ANALYSIS OF THE NEED FOR AN INFORMATION SYSTEM ON PRICES AND AVAILABILITY OF BASIC MATERIALS

Andriyan Dwi Putra[1]; Diana Rohmaniah[2*]

Information Systems[1], Informatics[2]
Universitas Amikom Yogyakarta, Yogyakarta, Indonesia
https://home.amikom.ac.id/
andriyan@amikom.ac.id[1], dianar@students.amikom.ac.id[2*]
(*) Corresponding Author

Abstract—*The development of information technology has driven digital transformation in various sectors, including the economic sector. Managing data on the prices and availability of basic commodities is crucial for maintaining community economic resilience. This study applies a design thinking approach to analyze the need for an information system on the prices and availability of basic commodities in Yogyakarta City, with a testing plan prepared using black box, white box, and security methods. The analysis produced three main findings: the need for Single Sign-On (SSO) with role-based access, real-time monitoring of commodity prices, and cross-agency integration in agenda and program management. The proposed system design consists of four main modules: administration, agenda, services, and programs/activities. Since this study is limited to the needs analysis and prototype design stage, empirical test results are not yet available. Nevertheless, the study provides an initial framework and foundation for cross-agency integration in the Yogyakarta City Government to support transparency, coordination, and control of basic commodity prices.*

Keywords: *design thinking, information system, requirements analysis, staple goods.*

Abstrak—*Perkembangan teknologi informasi telah mendorong transformasi digital di berbagai sektor, termasuk sektor ekonomi. Pengelolaan data mengenai harga dan ketersediaan komoditas pokok sangat penting untuk menjaga ketahanan ekonomi masyarakat. Penelitian ini menerapkan pendekatan design thinking untuk menganalisis kebutuhan sistem informasi harga dan ketersediaan komoditas pokok di Kota Yogyakarta, dengan rencana pengujian yang disiapkan menggunakan metode blackbox, whitebox, dan keamanan. Hasil analisis menghasilkan tiga temuan utama, yaitu kebutuhan akan Single Sign-On (SSO) dengan akses berbasis peran, pemantauan harga komoditas secara real-time, serta integrasi lintas instansi dalam pengelolaan agenda dan program. Rancangan sistem yang diusulkan terdiri dari empat modul utama: administrasi, agenda, layanan, dan program/kegiatan. Karena penelitian ini masih terbatas pada tahap analisis kebutuhan dan rancangan prototipe, hasil uji empiris belum tersedia. Meskipun demikian, penelitian ini memberikan kerangka awal dan landasan bagi integrasi lintas instansi di Pemerintah Kota Yogyakarta untuk mendukung transparansi, koordinasi, dan pengendalian harga komoditas pokok.*

Kata Kunci: *design thinking, sistem informasi, analisis kebutuhan, komoditas pokok.*

INTRODUCTION

Technology is developing rapidly, making it easier for people to live their daily lives. In many ways, technology plays an important role in various fields, including economics, social affairs, and science. In the economic field, the availability and stability of staple food prices are crucial factors in maintaining the economic resilience of society. Data on staple food price developments is an important element for government agencies in monitoring the trade and economic sectors (Sufri et al., 2023). Economic growth is an index for measuring the success of a country's development, which is reviewed through several economic parameters (Chabibi & Sishadiyati, 2024). With technological advances, the digital economy, as the main driver of economic growth, is expected to continue to grow in the coming years (Xia et al., 2024).

Information systems are formed through the integration of information technology and the active role of users (Marini et al., 2023). Management

information systems play a crucial role in supporting improvements in efficiency, productivity, and competitiveness of organizations in competitive markets (Hany Maria Valentine & Lira Arum Kusumaning Thyas, 2024). In addition, Management Information Systems can help make data accurate, fast, and flexible, so that information is organized according to user preferences (Lutfi et al., 2023). According to Presidential Decree No. 3 of 2021 concerning the Task Force for the Acceleration and Expansion of Regional Digitalization, it is stated that the development of digital transactions among the public is aimed at realizing financial inclusion and strengthening economic and digital financial integration at the national level. In line with this, digital transformation is a concept that describes a shift in work approaches through the application of information technology to improve effectiveness and efficiency (Lastanti & Djasuli, 2024). A number of challenges faced by the city of Yogyakarta in the practice of managing information on prices and availability of basic commodities include the lack of integration of data between agencies, difficulties in collecting and processing data scattered across various formats, the absence of barriers between users, and the lack of a monitoring and evaluation system directly linked to operational data.

Research related to information system requirements analysis has been conducted by several researchers, such as the study entitled "Information System for Basic Commodities of the Palu City Trade and Industry Office." This study aims to enhance transparency and price stability in traditional markets to assist the government and small-scale traders in monitoring price fluctuations and maintaining market economic stability. Using Black Box and White Box testing methods, the study found that the system operates effectively and efficiently, meets user needs, and achieves a 21.14% performance improvement thanks to the use of a cache (Nursalim et al., 2024). The next study is titled Real-Time Web-Based Information System for the Availability and Development of Staple Goods. This study aims to assist the government and the community in monitoring staple goods prices quickly and accurately, as well as improving the efficiency of price monitoring and maintaining market stability in Pidie Regency. The method used is the Waterfall method with sequential software development. This research resulted in the development of a web-based system that enables users to access real-time information on basic commodity prices, facilitates data entry by administrators, and assists the public and government in efficiently and accurately monitoring basic commodity prices (Sufri et al., 2023). The next study is titled Information System to Improve the Effectiveness of Raw Material Supply in MSMEs Using Time Series Forecasting Autoregressive Model. This study aims to develop a web-based information system that uses the Autoregressive (AR) model in time series analysis to predict raw material requirements in food MSMEs. The research methods employed include time series data analysis, software system development through the stages of needs analysis, design, coding, and testing, as well as validation of the AR model using raw material demand data from SMEs. The results of this study indicate that the AR model is capable of providing accurate predictions, aiding in raw material procurement decisions, and enhancing efficiency and business strategies (Ilham M. Hanip Soetardjo et al., 2020).

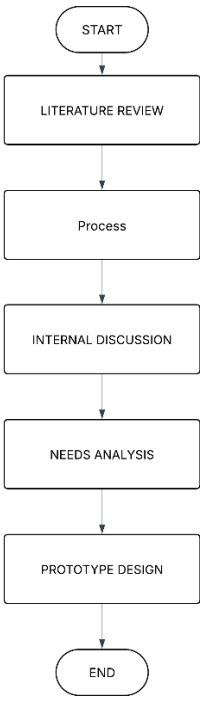
This study aims to analyze the information system requirements regarding the prices and availability of basic commodities in the city of Yogyakarta and to design a comprehensive and integrated management information system. Previous studies generally focused directly on system development, but did not emphasize cross-agency needs analysis as the basis for system design. Unlike previous studies, this study focuses on the information system needs analysis stage as the foundation before system development is carried out. This study uses the Design Thinking approach. Previous studies used the Agile and Waterfall methods. The Agile method emphasizes iterative development cycles and continuous stakeholder involvement (Osemeike Gloria Eyieyien et al., 2024) . Meanwhile, the Waterfall method follows a sequential process that makes it difficult to adapt to changes that often occur during system development (Justin Joseph John & Shailesh Satish Sharma, 2024) .The application of Design Thinking in local government improves decision-making by expanding solution options, involving various stakeholders, and improving communication (Frisk & Bannister, 2022) . Thus, this research contributes to a more in-depth mapping of user needs, which can be used as a basis for the design and development of targeted information systems. Additionally, this system will also benefit businesses, investors, and the general public by providing access to relevant information and supporting economic sector development in the city of Yogyakarta.

MATERIALS AND METHODS

The research stages used a case study approach in the Economic and Cooperation Division of the Yogyakarta City Government Secretariat. This research was conducted in the Economic and Cooperation Division of the Yogyakarta City Government Secretariat from May to October 2023. In the design process, the Design Thinking approach

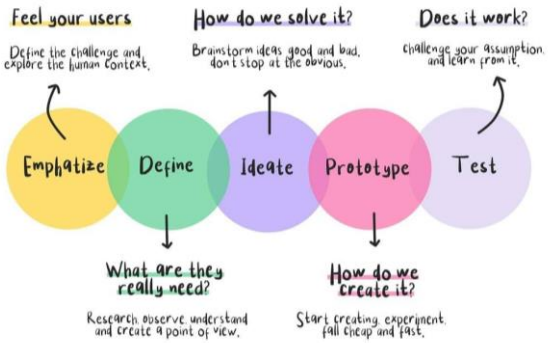
was applied through five stages: empathy, definition, ideation, prototyping, and testing. The Design Thinking approach was chosen because this method can identify user needs in various departments and is suitable for designing solutions based on real-world problems or solutions that are oriented towards problems (Permadi et al., 2025). In the testing process, three testing plans will be carried out: Black Box testing, White Box testing, and Security testing. The purpose of this testing is to identify security vulnerabilities, verify system compliance, test the system's response to attacks and threats, and validate the effectiveness of the implemented system security controls (Hegde & Mirle, 2023).

The research data sources were obtained from internal documents and operational activities related to price information management and the availability of basic commodities within the Yogyakarta City Government. The data included price monitoring results, work program evaluation reports from the Regional Inflation Control Team (TPID), and documents from the Regional Financial Access Acceleration Team (TPAKD) and the Regional Digitalization Acceleration and Expansion Team (TP2DD). Data collection techniques were carried out through direct observation of the manual system used, document review, and internal discussions with agency managers. Needs analysis was conducted in stages, including system requirements, visual, user, security, and cost analysis. The research flowchart can be seen in Figure 1.



Source: (Research Results, 2025)
Figure 1. Research Flowchart

The method used in this study is design thinking. Design thinking consists of five processes, namely empathize, define, ideate, prototype, and test, as shown in Figure 2.



Source: (Research Results, 2025)
Figure 2. Design Thinking Process

RESULTS AND DISCUSSION

Emphatize

Based on the results of the empathize stage, it is known that the economic and creative economy sectors currently require a management information system capable of managing administrative data and controlling work programs for institutions such as TPAKD, TPID, TP2DD, and KUR. Currently, management is still done manually using Google Sheets, but several challenges have been identified, such as work program data being scattered across multiple sheets (e.g., monitoring and evaluation), making it difficult to manage as data volume increases. Additionally, the lack of access restrictions means data is publicly accessible to many users. There are also challenges related to role separation, such as TPAKD being unable to view TPID's data. In developing the new system, it is hoped that there will be a Single Sign On (SSO) feature integrated with JSS accounts, as well as the ability to print reports, automatic notifications when data changes, document digitization, and easy monitoring and evaluation features. The parties involved in using this system include economic sector OPDs, TPAKD, TPID, TP2DD, KUR, Ekraf, and the general public.

Define

This stage formulates the main problems based on the findings in the empathy stage, where the information system must be able to accommodate various types of users with different access rights and functions. There are seven main types of users, namely admin, TPAKD, TPID, TP2DD, Ekraf, KUR, and the public.

Admins need to manage documents such as decrees, SOPs, procedures, and planning documents such as

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Anjab, Renja, SKP, DPA, and procurement. Admins are also responsible for managing user access rights, uploading announcements, compiling activity reports, and approving and validating work programs. The TPAKD, TPID, TP2DD, Ekraf, and KUR sections require the creation and revision of their respective work programs, uploading supporting documents, and compiling monitoring and evaluation documents. These sections also require access to documents uploaded by OPDs and work program evaluation reports. Meanwhile, the public is expected to be able to access publicly shared information such as decrees, activity reports, and budgets, as well as submit reports or complaints related to program implementation. To support these needs, the system is designed with forms as shown in Table 1.

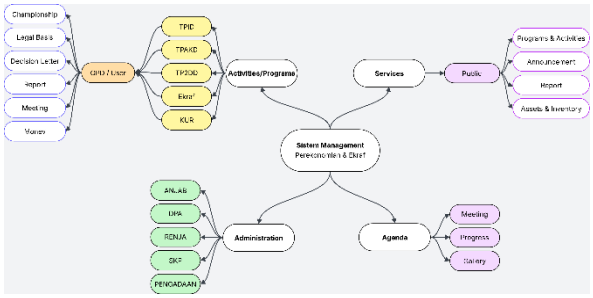
Table 1. Required Form Table

Form	Input	User
Login	- Username - Password	- OPD - TPID - TKAPD - TP2DD - KUR - Creative Economy
Agency	- Name of agency - Person in charge - Contact person - Type of agency - Agency address - Agency email	- OPD - TPID - TKAPD - TP2DD - KUR - Creative Economy
Project	a. Agency information - Agency name - Person in charge - Contact person - Type of agency - Agency address - Agency email b. Project scheme information - Project name - Period - Project theme - Description - Category - Project type - Financial services sector - Project details - Product type 3. Target information - Priority sectors - Gender-based groups - Community groups	

Source: (Research Results, 2025)

Ideate

After the problems and system requirements have been identified in the definition stage, the next step is to explore solutions in the ideation stage. This stage involves brainstorming with the relevant team to determine the core features and workflow of the Management Information System (MIS) that meet user requirements, as shown in Figure 3.

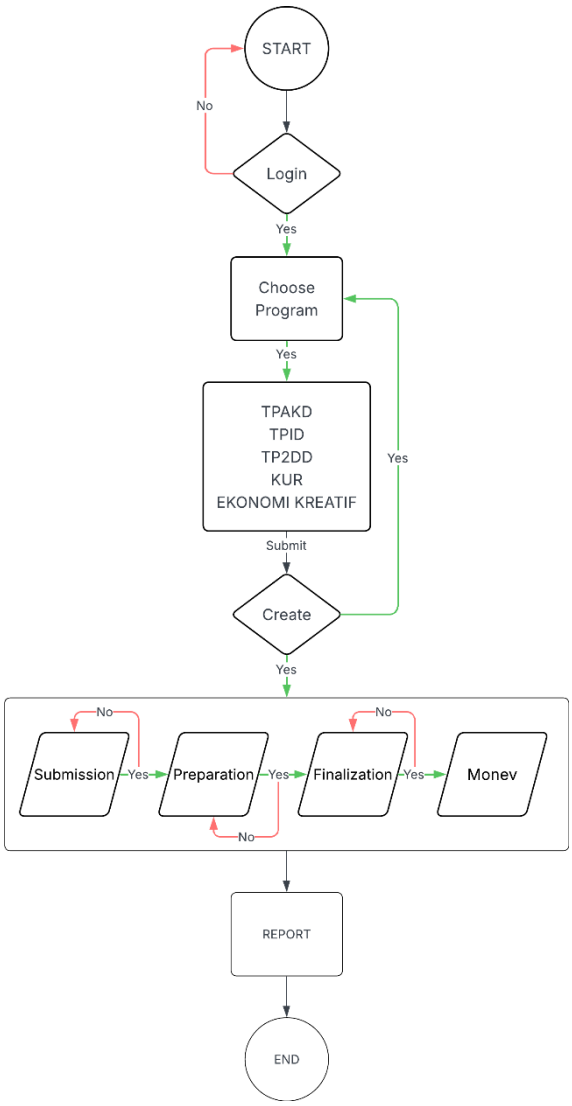


Source: (Research Results, 2025)

Figure 3. SIM Process Flow Design

There are three questions in the brainstorming stage, namely "what will we...", "how might we...", and "who will ...". What we will formulate are concrete steps in the form of creating a management information system work program to manage the regional economy of Yogyakarta City. How can we develop approaches or strategies to be implemented, such as implementing OPD management, monitoring OPD work programs, summarizing work programs, demonstrating transparency of activities to the public, restricting access rights to information published by the economic sector, and facilitating OPDs in submitting work programs. Who will be involved in the implementation of the proposed solution, which consists of a system structure divided into four main modules: the administration module, the agenda module, the service module, and the program/activity module. The administration module covers the management of planning documents such as decrees, SOPs, Anjab, Renja, DPA, and SKP. This module is very important because previously these documents were managed separately by each work unit, which often led to duplication, difficulty in searching, and delays in the verification process. With integration through the administration module, all planning documents can be managed centrally, well documented, and easily accessible according to user access rights. The agenda module is designed to integrate the schedules of activities across Regional Apparatus Organizations (OPD), whereas previously agenda data and inter-agency coordination meetings were still recorded manually through Google Sheets or separate documents, often resulting in duplication, delays in updates, and difficulties in monitoring the implementation of activities. The agenda module is important because it can overcome the problem of data fragmentation and ensure that all stakeholders have access to the same information in real time. The service module includes features for program activities, public announcements, reports, and inventory. This module is important because

previously, information related to program announcements and reports was scattered across various manual documents, making it difficult for the public and stakeholders to access quickly. With integration through the service module, all information can be delivered in a centralized and transparent manner, thereby increasing accessibility and accountability. Finally, the program/activity module serves as a center for managing the work program cycle, from submission and approval to monitoring and evaluation. This module is crucial because the previous mechanism still relied on manual documents and separate coordination meetings, resulting in delays in the evaluation process and difficulty in tracking program progress data. The program/activity module allows each stage to be systematically documented and accessed across agencies, as shown in Figure 4.

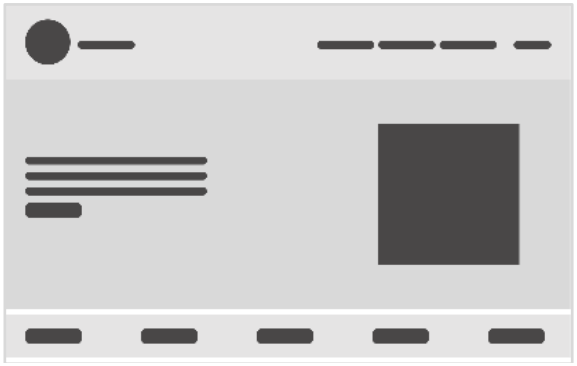


Source: (Research Results, 2025)
Figure 4. Work Program Submission Process Flow Design.

This structure is designed to meet all user needs and ensure feature integration within a single information system ecosystem. The hope is that this system will improve the effectiveness of program implementation between agencies in a structured and documented manner.

Prototype

At the prototype stage, a wireframe was created to represent the system interface structure. The design includes several main components: the landing page display (Figure 5), agency information (Figure 6), services (Figure 7), activity gallery and testimonials (Figure 8), and the footer (Figure 9). These wireframe visualizations collectively illustrate the overall interface design of the proposed system.



Source: (Research Results, 2025)
Figure 5. Wireframe Landing Page

Source: (Research Results, 2025)
Figure 6. Wireframe about Me and Information

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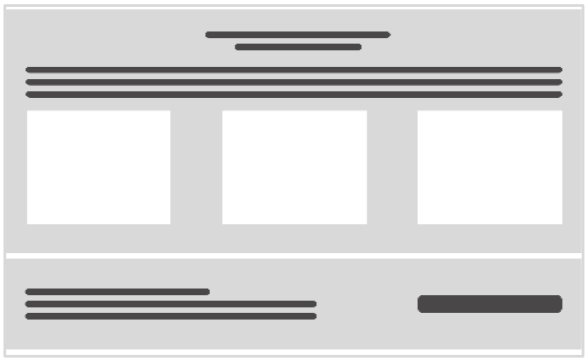
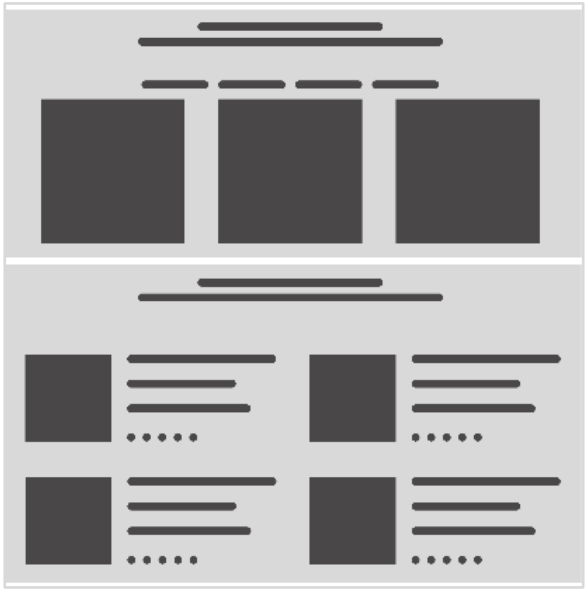


Source: (Research Results, 2025)
Figure 7. Wireframe Service



Source: (Research Results, 2025)
Figure 8. Wireframe Gallery and Testimoni

Source: (Research Results, 2025)
Figure 9. Wireframe Footer

Testing Plan

Testing will be conducted on the product among the public or users. The results of the testing will be used to make changes and improvements in order to gain a deeper understanding of the product from its users.

1. Security Testing Plan

a. Blackbox Testing

Blackbox testing is conducted based on specifications provided by the client, where the tester does not have access to or knowledge of the source code of the system being tested (Praniffa et al., 2023). Testing will focus on key modules, including user login, program input and validation, document uploads, agenda management, and monitoring and evaluation processes. Each scenario will be tested with different combinations of inputs from each type of user (admin, OPD, TPID, TPAKD, TP2DD, and the general public).

b. Whitebox Testing

Meanwhile, in white box testing, testers have an understanding of the code structure and use appropriate parameters to evaluate the logic flow and overall functionality of the system (Praniffa et al., 2023). The white box testing plan will focus on unit testing each module, such as user input validation, program data processing, and other internal functions. Each logic path will be tested using prepared parameters to identify logical errors, bugs, or potential vulnerabilities in the system.

c. Security Testing

Security testing is designed to identify potential vulnerabilities and ensure the system is capable of withstanding attacks. Its objectives include verifying compliance with security standards, testing the effectiveness of implemented controls, and ensuring the system remains protected from cyber-attacks. The scope of testing covers applications, infrastructure, databases, and services connected to the system. The methods planned for security testing include penetration testing, automated security scanning, vulnerability analysis, information leakage testing, and DoS (Denial of Service) testing. These tests will be conducted in an environment that reflects real-world conditions, including software and hardware configurations. This process is planned to be carried out in stages, with test results reported along with recommendations for improvements that will be followed up before the system is fully implemented.

2. System Implementation Results

The information system that has been designed is then implemented with a responsive interface display.

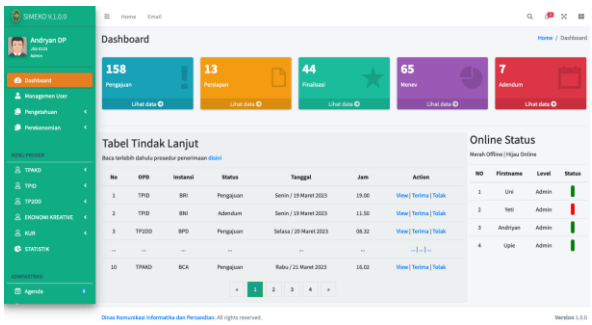
a. Landing Page

The landing page of the SIMEKO information system provides access to key features such as programs and activities, reports, inventory, and other public information as shown in Figure 8. The About Us menu page displays content in the form of information on the duties and responsibilities of the Yogyakarta City Economy Division. The services page is divided into three sections: JSS services, PPID services, and complaint services. In the footer section, there is a complaint service, allowing users to submit complaints by clicking the complaint form button, which will automatically download the form. The gallery page features photos related to activities conducted by the Economic Affairs Department of Yogyakarta, along with a filter control to narrow down images by category. The testimonial page displays reviews and user experiences regarding the Economic Affairs and Creative Economy sectors of Yogyakarta City. The footer page is located at the bottom of the page and serves as an area to display contact information, navigation links, or other important elements.

b. Admin Dashboard

The admin dashboard is designed to provide a summary of information and extensive control to administrators or users with certain access rights. Administrators have access to all features such as user management and other basic settings. This dashboard integrates several functional components designed to ensure effective system manage.

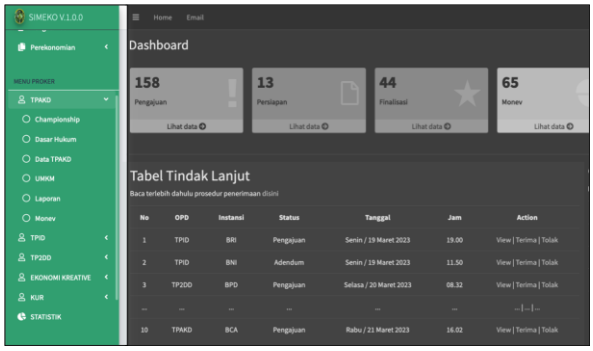
The overall interface of the admin dashboard is shown in Figure 10, presenting key information such as submissions, revisions, finalized documents, addenda, follow-up procedures, and user online status.



Source: (Research Results, 2025)

Figure 10. Admin Dashboard Display

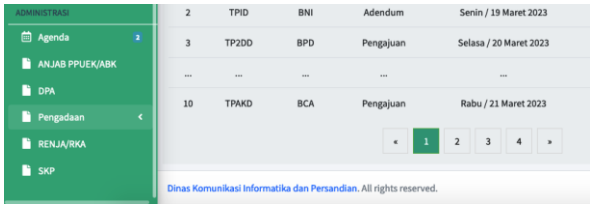
The work program menu, as illustrated in Figure 11, provides structured access to program categories and their respective functions, supporting efficient management of planned activities.



Source: (Research Results, 2025)

Figure 11. Work Program Menu Display

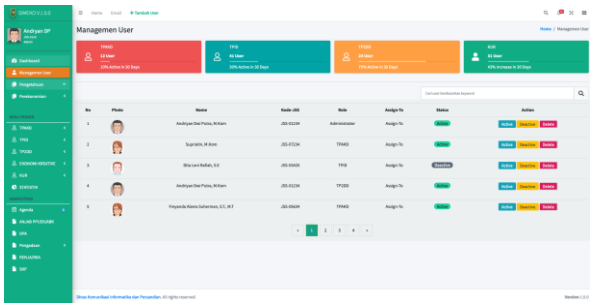
The administration menu, as shown in Figure 12, contains various administrative forms and functions that support operational processes such as agenda, procurement, and planning.



Source: (Research Results, 2025)

Figure 12. Administration Menu Display

The user management menu, illustrated in Figure 13, enables administrators to oversee user accounts, including roles, access rights, and account-related actions.



Source: (Research Results, 2025)

Figure 13. User Management Menu Display

The action notification menu, as presented in Figure 14, provides information about recent activities and system changes, allowing administrators to monitor updates in real time.

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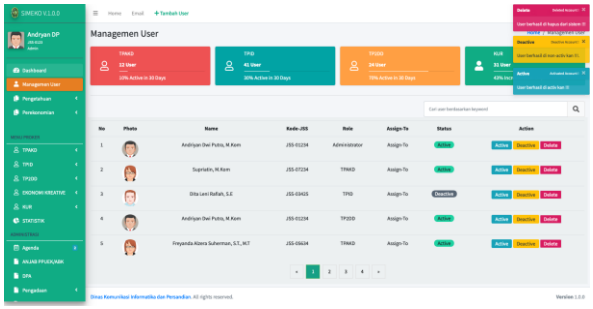
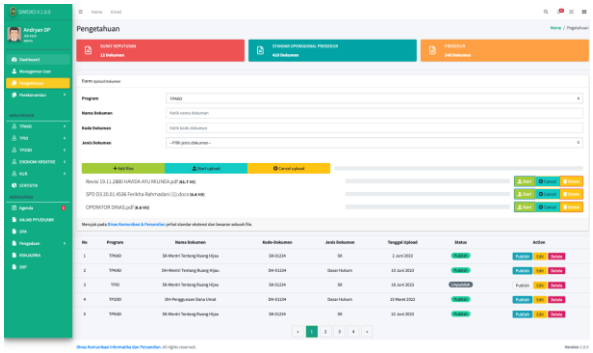


Source: (Research Results, 2025)
Figure 14. Action Notification Menu Display

The knowledge menu, shown in Figure 15, provides structured access to a repository of documents, including search, upload, and publishing features, thereby supporting systematic document management.



Source: (Research Results, 2025)
Figure 15. Document Upload Menu Display

CONCLUSION

This study successfully identified the information system requirements regarding the prices and availability of basic commodities in the city of Yogyakarta using the *Design Thinking* approach. The requirements analysis resulted in a prototype design with four main modules (administration, agenda, services, and programs/activities) that are designed to be integrated into a single ecosystem.

However, this study is still limited to the requirements analysis and prototype design stages. Full system implementation, functional, performance, and security testing, as well as a broader evaluation of stakeholder involvement, have not yet been carried out. Other limitations include the lack of direct validation from end users, the absence of performance and usability benchmarks, and the lack of empirical test data.

Further research needs to develop the system to the stage of actual implementation, involving stakeholders directly in trials, and adding evaluations based on performance metrics and user satisfaction.

The main contribution of this research is to provide an initial framework while enriching the study of the application of *Design Thinking* in the public sector, as well as serving as a practical reference for local governments in supporting transparency, inter-agency coordination, and control of basic commodity prices. Further studies should test the system through field trials to assess user adoption.

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