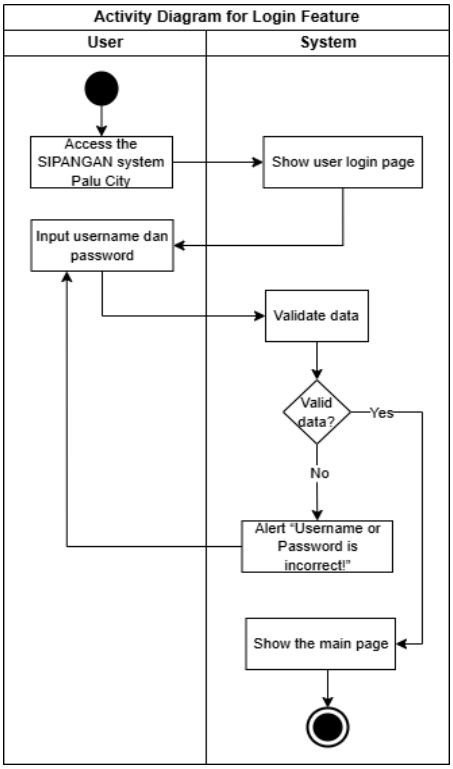

Figure 4. Activity Diagram for Login Feature

b. Activity Diagram Input Data

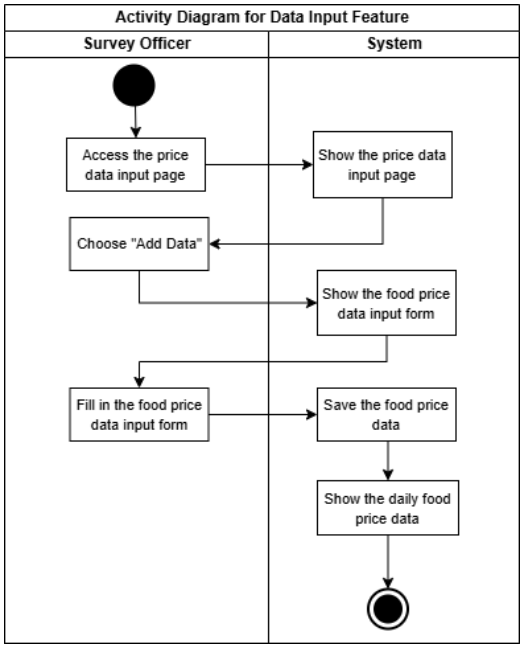

Figure 5. Activity Diagram for Data Input Feature

c. Activity Diagram of Reporting System

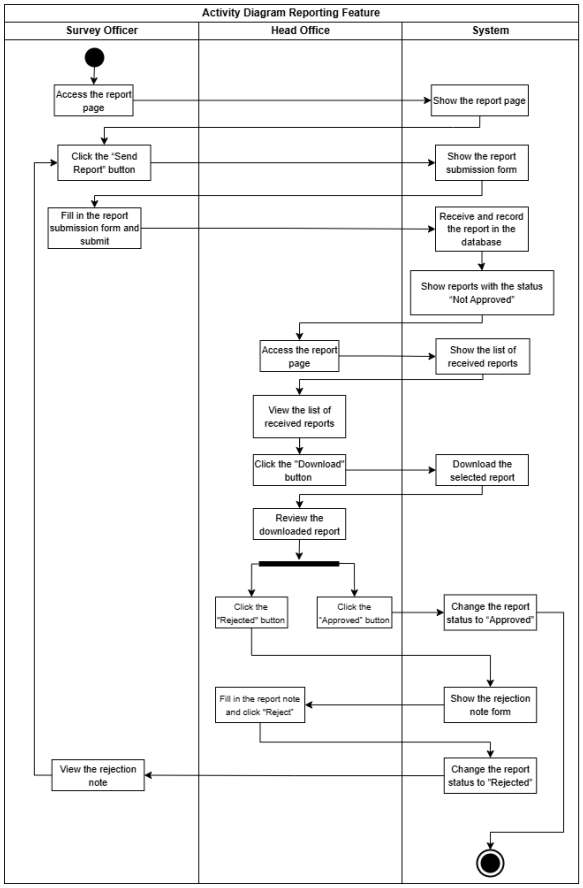

Figure 6. Activity Diagram Reporting Feature

3.3.3. Class Diagram

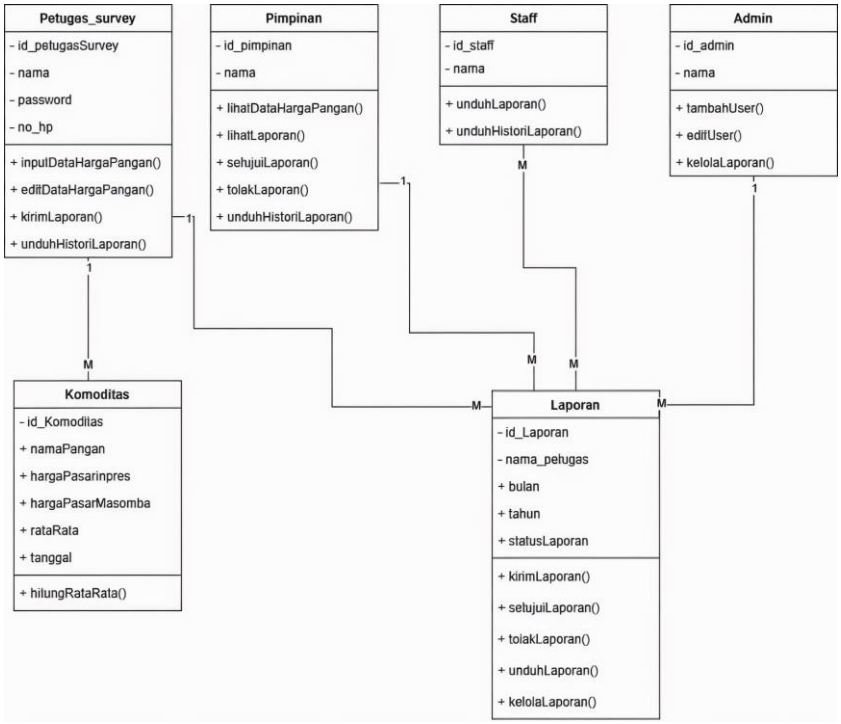

Figure 7. Class Diagram

3.4. Interface Design

The following are several design drafts for the interface of the Food Price Data Processimg Information System:

3.4.1. Login Page Interface Design

Figure 8. Login Page Interface Design

3.4.2. Data Input Page Interface Design

Figure 9. Data Input Interface Design

3.4.3. Report Page Interface Design

Figure 10. Report Page Interface Design

3.5. Prototype Development

The following are the results of the system implementation that has been carried out on the Food Price Data Processing Information System:

3.5.1. Login Page for Food Price Data Processing Information System

This page is the initial display when accessing the system, where the user must enter their registered username and password in order to log in to the system, as shown in Figure 11.

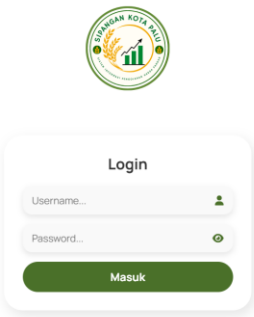

Figure 11. Login Page

3.5.2. User Dashboard Page

This page is the main display after the user successfully login. This page displays a dashboard containing real-time graphical data on average food prices, as shown in Figure 12.

Figure 12. User Dashboard Page

3.5.3. Data Input Page

This page displays food price data that has been entered by survey officers. There is an "Add Commodity" button to add commodity data, which will display a form as shown in Figure 14.

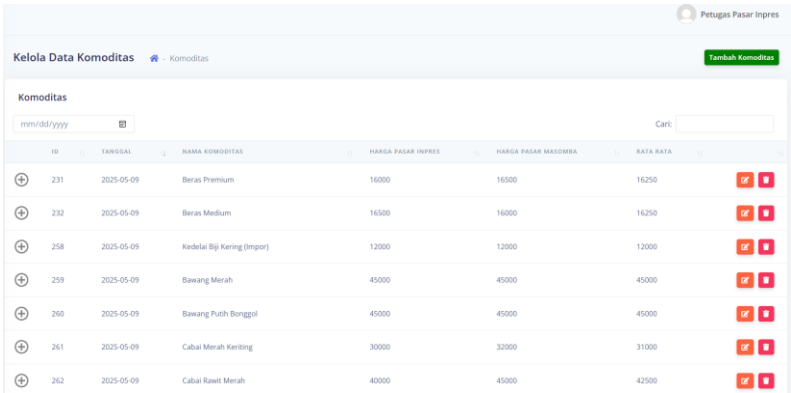

Figure 13. Data Input Page

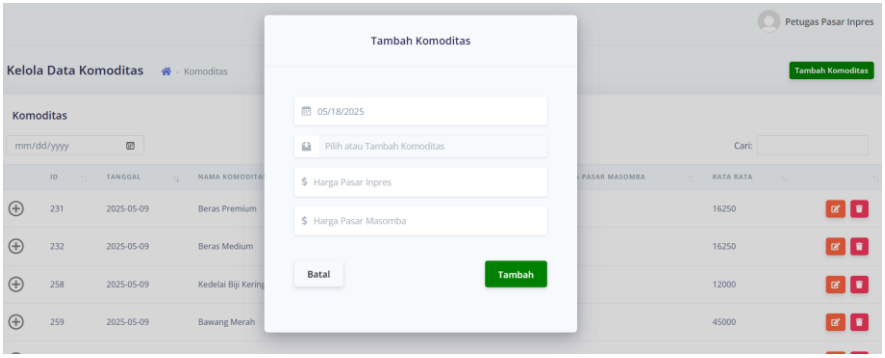

Figure 14. Commodity Data Input Form

3.5.4. Survey Officer Report Page

This page displays a list of reports that have been submitted by survey officers, along with their status, such as pending approval, approved, or rejected. There are edit and delete buttons, with the edit button used to edit reports and the delete button used to delete report data.

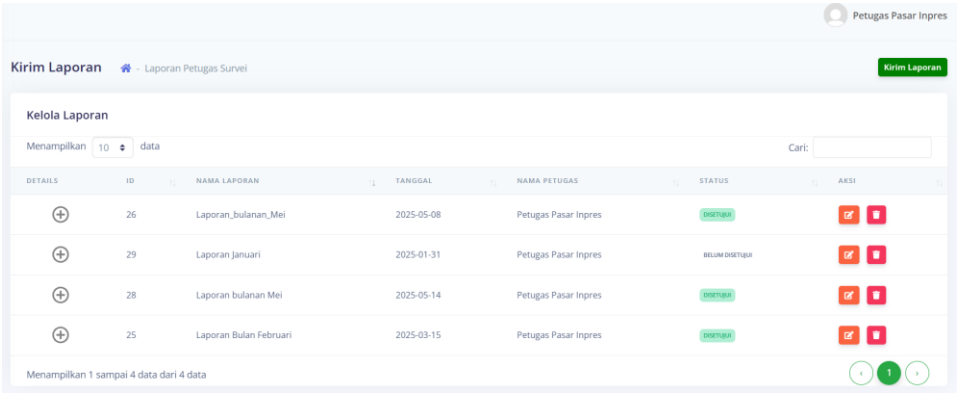

Figure 15. Survey Officer Report Page

3.5.5. Head Office Report Page

This page displays a list of reports that have been received by executives for verification. Executives can download, approve, or reject the reports.

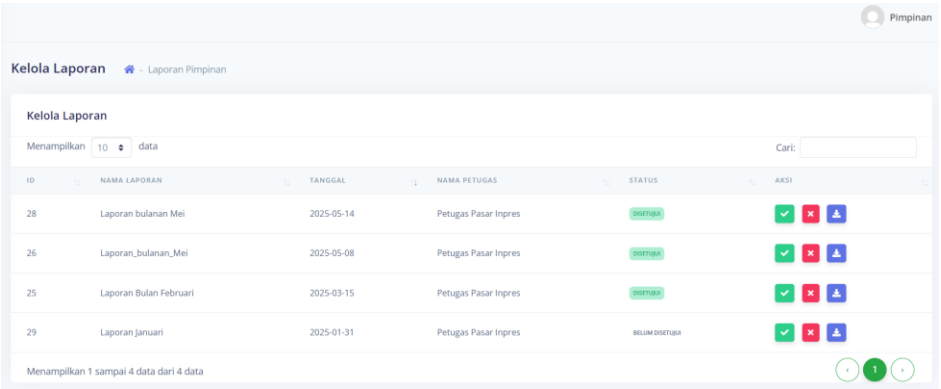

Figure 16. Head Office Report Page

3.5.6. User History Page

This page is used to download monthly reports stored in the system.

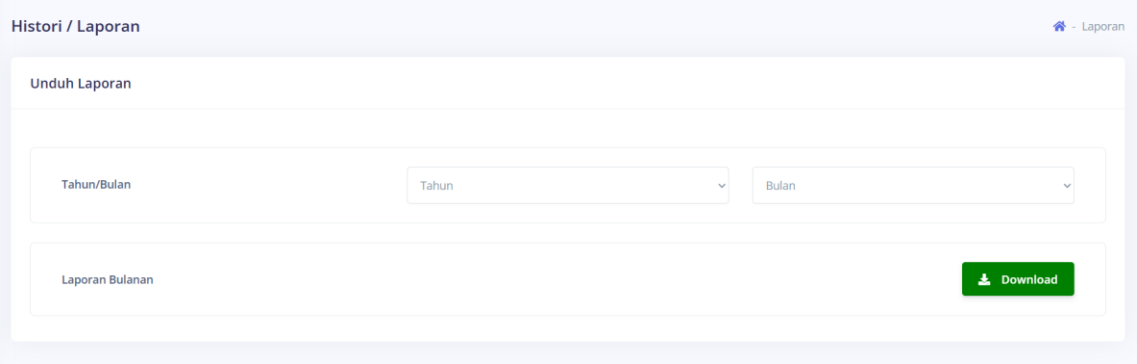

Figure 17. User History Page

In the development process, prototypes are tested and improved iteratively based on user feedback. Each iteration aims to improve functionality and ensure that the system meets user needs. The following are several phases of iteration that have been carried out:

- First iteration: Users suggested that the system should not allow the same commodity to be entered on the same day to avoid duplicate data. Previously, survey officers could enter the same commodity multiple times in a day, which risked making the data inaccurate. To address this, a validation feature was added that displays a warning if the commodity has already been entered on that day.
- Second iteration: users proposed a note feature when reports submitted were rejected by supervisors. Previously, survey officers did not know the reasons for rejection, so they corrected the reports. Therefore, a feature was added that allows supervisors to provide notes when rejecting reports, as shown in Figure 18.

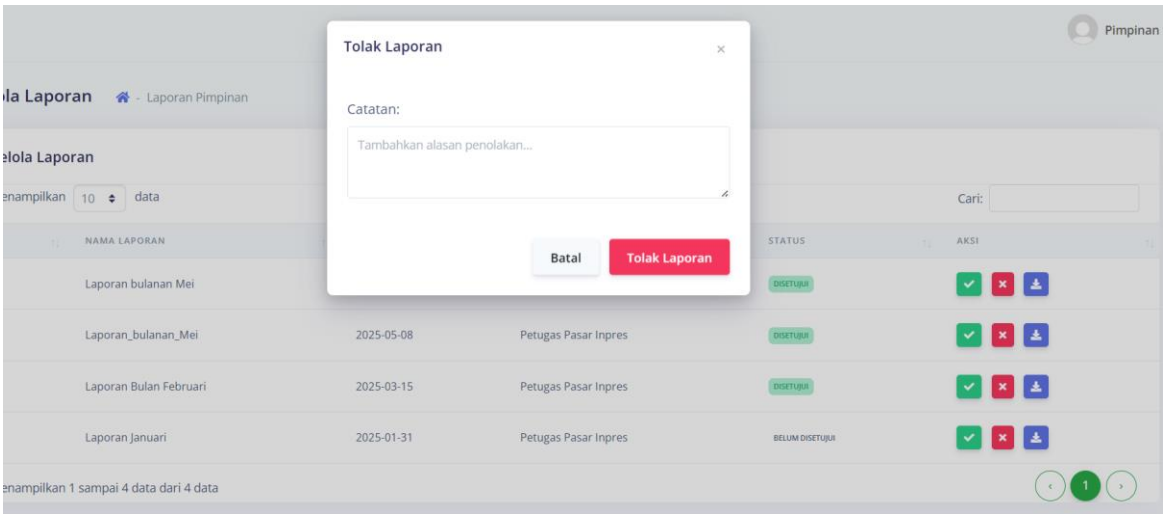

Figure 18. Report Rejection Page

3.6. Testing Results

3.6.1. Black Box Testing

Table 2. Results of User Tests by Survey Officer

No	Condition	Input	Output	Conclusion
1.	Login with the correct account	Password and Username valid	Login to the system	Successful
2.	Login with the incorrect account	Password and Username not valid	The error message "Username or Password is incorrect" appears	Successful
3.	Adding the food price data	Fill in the price data form	Data is stored in the database and displayed in the price list	Successful
4.	Adding the food price data without filling in all fields	Leave one field blank	The "Add Data" button does not work and the data is not saved	Successful
5.	Editing the food price data	Enter changes in the form	Data successfully updated and displayed in the food price list	Successful
6.	Deleting the food price data	Click the "Delete" button on the specific data	Data deleted from the system	Successful
7.	Downloading the food price report	Click the "Download Report" button	The file is successfully downloaded	Successful
8.	Submitting the monthly food price report	Click the "Submit Report" button	The report is sent and entered into the management report list	Successful
9.	Editing the monthly food price report data	Enter the changes in the form	The report data is successfully updated	Successful
10.	Deleting a monthly report from the list	Click the "Delete" button on the specific data	The data is successfully deleted from the system	Successful

Table 3. Results of User Tests by Head Office

No	Condition	Input	Output	Conclusion
1.	Login with the correct account	Password and Username valid	Login to the system	Successful
2.	Login with the incorrect account	Password and Username not valid	The error message "Username or Password is incorrect" appears	Successful
3.	Approving the food price report	Click the "Approve" button	The report status changes to approved and is sent to staff	Successful
4.	Rejecting the food price report and adding a note	Click the "Reject" button and enter a rejection note	The report status changes to "Rejected", and the note is sent to the survey officer	Successful
5.	Deleting the food price report	Click the "Delete Report" button	The report is successfully deleted from the system	Successful
6.	Downloading the food price report	Click the "Download Report" button.	The report file is successfully downloaded	Successful

Table 4. Results of User Tests by Staff

No	Condition	Input	Output	Conclusion
1.	Login with the correct account	Password and Username valid	Login to the system	Successful
2.	Login with the incorrect account	Password and Username not valid	The error message "Username or Password is incorrect" appears	Successful

No	Condition	Input	Output	Conclusion
3.	Downloading the food price report	Click the Download button	The file is successfully downloaded	Successful

Table 5. Results of User Tests by Admin

No	Condition	Input	Output	Conclusion
1.	Login with the correct account	Password and Username valid	Login to the system	Successful
2.	Login with the incorrect account	Password and Username not valid	The error message "Username or Password is incorrect" appears	Successful
3.	Adding a user account	Enter the username, password, and phone number	The account is successfully added and can be used to login	Successful
4.	Editing user account data	Make the necessary data changes	The account data is successfully updated	Successful
5.	Deleting a user account	Click the "Delete" button	The account is deleted from the system and can no longer be used to login	Successful

3.6.2. System Usability Scale (SUS) Testing

Usability testing was conducted by distributing SUS questionnaires to 20 respondents who were prospective users of the system. The results of the questionnaire data processing are presented in the following table:

Table 6. SUS Score Calculation Results

Respondents	Statements										J	N
	1	2	3	4	5	6	7	8	9	10		
R1	3	3	4	2	3	2	3	3	4	3	30	75
R2	4	2	3	2	4	3	3	2	4	3	30	75
R3	4	3	3	3	3	3	4	2	3	2	30	75
R4	4	2	3	3	4	3	3	2	3	2	29	73
R5	3	2	4	3	3	3	3	3	3	3	30	75
R6	3	3	4	3	4	3	4	2	3	2	31	78
R7	3	3	3	2	3	2	3	3	4	2	28	70
R8	4	2	4	2	4	2	4	3	4	2	31	78
R9	4	3	4	3	4	3	3	3	4	2	33	83
R10	4	3	3	2	3	3	4	2	4	3	31	78
R11	3	3	4	3	4	2	4	2	3	3	31	78
R12	4	3	3	3	4	3	3	3	4	2	32	80
R13	4	2	3	3	4	3	3	2	4	2	30	75
R14	3	2	4	3	4	3	4	3	4	2	32	80
R15	3	2	4	2	4	2	4	2	4	3	30	75
R16	3	2	4	3	4	3	4	3	4	3	33	83
R17	3	2	3	2	3	2	4	2	4	2	27	68
R18	4	0	3	3	3	1	2	3	3	1	23	58
R19	3	1	3	3	3	1	2	2	3	1	22	55
R20	3	2	4	2	3	2	3	3	3	2	27	68
Average Score												**74**

Based on the calculations, the average SUS score was 74. This score falls into the "Good" or "Acceptable" category, indicating that the system is relatively easy for users to use. This score is comparable to the results of research by [23], who obtained a SUS score of 78 for

a prototype-based marketing information system. Although the score in this study is slightly lower, both indicate a high level of usability and acceptability by users. This comparison shows that the system developed in this study has competitive usability performance and is in line with similar systems tested using the same approach.

The usability score obtained is influenced by several factors. The prototyping method used allows the system to be developed based on direct user input, and the simple interface makes it easy to use. However, the score can also be affected by limitations such as unoptimized access on mobile devices and differences in digital literacy levels between users.

Although the system obtained a good usability score, some limitations were still found. The price history search feature does not yet support filters by commodity, limiting user flexibility. On the other hand, although the system's interface is responsive, there are still issues with the navigation structure and placement of interface elements, which make it difficult for some users to access certain features. In addition, the system relies on an internet connection and has not been integrated with external data, such as the national food price API.

4. CONCLUSION

The research results indicate that the design of a web-based food price data processing information system for the Agriculture and Food Security Agency of Palu City has been successfully implemented. This system addresses issues in manual data recording, such as errors and difficulty in tracking historical information. Developed using the prototype method, it allows for iterative refinement based on user feedback. Usability testing showed a SUS score of 74, indicating that the system is easy to use. Scientifically, this study demonstrates the application of prototyping and usability evaluation in the development of public-sector information systems. It contributes to digital innovation in food price monitoring and government data management. The system is expected to improve operational efficiency and serve as a reference for similar systems in other regions or sectors.

5. SUGGESTED

Based on the results of the study, it is recommended that a food price data processing system be implemented widely to improve the efficiency and accuracy of recording and facilitate data access to support information-based decision making. System development should also focus on improving access flexibility, including the development of mobile applications so that survey officers can record data directly in the field. In addition, socialization and training for all users, such as survey officers, staff, and leaders, are very important to ensure optimal understanding and use of the system, so that the transition from manual to digital methods can run smoothly without technical obstacles. Furthermore, to enhance system functionality, it is recommended to integrate the system with national food price APIs and explore the use of machine learning algorithms to predict future food price trends. These improvements can provide more comprehensive data analysis and strengthen the system's support for decision-making and food price stabilization efforts.

6. REFERENCES

[1] A. D. Primalita, "Rancang Bangun Aplikasi Pengelolaan Data," *Politek. Negeri Lampung*, vol. 1, no. September, pp. 97–105, 2022.

[2] I. G. Toiyo and Q. Kainde, "Aplikasi Pelayanan dan Informasi Mengenai Bahan Pangan di Dinas Ketahanan Pangan Kab. Minahasa," *Innov. J. Soc. Sci. Res.*, vol. 4, no. 1, pp. 8581–8590, 2024.

[3] I. Marina, D. Sukmawati, E. Juliana, and Z. N. Safa, "Dinamika Pasar Komoditas Pangan Strategis: Analisis Fluktuasi Harga Dan Produksi," *Paspalum J. Ilm. Pertan.*, vol. 12, no. 1, p. 160, 2024, doi: 10.35138/paspalum.v12i1.700.

[4] P. Afriyadi, A.; Wicaksono, A. D.; Saputra, A.; Defagansa, D. F.; Yolanda, J.; Marshall, M. A.; Andriani, "Strategi dan Peran Dinas Pertanian , Pangan , dan Perikanan (DP3)," *J. Multidisiplin*, vol. 02, no. 06, pp. 929–937, 2024.

[5] Peraturan Walikota Palu No. 3, "Wali kota palu provinsi sulawesi tengah," *Peratur. Walikota Kota Palu Nomor 3*, no. 6, pp. 268–275, 2018.

[6] Undang-Undang Republik Indonesia No.18, "Undang-undang RI Nomor 18 Tahun 2012," pp. 1–11, 2012.

[7] R. Aulianita and A. Mukhayaroh, "Implementasi Sistem Informasi Penjualan Kue Menggunakan Framework Codeigniter Dengan Pendekatan Metode Prototype," vol. 9, no. 2, pp. 101–110, 2024.

[8] Kadek Intan Janeta Pratiwi, Ni Made Satvika Iswari, and Ni Putu Noviyanti Kusuma, "Analisis Dan Perancangan Sistem Informasi Penjualan Dan Persediaan Di Ud Dongmart Berbasis Webdengan Menggunakan Metode Prototype," *J. TEKINKOM*, vol. 7, no. No. 1, pp. 281–291, 2024, doi: 10.37600/tekinkom.v7i1.1409.

[9] Syahrullah, A. M. Najar, H. R. Ngemba, and S. Hendra, "Desain dan Implementasi Sistem Informasi Pengawasan Hutan Produksi di Wilayah Provinsi Sulawesi Tengah Design and Implementation of a Production Forest Monitoring Information System in Central Sulawesi Province," vol. 14, pp. 845–855, 2025.

[10] Suciarani, "Aplikasi Pengelolaan Data Harga Pasar Tradisional Kabupaten Tasikmalaya Berbasis Web," *e-Proceeding Appl. Sci.*, vol. 6, no. 1, pp. 161–174, 2020, doi: 10.1007/978-3-8348-2485-1_6.

[11] R. Sufri, M. Mukhroji, N. Nazuarsyah, R. B. Ginting, and S. Prayudi, "Sistem Informasi Ketersediaan Dan Perkembangan Harga Bahan Pokok Secara Real Time Berbasis Web," *J. Ilm. Inform.*, vol. 11, no. 01, pp. 102–105, 2023, doi: 10.33884/jif.v11i01.7168.

[12] A. Muhi, L. Lukman, and W. Wulandari, "Perancangan Sistem Informasi Daftar Harga Dan Persediaan Barang Pada Toko Aas Sembako," *Semnas Ristek (Seminar Nas. Ris. dan Inov. Teknol.*, vol. 6, no. 1, pp. 235–241, 2022, doi: 10.30998/semnasristek.v6i1.5681.

[13] H. A. Harwindra Kurnia Adi, Andreo Yudertha, "PERANCANGAN SISTEM INFORMASI PENGELOLAAN SURAT ELEKTRONIK BERBASIS WEB PADA DINAS KOMUNIKASI INFORMASI DAN PESRSANDIAN KABUPATEN BUNGO," *J. Ilmu Komput.*, vol. 08, no. 12, pp. 38–43, 2024.

[14] Darmansah and Raswini, "Perancangan Sistem Informasi Pengelolaan Data Pedagang Menggunakan Metode Prototype pada Pasar Wage," *J. Sains Komput. Inform. (J-SAKTI*, vol. 6, no. 1, pp. 340–350, 2022.

[15] D. M. Vira Adi Kurniyanti, "PERBANDINGAN MODEL WATERFALL DENGAN PROTOTYPE PADA PENGEMBANGAN SYSTEM INFORMASI BERBASIS WEBSITE," *J. Fusion*, vol. 2, no. 1, pp. 1–7, 2022.

[16] I. H. B. Supriyanta, Eka Rahmawati, "Perancangan Sistem Informasi Pengelolaan Arsip Berbasis Web Dengan Metode Prototype," *Indones. J. Softw. Eng.*, vol. 10, no. 1, pp. 1–11, 2024, doi: 10.29407/stains.v3i1.4332.

[17] A. Luskyawan and Riki, "Analisa dan Rancangan Sistem Informasi Pembelian, Persediaan, Penjualan Mortar Berbasis Web," *bit-Tech*, vol. 7, no. 1, pp. 47–57, 2024, doi: 10.32877/bt.v7i1.1419.

[18] R. Firdaus *et al.*, "PERANCANGAN DAN IMPLEMENTASI ANTARMUKA PENGGUNA SISTEM INFORMASI BERBASIS WEBSITE SMK NEGERI 6 JAKARTA DENGAN METODE PROTOTYPE," vol. 8, no. 2, pp. 66–74, 2024.

[19] E. Bjarnason, F. Lang, and A. Mjöberg, *An empirically based model of software prototyping: a mapping study and a multi-case study*, vol. 28, no. 5. Springer US, 2023. doi: 10.1007/s10664-023-10331-w.

[20] B. Navissa, R. Afwani, and M. Ali Albar, "SISTEM INFORMASI PEMESANAN UNIT PERUMAHAN PADA PT. NATA ALAM RAYA BERBASIS WEBSITE (Information System for Booking Housing Units of PT. Nata Alam Raya Website Based)," 2023.

[21] L. P. Valenty, S. Kosasi, G. Gat, D. David, and S. M. Kuway, "Website Design Using Laravel Framework for Tart Tuns Shop Sales Pontianak," *CCIT J.*, vol. 17, no. 1, pp. 47–58, 2024, doi: 10.33050/ccit.v17i1.2998.

[22] A. Sultansyah, A. S. Rahayu, I. Yudiana, P. Fauzi, and E. N. Aripin, "Pengujian Black Box Testing Pada Fitur Permohonan Informasi Publik Melalui Website Pemerintah Jawa Barat," vol. 3, no. 4, pp. 5912–5919, 2025.

[23] A. C. Pramuditya, "PENGUJIAN USABILITY PADA PROTOTYPE SISTEM," vol. 2, no. 2, pp. 0–5, 2023.

[24] J. Brooke, "SUS: A 'Quick and Dirty' Usability Scale," *Usability Eval. Ind.*, no. November 1995, pp. 207–212, 1995, doi: 10.1201/9781498710411-35.

[25] J. T. Bangor, A.; Kortum, P. T.; Miller, "Determining what individual SUS scores mean: Adding an adjective rating scale," *J. Usability Stud.*, vol. 4, no. 3, pp. 114–123, 2009, [Online]. Available: https://uxpajournal.org/determining-what-individual-sus-scores-mean-adding-an-adjective-rating-scale/