

Implementing Web-Based SIPD Feature Development For Public Response Using A Design Thinking Approach

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ABSTRACT: The development of information technology in government governance encourages local institutions to provide transparent, accountable, and accessible services. The Regional Government Information System (SIPD) has been used to support administrative processes and regional government information management; however, it still has limitations in facilitating two-way interaction between the government and the public. This study aims to design a web-based public response feature for SIPD at BPKAD Kota Semarang using the Design Thinking method. The method consists of five stages: Empathize, Define, Ideate, Prototype, and Test. The Empathize stage was conducted through observation, interviews, and empathy map development. The Define stage formulated problems through pain points and How Might We questions, while the Ideate stage produced requirement solutions, user flows, and wireframes. The Prototype stage was carried out using Figma to design the Public Response Menu, Public Response Form, Response Status/History Check, and Public Response Admin Dashboard. The Test stage was conducted using the System Usability Scale (SUS) involving 12 respondents. The results showed that the prototype obtained an average SUS score of 90, which falls into the Acceptable category, Grade A, and is classified as Excellent, approaching Best Imaginable. These results indicate that the prototype has a very good level of usability, is easy to understand, and can be accepted by users. This design can serve as an initial reference for developing interactive features on the BPKAD Kota Semarang website to support public participation, transparency, and more structured response management.

KEYWORDS: SIPD, public response, website, Design Thinking, prototype, System Usability Scale

I. INTRODUCTION

The rapid advancement of information technology has driven the transformation of governance toward systems that are more transparent, accountable, and efficient [1]. Local governments are compelled to utilize digital technology to support data management, information dissemination, and more rapid, integrated public services [2]. One prominent implementation of this is the Regional Government Information System (Sistem Informasi Pemerintahan Daerah or SIPD), which is employed to support integrated planning, budgeting, execution, and regional financial reporting processes [1], [3].

SIPD plays a pivotal role in enhancing administrative effectiveness through the provision of highly accurate information, the acceleration of administrative workflows, and the rigorous monitoring of regional budget and asset management [4]. Furthermore, data integration within SIPD enhances the quality of financial reporting and strengthens good governance practices [5]. At the Regional Financial and Asset Management Agency (BPKAD) of Semarang City, SIPD has effectively supported regional financial administration and information management; however,

limitations persist regarding the interactive dynamics between the government and the public.

Currently, there is no built-in feature that enables citizens to submit feedback, suggestions, or inputs directly through the website. The information presented remains strictly unidirectional, meaning public participation in providing constructive feedback has not been optimally facilitated. In fact, citizen participation constitutes a fundamental element in realizing open and responsive governance [6].

A government website should function not only as an information dissemination medium but also as a platform for two-way communication between institutions and the public. Therefore, developing a website-based public response feature within SIPD is imperative so that citizens can submit structured inputs, while the agency can manage and follow up on them in a highly documented manner [7].

The development of this feature must carefully consider user needs and user experience (UX) to ensure the resulting system is intuitive and well-aligned with the requirements of both the public and the institution [8]. One viable framework for this purpose is Design Thinking—a human-centered design methodology executed through five iterative phases:

Empathize, Define, Ideate, Prototype, and Test [9], [10]. This approach ensures a systematic design process rooted in genuine user needs.

Prior research demonstrates that Design Thinking is highly effective in designing public service systems and web-based applications, as it consistently generates solutions tailored closely to user demands [7], [11]. Additionally, usability evaluations leveraging the System Usability Scale (SUS) are widely adopted to measure the ease of use and user acceptance of a system [12].

Motivated by these challenges, this study aims to design a web-based public response feature expansion for SIPD at BPKAD Semarang City utilizing the Design Thinking methodology. The development focuses specifically on integrating a Public Response Menu, a Public Response Form, a Status Check/Response History tracking tool, and an Admin Public Response Dashboard into the existing website. The prototype is designed using Figma [13] and evaluated via SUS to measure the usability score of the generated interface. This research is expected to foster enhanced public participation, increase information transparency, and establish a more structured response management framework within regional governance information systems, while serving as a baseline reference for applying Design Thinking to web-based public service UI/UX design.

II. METHOD

This study employs the Design Thinking methodology to design a prototype for the web-based SIPD public response feature at BPKAD Semarang City. This method was selected due to its human-centered orientation, which addresses user needs through five distinct phases: Empathize, Define, Ideate, Prototype, and Test [9], [10].

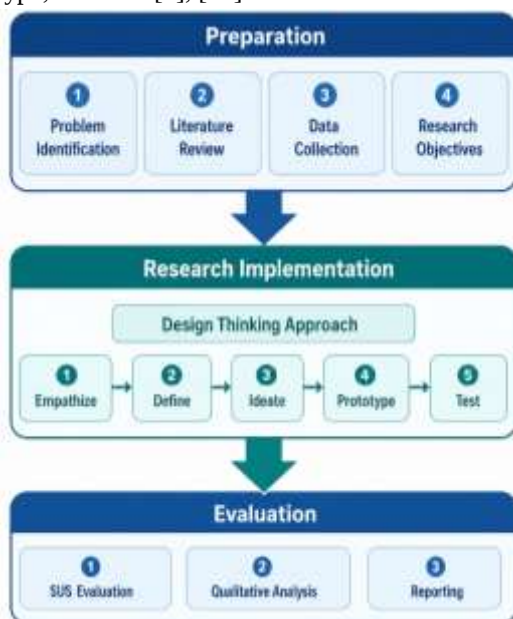


Figure 1. Research Framework

The study initiates with problem identification and a literature review, followed by the design process utilizing the Design

Thinking framework, and concludes with a usability evaluation leveraging the System Usability Scale (SUS).



Figure 2 Design Thinking

The Design Thinking framework implemented in this study comprises five sequential phases: Empathize, Define, Ideate, Prototype, and Test. Each stage is executed systematically to understand user needs, define problem statements, generate solution ideas, develop prototypes, and evaluate the final designs.

1. Empathize

The Empathize phase is conducted through observations and semi-structured interviews to gain a deep understanding of user needs, constraints, and expectations regarding the public response feature [10]. The qualitative data gathered is subsequently analyzed using an empathy map across four quadrants—Says, Thinks, Does, and Feels—to accurately capture the psychological and behavioral perspectives of both the general public and BPKAD personnel [14].

2. Define

The Define phase analyzes the outputs of the observations, interviews, and empathy mapping to isolate user pain points and formulate the core problem statements [15]. These synthesized challenges are then framed into actionable How Might We (HMW) questions, which serve as the foundation for driving the solution development process.

3. Ideate

The Ideate phase generates alternative design solutions, outlining specific feature requirements, user flows, and wireframes derived from the established problem statements [10]. The conceptualized features include a Public Response Menu, a Public Response Form, a Status Check/Response History tracking interface, and an Admin Public Response Dashboard.

4. Prototype

The Prototype phase utilizes Figma to transform low-fidelity wireframes into interactive, high-fidelity user interface prototypes [13]. The prototype functions as an early-stage representation of the solution, enabling the comprehensive evaluation of navigation flows, visual layouts, and user interactions prior to actual development and system implementation [12]. The resulting prototype fully encompasses the four core web pages designed.

5. Test

The Test phase is executed by evaluating the interactive prototype with 12 selected respondents to assess the suitability, ease of use, and overall effectiveness of the design

interface [15]. This usability evaluation leverages the System Usability Scale (SUS), a standardized instrument consisting of 10 items measured on a 5-point Likert scale [12]. The final SUS scores quantify the design's overall usability, while qualitative feedback from the respondents serves as the empirical basis for iterative design refinements.

III.RESULTS AND DISCUSSIONS

A. Empathize and Define Stage: Explore User Problems

The Empathize phase was conducted to understand the distinct needs and constraints of users regarding the development of the web-based SIPD public response feature at BPKAD Semarang City. Primary data was gathered through observations and semi-structured interviews with 12 purposively selected respondents. This sample comprised the Head of BPKAD, website administrators, relevant internal staff, and members of the general public representing prospective end-users of the feature.

The empirical findings from the observations and interviews indicated that the public requires an official, user-friendly platform to submit inputs, suggestions, and grievances, alongside a tracking mechanism to ensure that their submissions have been received and can be monitored transparently. Conversely, BPKAD necessitates a highly structured system to accept, manage, and officially follow up on these public inputs.

To systematically process the findings from the Empathize phase, the qualitative data was analyzed using empathy maps categorized into two distinct user groups: the general public and BPKAD staff/administrators. This categorization allowed for a deep dive into what users say, think, do, and feel. The resulting empathy maps are illustrated in Figure 3 and Figure 4.



Figure 3. Empathy Map The public / Potential Users



Figure 4. Empathy Map Staff / Administrators

Based on the insights derived from the empathy mapping, the Define phase was executed to formulate the core problem statements. The critical issues identified include the complete absence of a dedicated public response menu, restricted two-way communication channels, the unavailability of unique tracking codes for submissions, the lack of a real-time status tracking feature, and the absence of an administrative dashboard dedicated to managing public responses.

These identified challenges were subsequently synthesized into user pain points and actionable How Might We (HMW) questions, serving as the foundational framework for driving solution development during the Ideate phase.



Figure 5. Pain Points



Figure 6. How Might We

B. Ideate Stage: Designing Initial Solutions

The Ideate phase was executed once the core user problem statements were formulated through pain points and How Might We questions. At this stage, the empirical findings from the Empathize and Define phases were translated into concrete design solutions. The primary focus of this phase was to structure features capable of addressing the needs of both the general public (as users of the response mechanism) and BPKAD Semarang City (as the administrators managing the feedback).

Based on the ideation process, the conceptualized solutions focus not only on providing a medium for public submission but also on addressing critical requirements for transparency, follow-up tracking, and internal response workflow management. To ensure that every identified user pain point receives a corresponding and appropriate solution, a mapping matrix was constructed to align the user needs discovered in the previous phase with the proposed feature sets. This comprehensive mapping matrix is presented in Table 1.

Table 1. Public Response Feature Solution Design

User Problems	Proposed Feature Solutions
There is no official medium for submitting public responses through the website.	Public Response Menu
Communication between the public and the institution is still one-way.	Public Response Form
Users need confirmation that their response has been received by the system.	Notification and response code
Users have difficulty monitoring the follow-up status of their responses.	Response Status/History Check
Public responses are not yet managed in a centralized system.	Public Response Admin Dashboard
Administrators need to classify, record, and follow up responses efficiently.	Filter, category, status, and response management features on the admin dashboard
The feature must remain simple and easy to understand for users.	Simple page structure, concise form, and clear navigation flow

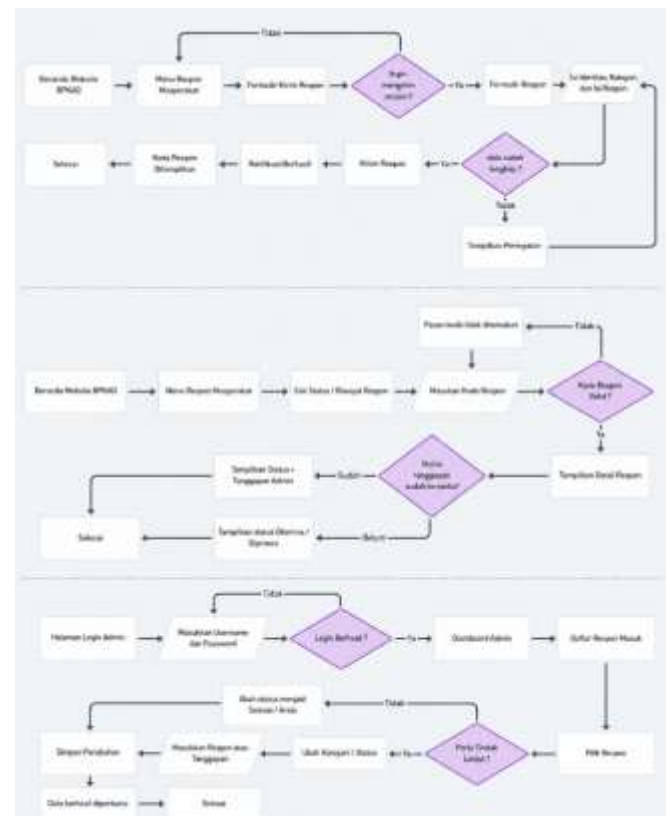


Figure 7. User Flow of Public Response Feature

Based on the conceptualized feature solutions, the core functionalities developed in this study are outlined as follows:

- **Public Response Menu:** Serves as the primary access gateway for users to submit feedback, suggestions, or inputs through the official BPKAD Semarang City website.
- **Public Response Form:** Enables users to submit their feedback by inputting their identity, contact details, response category, and message body, with the option to upload supporting file attachments if required.
- **Status Check/Response History:** Allows users to retrieve their previously submitted feedback and monitor its verification progress or follow-up status using a unique tracking code generated by the system.
- **Admin Public Response Dashboard:** Empowers system administrators to view incoming feedback, perform data search and filtering operations, review detailed submissions, update categories and statuses, and log official institutional responses.
- **Notification and Confirmation:** Provides immediate user feedback upon successful submission via a system success message and the generation of a tracking code, ensuring the user possesses verifiable proof that their entry has been recorded.
- **Following the formulation of these core features,** user flows were mapped to illustrate the behavioral interactions between the users and the system. The user flows are categorized into three primary paths: the feedback submission flow, the status/history checking

flow, and the administrative response management flow.

The feedback submission flow delineates the sequence beginning with the user accessing the BPKAD website, selecting the Public Response menu, completing the form fields, undergoing data validation, submitting the entry, and ultimately receiving a tracking code as proof of submission. The status/history checking flow describes the mechanism where the user inputs their unique tracking code to view the submission details, follow-up progress, and administrative remarks. Meanwhile, the administrative management flow illustrates the internal back-end process, starting from administrator authentication, viewing the incoming feedback registry, selecting specific entries, updating categories and statuses, appending official remarks, and saving the structural changes to the database. These three distinct flows establish the empirical blueprint for constructing the low-fidelity wireframes and the final user interface visualizations during the prototyping phase.



Figure 8. Wireframe Public Response

C. Prototype Stage: Building an Application Prototype

Once the feature solutions and user flows were formulated, the subsequent phase involved developing the interface designs into a high-fidelity prototype. The wireframes established in the previous stage served as the baseline to determine page structures, layouts, and interaction flows. Based on these wireframes, the design was then evolved into a prototype that provides a more tangible visualization of the user interface and feature functionalities.

The prototype was developed using Figma to visualize the public response features for the BPKAD Semarang City website. This design is not intended to build a completely new website, but rather to function as an interactive feature expansion integrated into the pre-existing official website. Consequently, the prototype design strictly maintains the established visual identity and navigation structure of the official BPKAD Semarang City website, ensuring that the newly introduced features blend seamlessly with the active operational system.



Figure 9. Public Response Menu

The initial interface layer is the Public Response Menu. In this layout, the Public Response menu is positioned within the website's main navigation bar, offering two distinct submenus: The Response Form and the Status Check/Response History tracking tool. This menu functions as the primary entry point for users to access the submission services or track previously sent feedback.

The second interface layer is the Public Response Form. This page enables users to submit inputs, suggestions, or grievances by filling out their full name, contact information or email address, response category, message body, and supporting attachments if necessary. The form is designed with a clean and structured layout to ensure that the response submission process can be executed with maximum ease and clarity.

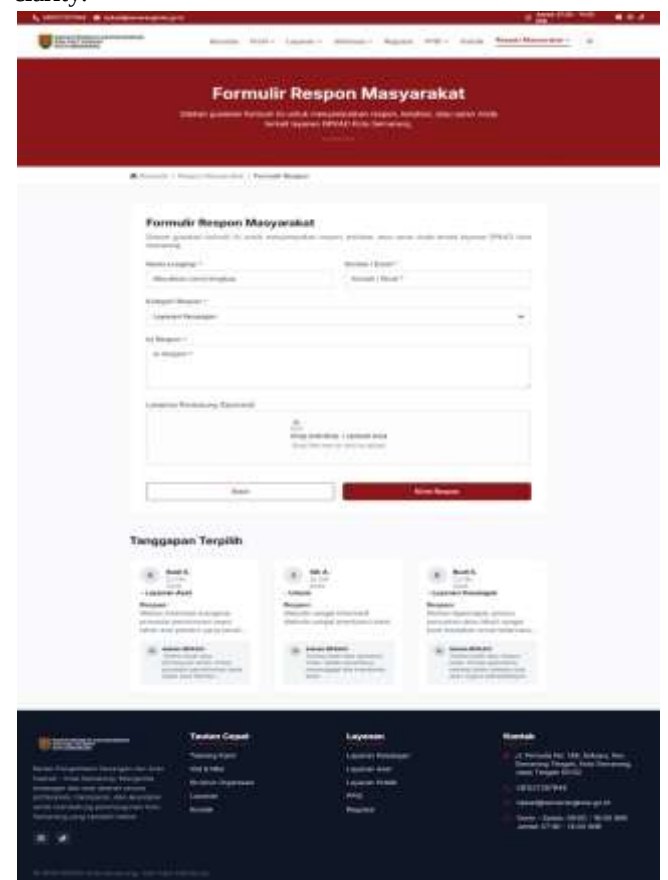


Figure 10. Public Response Form

The third interface layer is the Status Check/Response History page. This feature enables users to input their unique tracking code to view submission details, submission dates, categories, reporter identities, message bodies, processing statuses, and historical follow-up logs. This page is specifically designed to promote transparency, allowing users to closely monitor the ongoing progress of their submitted feedback.

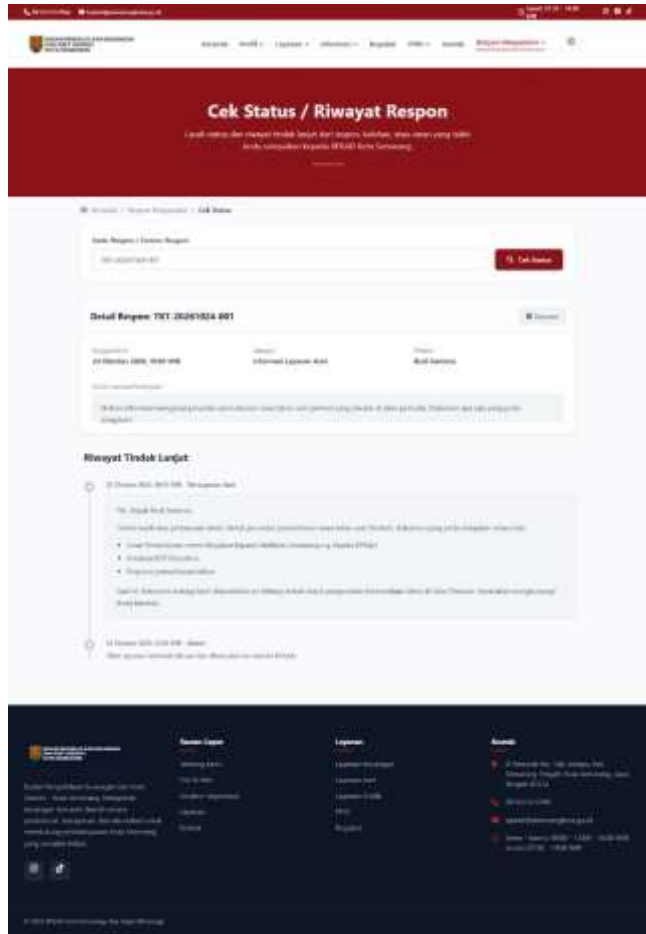


Figure 11. Response Status/History Check

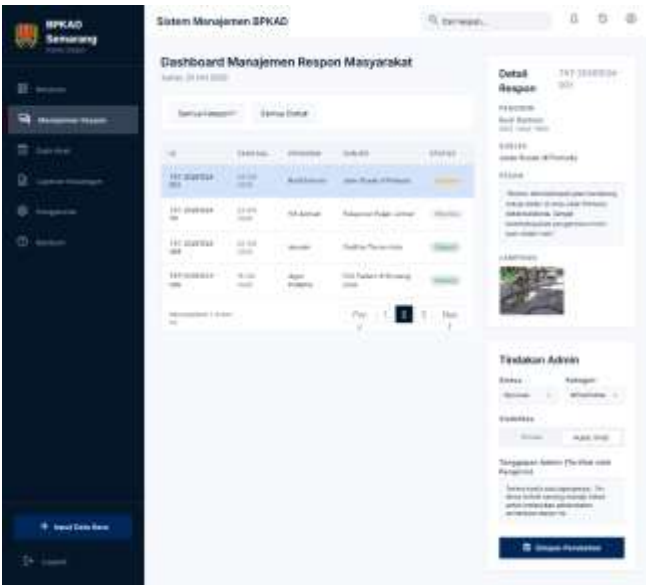


Figure 12. Public Response Admin Dashboard

The fourth interface layer is the Admin Public Response Dashboard. This back-end interface is specifically engineered for BPKAD internal administrators to streamline the data management workflow of incoming public feedback. The dashboard incorporates an analytical overview panel highlighting total entries, processing queues, resolved cases, and rejected submissions. Furthermore, it features structured data filtering by date range or department category, detailed record inspection views, and an administrative panel to log official institutional resolutions, update progress tracking statuses, and save data changes systematically into the repository.

Overall, this prototype visualizes the solutions formulated during the Ideate phase into a more concrete user interface. These four primary interface layers display the complete public response service workflow, spanning from the citizen-facing user experience to the back-end administrative management system. This high-fidelity prototype subsequently serves as the foundational artifact for the usability testing process in the next phase.

D. Test Phase: Prototype Trial and Evaluation

The Test phase was conducted to evaluate the prototype of the web-based SIPD public response feature at BPKAD Semarang City. The evaluation was carried out by presenting the interactive prototype to 12 selected respondents, consisting of internal BPKAD Semarang City officials and citizens representing prospective end-users. Respondents were instructed to observe the user interface layouts, comprehend the navigation flows, and evaluate the overall ease of use, clarity, and suitability of the designed features.

The usability evaluation was quantitatively measured using the System Usability Scale (SUS). The SUS instrument consists of 10 items, alternating between positive statements on odd numbers and negative statements on even numbers. Respondents provided their assessments using a 5-point Likert scale, ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral/Undecided), 4 (Agree), to 5 (Strongly Agree) [12]. These evaluations were recorded based on the respondents' direct experiences and impressions after interacting with the prototype, which encompasses the Public Response Menu, Public Response Form, Status Check/Response History tracking interface, and the Admin Public Response Dashboard.

Table 2. Raw Score

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q1 0
R1	4	3	4	3	4	3	4	3	4	3
R2	4	4	4	3	4	3	4	3	4	3
R3	4	3	4	3	4	4	4	3	4	3
R4	4	4	4	3	4	3	4	4	4	3
R5	4	3	4	3	4	3	4	4	4	3
R6	4	4	4	3	4	4	4	3	4	3
R7	3	4	4	3	4	3	4	3	4	3

R8	4	3	4	4	4	3	4	3	4	3
R9	4	4	4	3	4	3	4	3	4	4
R10	4	3	4	3	4	3	4	3	4	3
R11	4	4	4	4	4	3	4	3	4	3
R12	4	3	4	3	4	4	4	3	4	2

Once the raw SUS scores were obtained, the data was converted in compliance with the standard SUS calculation protocols. For the odd-numbered items, the score contribution is determined by subtracting 1 from the respondent's rating. Conversely, for the even-numbered items, the score contribution is calculated by subtracting the respondent's rating from 5.

The converted scores across all 10 items were subsequently summed to determine the total converted score for each respondent, with a maximum possible value of 40. This total converted score was then multiplied by 2.5 to yield the final individualized SUS score for each respondent. Lastly, the ultimate cumulative SUS score was derived by calculating the mean average score across all 12 respondents, as presented in Table 3.

Table 3. Final SUS Score Results

Respondent	Total Converted Score (max 40)	SUS Score (×2.5)
R1	35	87.5
R2	36	90.0
R3	36	90.0
R4	37	92.5
R5	36	90.0
R6	37	92.5
R7	35	87.5
R8	36	90.0
R9	37	92.5
R10	35	87.5
R11	37	92.5
R12	35	87.5
Average	36	90.0

Based on the SUS calculation results, the prototype achieved a mean average score of 90. This value indicates that the web-based public response feature prototype exhibits an excellent level of usability. To interpret this score systematically, this study utilizes standard SUS evaluation frameworks consisting of Acceptability Ranges, the Grade Scale, and Adjective Ratings.

The Acceptability Range is employed to determine the level of user acceptance toward the system, the Grade Scale is used to categorize the usability quality into a specific letter grade, and the Adjective Rating serves to qualitatively describe the users' subjective impressions of the system.

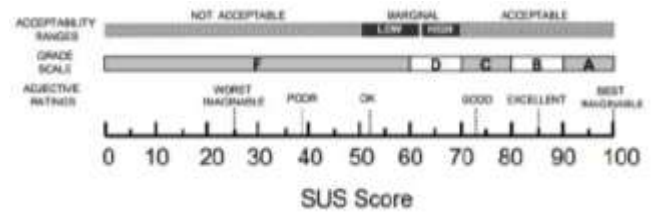


Figure 13. SUS Indicator

Based on the SUS evaluation metrics, a score of 90 is categorized as Acceptable within the Acceptability Range. On the Grade Scale, this score corresponds to a Grade A, while on the Adjective Rating framework, it falls under the Excellent category and closely approaches Best Imaginable. These quantitative indices demonstrate that the prototype is perceived as intuitive, highly usable, and well-received by the target users. Furthermore, this score sits substantially above the global average SUS benchmark of 68, thereby confirming that the prototype successfully meets rigorous usability standards and exhibits strong viability for further technological development.

Beyond the quantitative SUS metrics, this study also gathered qualitative feedback to acquire a deeper contextual understanding of the prototype's strengths and design gaps. The qualitative data analysis is structurally divided into positive findings and optimization recommendations.

1. Positive Qualitative Findings

- High Accessibility of the Public Response Feature:** Respondents observed that the Public Response Menu is highly discoverable due to its placement within the primary navigation bar of the official BPKAD Semarang City website. This strategic positioning reinforces user recognition of the feature as an official component of the institutional platform.
- Clean and Structured Response Form:** The Public Response Form was evaluated as highly intuitive, attributed to its logical, sequential field arrangement—spanning full name, contact information/email, response category, message body, and supporting attachments. This structured workflow maximizes efficiency during the submission process.
- Transparency via Response Status Tracking:** The Response Status/History Check module was considered highly beneficial, as it empowers users to monitor the live progress of their submitted feedback via unique tracking codes. This feature provides administrative assurance that submissions are systematically recorded and processed.
- Streamlined Back-End Management for Administrators:** The Public Response Admin Dashboard was noted for its utility in providing an organized interface equipped with an incoming feedback registry, search and filtering mechanisms, detailed records views, status modifiers, and resolution logging fields. These components assist administrators in executing a highly structured data management workflow.

- e) Cohesiveness with Government Web Standards: Respondents validated that the prototype strictly adheres to the visual identity of the BPKAD Semarang City website. The formal and minimalist design architecture ensures that the newly integrated feature blends seamlessly into the legacy platform rather than appearing as an isolated, disparate system.

2. Negative Qualitative Findings and Improvement Recommendations

- a) Visibility of the Public Response Menu: Several respondents suggested optimizing the visual prominence of the Public Response Menu, particularly for first-time visitors. Consequently, future iterations should incorporate visual anchors such as distinct active state colors, functional icons, or highlight effects to enhance menu discoverability.
- b) Descriptive Information within Form Fields: The feedback categories and file upload modules require clearer contextual guidance. Integrating microcopy, brief descriptions, illustrative category examples, and explicit file format or size constraints would mitigate input errors and guide users to complete the form accurately.
- c) Post-Submission Confirmation Mechanisms: Users require an explicit confirmation event following a successful form submission. To address this, the system should deploy a dedicated confirmation modal or a success page that explicitly features a success message alongside the generated unique tracking code for status retrieval.
- d) Tracking Code Recovery Protocols: Users may experience friction if they misplace or forget their unique tracking codes. To alleviate this vulnerability, the system infrastructure should incorporate a recovery protocol enabling users to request the tracking code to be resent via their verified email or mobile contact numbers.
- e) Granular Workflow Status Indicators: The tracking logs can be enhanced by introducing discrete operational stages, such as Received, In Process, Followed Up, and Resolved. Each status transition should ideally log a timestamp and a brief administrative note to give users a transparent overview of the institutional workflow.
- f) Advanced Filtering Configurations on the Admin Dashboard: The back-end dashboard can be further optimized by integrating multidimensional filtering matrices based on exact submission dates, priority matrix tiers, system categories, and resolution stages. This feature expansion will enable administrators to manage higher volumes of data with optimal operational efficiency.

Conclusion of the Evaluation

In conclusion, the empirical validation results demonstrate that the proposed public response feature prototype exhibits an exceptional degree of usability. The quantitative SUS

score of 90 is robustly backed by qualitative data confirming that the prototype is highly accessible, easy to comprehend, and well-aligned with the practical needs of both citizens and institutional administrators. While specific areas for iterative improvement were identified, the required refinements remain minor and do not undermine the core architecture or structural functionalities of the proposed design. Consequently, this conceptual framework serves as a reliable foundational blueprint for deploying an interactive, transparent, and structurally integrated public response system within the BPKAD Semarang City website.

IV. CONCLUSIONS

This study successfully delivers a high-fidelity user interface prototype for the web-based SIPD public response feature at BPKAD Semarang City, developed via the Design Thinking methodology. By systematically executing the Empathize, Define, Ideate, Prototype, and Test phases, this research identified a critical operational demand for built-in features that foster structured, two-way communication between the general public and government institutions for submitting and managing public feedback, suggestions, and grievances.

The conceptualized design solutions encompass a Public Response Menu, Public Response Form, Response Status/History Check, Public Response Admin Dashboard, and a Notification and Confirmation mechanism powered by unique tracking codes. The final prototype was visualized across four primary core interfaces the response menu, submission form, status/history tracking layout, and administrative back-end dashboard functioning as an integrated interactive feature expansion for the official pre-existing BPKAD Semarang City website.

The quantitative usability evaluation leveraging the System Usability Scale (SUS) with 12 selected respondents yielded an outstanding mean average score of 90. Within the standardized SUS interpretation matrices, this performance places the design comfortably within the Acceptable range, achieving a Grade A and an Excellent rating. These indices empirically validate that the prototype exhibits an exceptional level of usability and is highly intuitive for end-users.

Furthermore, qualitative findings substantiate that the engineered features are highly user-friendly, actively promote institutional transparency through real-time tracking logs, and streamline administrative workflows into a highly structured data management architecture. Nonetheless, minor areas for iterative optimization persist, including enhancing menu discoverability, embedding microcopy within form fields, refining post-submission confirmation modals, establishing tracking code recovery protocols, formatting granular workflow status indicators, and expanding multidimensional filtering configurations on the admin dashboard.

In conclusion, this interactive prototype serves as a reliable, empirical blueprint for future functional expansion on the BPKAD Semarang City website. For future work, it is

highly recommended to transition this prototype into actual software implementation and execute extensive user testing with a significantly larger and more diverse demographic sample size to further validate system acceptance.

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