International Journal Software Engineering and Computer Science (IJSECS)
5 (2), 2025, 853-860
Published Online August 2025 in IJSECS (http://www.journal.lembagakita.org/index.php/ijsecs)
P-ISSN: 2776-4869, E-ISSN: 2776-3242. DOI: https://doi.org/10.35870/ijsecs.v5i2.4745.

RESEARCH ARTICLE Open Access

Redesign of The Digital Population Identity Application (DPIA) Interface Using Design Thinking to Improve User Experience

Muhammad Zaki Robbi Akhsin *
Department of Informatics, Faculty of Industrial Technology, Universitas Islam Indonesia, Sleman Regency, Special Region of Yogyakarta Province, Indonesia.
Corresponding Email: muhammad.akhsin@students.uii.ac.id.

Kurniawan D. Irianto
Department of Informatics, Faculty of Industrial Technology, Universitas Islam Indonesia, Sleman Regency, Special Region of Yogyakarta Province, Indonesia.
Email: k.d.irianto@uii.ac.id.

Received: July 1, 2025; Accepted: July 25, 2025; Published: August 1, 2025.

Abstract: The objective of the study is to enhance user experience within the Digital Population Identity Application (DPIA), known as Identitas Kependudukan Digital (IKD), through interface redesign for public administration services in Indonesia. The research employs a user-centered design methodology structured around five sequential phases: user experience analysis, challenge identification, solution ideation, prototype development, and evaluation testing. Data collection involves user interviews and direct observation of application usage patterns. The application prototype underwent redesign based on identified challenges and was subsequently evaluated through quantitative survey methods focusing on usability metrics. Post-redesign testing revealed substantial improvements in ease of use, navigation efficiency, and user comfort levels. The study outcomes aim to advance user-friendly public service applications and may serve as a framework for developing additional digital systems requiring direct community-government interaction.

Keywords: User Experience; Interface; Redesign; Digital Population Identity Apps; User-centered Design; Design Thinking; System Usability Scale; User Interface Design.

1. Introduction

Information technology adoption within Indonesia's government sector accelerates public service digitization, creating more efficient, rapid, and accessible services for citizens. Previously manual public services have evolved into online-based systems utilizing digital information platforms [1]. Government transformation involves providing digital services with advantages in processing speed, simplified standards, and reduced costs [2]. The Digital Population Identity Application (DPIA), known as Identitas Kependudukan Digital (IKD), represents an official portal developed by the Directorate General of Dukcapil, Ministry of Home Affairs of Indonesia, designed to digitize population identity documents [3]. Through DPIA, citizens possessing an electronic Indonesian Identity Card (E-KTP) and having activated their accounts can access electronic population documents functioning as digital identification and valid personal data [3].

Several challenges emerged during implementation, affecting perceived user experience within DPIA. According to Antara news data, DPIA users nationwide reached 9,407,945 [4]. However, research published

in the CO-SCIENCE Journal titled "Sentiment Analysis of Digital Population Identity Application Reviews on the Play Store Using the Naive Bayes Method" demonstrated that user reviews were dominated by negative sentiment at 619.62%, while positive sentiment accounted for 381.38% [5]. The study also provided word frequency analysis, revealing that negative terms such as "difficult" and "please" frequently appeared in reviews [5], indicating user dissatisfaction with the application. Furthermore, the Journal of Scientific Studies of Informatics and Computers' article "Sentiment Classification of Digital Population Identity Applications Using Naive Bayes and SVM Algorithms" confirms similar conclusions. Research findings revealed that DPIA performance remains suboptimal, with users continuing to encounter various obstacles [6]. The investigation identified 1049 negative attitudes (approximately 53.46%) and 914 positive sentiments (about 46.54%) toward DPIA [6].

Meanwhile, the Lentera BITEP Journal article "Sentiment Analysis Review of Digital Population Identity Applications Using Support Vector Machine Algorithms" explains that user satisfaction falls below expectations. The study utilized RapidMiner and achieved 82.61% accuracy with 52 positive data points (class precision 7.13%) and 243 negative data points (class recall 82.37%) [7]. Positive evaluations with low precision values prove difficult to distinguish, while negative comments with high recall are readily identified by the algorithm.

Additionally, the Tambusai Education Journal's article "User Experience Analysis in Using DPIA Services at the Padang City Population and Civil Registry Office" identified problems with the Digital Population Identity Application's user experience. Discovered issues include poor system response and navigation interface difficulties [8]. DPIA received numerous one-star reviews, reflected in the 3.7 out of 5 rating achieved on application distribution platforms [9]. More than half of approximately 30,000 reviews were negative, demonstrating that application service quality failed to meet majority user expectations [9]. Furthermore, socialization and adoption processes for DPIA have not proceeded as anticipated, evidenced by incoming review patterns [9].

Based on identified issues, DPIA requires interface restructuring. Redesign becomes necessary to make the program more user-friendly, responsive to user needs, and capable of delivering optimal digital services, which was the primary purpose of development. The redesign process utilizes the Design Thinking method, with the main objective of optimizing user experience. User experience (UX) design plays a crucial role in creating mobile applications that align with user needs and ensure ease of use [10]. The UX design process also considers user interactions when accessing programs to ensure comfort, promote motivation, and provide user satisfaction [10]. Two previous studies demonstrated the effectiveness of the Design Thinking method in enhancing UI/UX. Research on the eClinic website successfully addressed display and navigation concerns, with SEQ test results showing improved ease of use [11]. Meanwhile, research on the Amikom Center E-Learning site successfully resolved content search problems and information structure through user-focused redesign [12]. Both emphasized that using a user-centered approach with the Design Thinking process results in more efficient and appropriate design solutions.

2. Related Work

Indonesia's Digital Population Identity Application (DPIA) has been subject to various implementation studies that reveal both opportunities and challenges in digital government services. Permadi and Rokhman (2023) examined the implementation of digital population identity systems, focusing particularly on personal data security measures [1]. Their research established that effective data protection mechanisms are fundamental to maintaining public trust in government digital platforms. Munthe and Gatiningsih (2024) evaluated DPIA effectiveness in improving population administration services at Karo Regency's Population and Civil Registration Office, finding that while the application offers substantial potential for service enhancement, implementation barriers continue to hinder optimal performance [2]. Bella and Widodo (2024) investigated DPIA implementation in Tambaksari District's public service delivery, revealing both advancement opportunities and persistent obstacles in population service digitization [3]. The innovation diffusion process of DPIA has been analyzed by Prita Veronica Putri Oktaviana *et al.* (2024) in Boyolali Regency, where they identified key factors influencing citizen adoption rates [9]. Their study revealed that socialization strategies and community acceptance patterns significantly affect the success of digital government initiatives. The research demonstrated that understanding local adoption dynamics is crucial for successful digital transformation in public services.

User satisfaction analysis through sentiment mining has consistently revealed concerning patterns in DPIA user experiences. Komarudin and Hilda (2024) applied Naïve Bayes methodology to analyze Play Store reviews, discovering that negative sentiment dominated at 619.62% while positive sentiment reached only 381.38% [5]. Their word frequency analysis showed that terms like "difficult" and "please" appeared frequently in user feedback, indicating widespread frustration with application usability. Nursyamsyi and Hasan (2023) employed both Naïve Bayes and Support Vector Machine algorithms for sentiment classification, confirming suboptimal

application performance with 1049 negative attitudes (53.46%) compared to 914 positive sentiments (46.54%) [6].

Jayanti (2024) utilized Support Vector Machine algorithms achieving 82.61% accuracy in sentiment analysis, with results showing 52 positive data points (7.13% class precision) and 243 negative data points (82.37% class recall) [7]. The study revealed that while negative comments are easily identified by algorithms, positive evaluations with low precision values prove difficult to distinguish, suggesting that genuine positive user experiences are uncommon. Raihan *et al*. (2023) conducted user experience research at Padang City's Population and Civil Registration Office, identifying specific usability problems including poor system response times and navigation interface difficulties [8]. Their qualitative findings provided detailed documentation of user interaction problems that contribute to overall dissatisfaction.

Design Thinking methodology has demonstrated effectiveness across various UI/UX redesign projects, establishing its value in creating user-centered solutions. Hasna *et al*. (2023) implemented Design Thinking for eClinic website redesign, successfully addressing display and navigation concerns through user-focused approaches [11]. Their Single Ease Question (SEQ) test results demonstrated improved usability following the redesign process. Shirvanadi and Idris (2021) applied Design Thinking methods to redesign Amikom Center's E-Learning site UI/UX, successfully resolving content search problems and information structure issues [12]. Their research emphasized that user-centered approaches with Design Thinking processes result in more efficient and appropriate design solutions. Multiple studies have validated Design Thinking effectiveness across different application domains. Wibowo and Setiaji (2020) utilized the methodology for business website design [13], while Aufa and Irianto (2024) applied it for restaurant reservation application development [14]. Putra and Indah (2023) implemented Design Thinking in Giwang Sumsel application development [15], and Alfirahmi *et al*. (2023) used the approach for plastic waste management application creation [16]. These studies consistently demonstrate Design Thinking's versatility and effectiveness in creating user-centered digital solutions across various sectors.

User-centered design principles have been successfully implemented in diverse application development projects. Adiswara and Irianto (2024) designed GoMasjid application UI/UX using Human Centered Design approaches, emphasizing the necessity of understanding user needs and behaviors in creating effective interfaces [10]. Their research demonstrated how user-centered methodologies lead to more intuitive and satisfying user experiences. Ainurohmah and Irianto (2024) applied UI/UX design principles for TELAHOUSE application development, focusing on automatic light and temperature control for elderly users [18]. Their work illustrated the importance of considering specific user demographics and their unique requirements in interface design, particularly for applications serving specialized populations.

Usability evaluation methods have been employed to assess digital application effectiveness through standardized testing approaches. Handayani and Adelin (2019) utilized System Usability Scale (SUS) for interpreting Wibatara system usability testing, providing quantitative measures of user experience quality [17]. Their research established benchmarks for usability evaluation in Indonesian digital applications. Nurlistiani *et al*. (2021) applied SUS methodology for evaluating e-learning usability during the COVID-19 pandemic, demonstrating the importance of usability testing in ensuring effective digital service delivery during critical periods [19]. Their findings emphasized how usability directly impacts user adoption and satisfaction in government and educational digital services. Current research has identified significant usability and user satisfaction issues with DPIA through sentiment analysis and user experience studies, yet limited research has focused on systematic interface redesign solutions. Previous studies have primarily concentrated on problem identification rather than solution development. While Design Thinking methodology has proven effective in various UI/UX redesign situations, its application to government digital identity systems, particularly DPIA, remains unexplored. The present study addresses this gap by applying Design Thinking methodology specifically to DPIA interface redesign, providing a systematic approach to improving user experience based on identified usability issues.

3. Research Method

This study employs a qualitative approach and the Design Thinking method. The goal of this method is to revamp the Digital Population Identity Application (DPIA) interface based on user requirements and experience. This trial ran from October to December 2024. Data gathering took place both in person and online, utilizing the online meeting media. The Figma program was used to design the prototype, and testing was done with a usability level measurement tool called the System Usability Scale. The research subjects were 14 active users of the application, with six persons involved from the start as main participants and eight additional respondents added during the testing phase. The subjects were chosen purposively in order to collect data relevant to the application use.

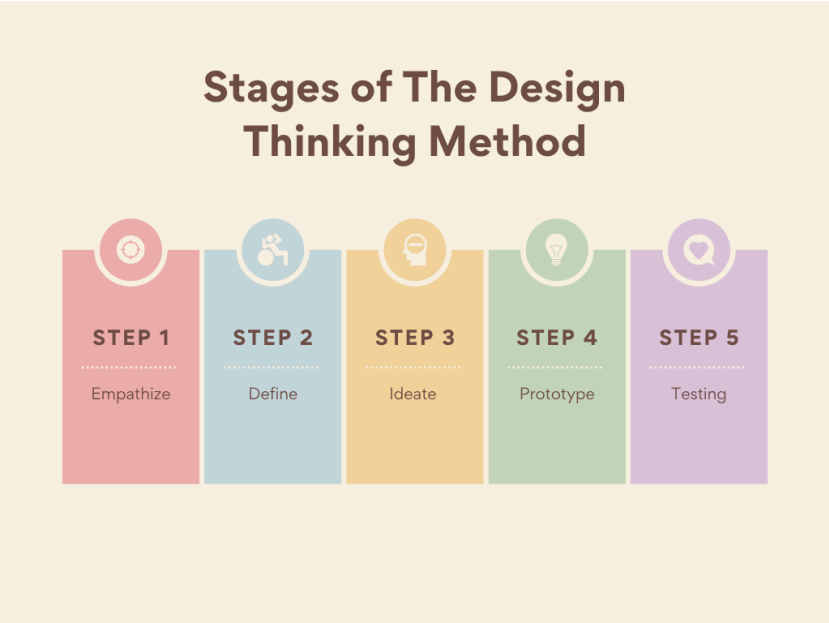

Figure 1. Stages of the Design Thinking Method

Design Thinking is a problem-solving method that focuses on collaboration with customers to produce acceptable solutions based on their needs. The primary advantage of this technique is that it fosters the generation of innovative ideas during the process of inspiration, idea development, and implementation into a prototype [13]. This technique combines logical analysis, practical skills, and aspects of creativity to generate a process that is structured, innovative, and oriented toward effective issue solving [14]. In practice, this procedure is dynamic and flexible, allowing for repetition at each stage of development to meet the needs [13]. With these characteristics, Design Thinking allows considerable opportunity for testing and refining solutions until an appropriate and efficient design is created [13]. Figure 1 shows the five stages of the Design Thinking method: understanding users (Empathize), defining challenges (Define), developing ideas (Ideate), producing prototypes (Prototype), and conducting testing (Test) [15]. Below is an explanation of each level of the Design Thinking technique [16]:

1) Empathize
   The first stage in the Design Thinking technique is Empathize, which is an exploratory process that involves observation and in-depth study to comprehend users' actions, speech, thoughts, and feelings.
2) Define
   The Define stage is the second step in the Design Thinking technique, and it aims to formulate the core problem based on the Empathize stage findings.
3) Ideate
   The Ideate stage of the Design Thinking technique focuses on generating and developing numerous creative ideas as solutions to previously defined challenges.
4) Prototype
   The Prototype stage is the initial manifestation of ideas produced in the Ideate phase. The purpose is to build an initial representation or prototype of the suggested solution that may be utilized to address user issues.
5) Test
   In the Design Thinking technique, the Testing step entails putting the prototype through its paces with users. This phase collects replies and feedback from users after they test the prototype that was created.

In this study, data was collected using a semi-structured interview approach for the Empathy stage, participant observation to gather feedback on the designs created in the Ideate and Prototype stages, and a System Usability Scale (SUS) questionnaire for the testing or Test stage. Interview guides, recording equipment, prototypes, and SUS forms were all employed as instruments. To assess the efficiency of the redesign, qualitative data was analyzed thematically and quantitatively using SUS scores. Fourteen respondents were selected purposively based on their experience using the DPIA application. The selection criteria included their level of usage experience and the diversity of regional domicile to ensure a broad representation of user perspectives. Semi-structured interviews consisted of open-ended questions exploring users' frustrations, needs, and expectations. Ethical research procedures were followed, including obtaining informed consent from all participants. Qualitative data were analyzed using thematic analysis, identifying

patterns related to navigation problems, content clarity, and visual comfort. Quantitative data from the SUS instrument were calculated to measure perceived usability before and after the redesign.

4. Result and Discussion

4.1 Results

The findings of this study were acquired by evaluating the Digital Population Identity Application (DPIA) interface prototype with 14 respondents. The System Usability Scale (SUS) instrument was used to assess the level of convenience, efficiency of application use, and comfort following the application's redesign. The average SUS score achieved demonstrated a considerable rise over the previous version of the program.

Table 1. System Usability Scale Scores Before and After the Redesign

No.	Respondent	SUS Score Before Redesign	SUS Score After Redesign
1	R1	67.5	72.5
2	R2	65	72.5
3	R3	62.5	57.5
4	R4	70	52.5
5	R5	70	65
6	R6	70	82.5
7	R7	67.5	95
8	R8	77.5	95
9	R9	70	77.5
10	R10	75	92.5
11	R11	65	87.5
12	R12	57.5	92.5
13	R13	60	100
14	R14	70	92.5
	Mean	67.67	81.07

The SUS results showed a clear improvement in user perception after the redesign. Respondents highlighted the addition of online account registration, downloadable documents, improved navigation menu, and a more consistent visual layout as major enhancements. One participant noted, "The new features and updated interface make it much easier and more comfortable to use the application," indicating improved usability and enhanced user satisfaction. These results align with ISO 9241-11 usability factors: effectiveness, efficiency, and satisfaction. The redesigned interface enabled users to complete tasks faster and with fewer errors. The study found that incorporating user feedback through iterative prototyping leads to higher user acceptance. The graphics below depict the redesign of the DPIA interface using the Design Thinking stages. The prototype includes enhancements to the navigation structure and visual layout, as well as the addition of several key features such as online account registration, digital document access with download options, various population service submissions, interactive assistance, notifications, and others. Each display is intended to be more responsive, simple to understand, and deliver a more efficient and enjoyable program usage experience than the previous version.

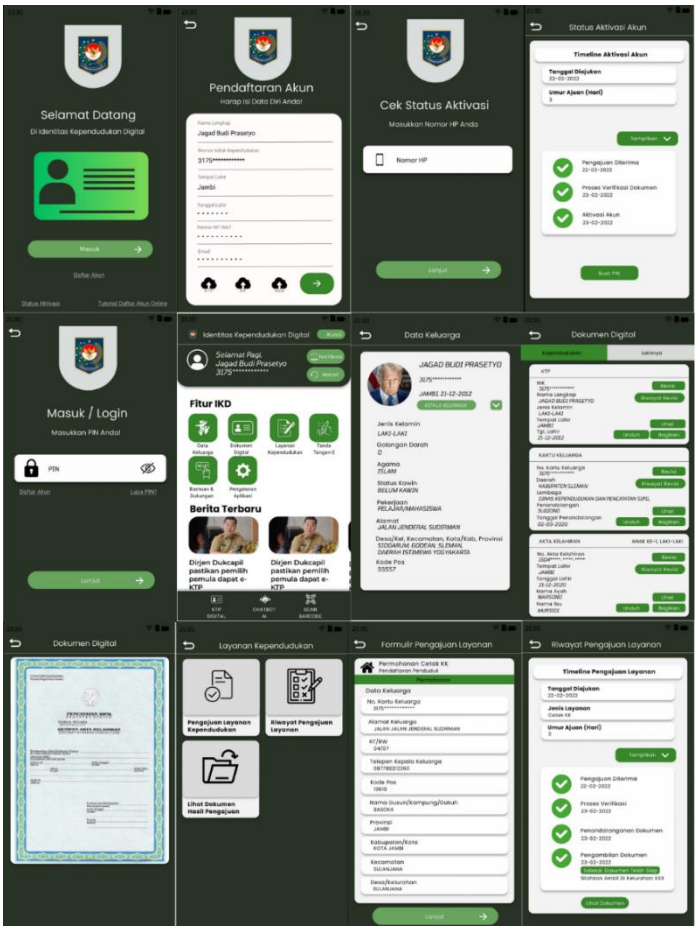

Figure 2. Results of the Digital Population Identity Application (DPIA) Prototype Design

Figure 3. Results of the Digital Population Identity Application (DPIA) Prototype Design

This rise in usability scores demonstrates that the new application design is more responsive to user needs. A cleaner design, simplified navigation, and the addition of services like document downloads, user guides, and service connections have all proven to increase user convenience and trust.

4.2 Discussion

According to the findings of interviews and observations, the previous version's challenges included the inability to register for an online account, the lack of user manuals, and a presentation that was perceived as boring and less helpful. Furthermore, various elements, including buttons, colors, and captcha input, lacked contrast and were not intuitive. Users also noticed a lack of live support features and chatbots, as well as low document resolution when displayed. After being rebuilt based on user feedback, the program was deemed easier to grasp, especially by novice users. This is supported by the comparison of the SUS score, which was previously in the Marginal-High category, moving to Acceptable in terms of Acceptability Ratings based on the interpretation of the SUS score proposed by Handayani and Adelin (2019) [17]. Furthermore, throughout testing, users responded well to the application redesign results. Users were also able to perform all the well-tested tasks. A testing procedure can be regarded as successful if the user is able to perform each task or scenario presented based on the success criteria that have already been specified by Ainurohmah & Irianto (2024) [18]. This success measures how well the design satisfies user demands and expectations throughout testing [10].

The study's conclusions are related to the concepts of user-oriented design emphasized by the Design Thinking technique. Theoretically, usability is an important factor in determining the success of an interface. According to ISO 9241-11, usability consists of three major components: effectiveness, efficiency, and application user pleasure [19]. Usability may be determined based on five factors, including the amount of ease of use of the application, efficiency, user memory while using the application, error management, and user happiness. The findings of this study show that redesigning the application interface has enhanced all five aspects. This is apparent in the increased SUS scores and positive user feedback during the testing phase.

5. Conclusion

This study demonstrates that redesigning the Digital Population Identity Application (DPIA) interface using the Design Thinking approach can enhance the quality of user experience. The redesign process, which was based on user feedback, resulted in a more intuitive, simple, and user-friendly interface. These findings demonstrate that a user-centered design strategy can effectively address usability issues in digital-based public services. As a result, in the future, the primary strategy for designing government applications should be to redesign them with user demands in mind. This study is expected to serve as a reference for the development of comparable systems that prioritize accessibility and user satisfaction as the primary indicators of application success.

References

[1] Permadi, I. B., & Rokhman, A. (2023). Implementasi identitas kependudukan digital dalam upaya pengamanan data pribadi. *JOPPAS Journal of Public Policy and Administration*, *4*(2), 80–88. https://doi.org/10.31539/joppas.v4i2.6199

[2] Munthe, H. B., & Gatiningsih. (2024). Efektivitas penerapan identitas kependudukan digital dalam meningkatkan pelayanan administrasi kependudukan di Dinas Kependudukan dan Pencatatan Sipil Kabupaten Karo. *IPDN*, 1–14.

[3] Bella, V. S., & Widodo, D. (2024). Implementasi aplikasi Identitas Kependudukan Digital (IKD) dalam menunjang pelayanan publik masyarakat di Kecamatan Tambaksari. *Saraq Opat: Jurnal Administrasi Publik*, *6*(1), 14-31.

[4] Sinambela, N. M. (2024). Dukcapil dukung pengembangan IKD menjadi INA-Pass. *Antaranews.com*. https://www.antaranews.com/berita/4126776/dukcapil-dukung-pengembangan-ikd-menjadi-ina-pass#google_vignette

[5] Komarudin, A., & Hilda, A. M. (2024). Analisis sentimen ulasan aplikasi identitas kependudukan digital pada Play Store menggunakan metode naïve Bayes. *Computer Science (CO-SCIENCE)*, *4*(1), 28-36. https://doi.org/10.31294/coscience.v4i1.2955.

[6] Nursyamsyi, F. P., & Hasan, F. N. (2023). Klasifikasi sentimen terhadap aplikasi identitas kependudukan digital menggunakan algoritma naïve bayes dan SVM. *KLIK Kajian Ilmiah Informatika dan Komputer*, *4*(3), 1788–1798. https://doi.org/10.30865/klik.v4i3.1517

[7] Jayanti, N. R. (2024). Analisis Sentimen Review Aplikasi Identitas Kependudukan Digital Menggunakan Algoritma Support Vector Machine. *Global: Jurnal Lentera BITEP*, *2*(04), 132-138. https://doi.org/10.59422/global.v2i04.460.

[8] Raihan, M., Herman, R. M., & Syamsir. (2023). Eksplorasi pengalaman pengguna dalam menggunakan aplikasi IKD pelayanan di Disdukcapil Kota Padang. *Jurnal Pendidikan Tambusai*, *7*(3), 29497–29502.

[9] Oktaviana, P. V. P., Warsono, H., & Astuti, R. S. (2024). Proses Difusi Inovasi Identitas Kependudukan Digital (IKD) di Kabupaten Boyolali. *Journal of Public Policy and Management Review*, *13*(2), 1-19. https://doi.org/10.14710/jppmr.v13i2.43532.

[10] Adiswara, D. R., & Irianto, K. D. (2024). Perancangan UI/UX Aplikasi GoMasjid Menggunakan Pendekatan Human Centered Design. *Technologia: Jurnal Ilmiah*, *15*(3), 607-618.

[11] Hasna, K., Defriani, M., & Totohendarto, M. H. (2023). Redesign user interface dan user experience pada website Eclinic menggunakan metode design thinking. *KLIK Kajian Ilmiah Informatika dan Komputer*, *4*(1), 83–92. https://doi.org/10.30865/klik.v4i1.1072

[12] Shirvanadi, E. C., & Idris, M. (2021). Perancangan ulang UI/UX situs e-learning Amikom Center dengan metode design thinking (Studi kasus: Amikom Center). *AUTOMATA*, *2*(2), 1–8.

[13] Wibowo, M. R., & Setiaji, H. (2020). Perancangan website bisnis Thrifdoor menggunakan metode pendekatan design thinking. *AUTOMATA*, *1*(2), 1–5.

[14] Aufa, D. S., & Irianto, K. D. (2024). Desain UI/UX aplikasi reservasi restoran Dafam Fortuna Malioboro menggunakan metode design thinking. *Smart Comp Jurnalnya Orang Pintar Komputer*, *13*(105), 682–691.

[15] Putra, I. M., & Indah, D. R. (2023). Implementasi metode design thinking dalam aplikasi Giwang Sumsel. *KLIK Kajian Ilmiah Informatika dan Komputer*, *3*(6), 688–697. https://doi.org/10.30865/klik.v3i6.872

[16] Alfirahmi, D. M., Kania, D. S., & Yusup, D. (2023). Rancang Bangun Aplikasi Pengelolaan Sampah Plastik Menggunakan Pendekatan Design Thinking. *Innovative: Journal Of Social Science Research*, *3*(3), 219-233.

[17] Handayani, F. S., & Adelin. (2019). Interpretasi pengujian usabilitas Wibatara menggunakan system usability scale. *Techno.COM*, *18*(4), 340–347.

[18] Ainurohmah, S., & Irianto, K. D. (2024). Desain Ui/Ux Telahouse: Aplikasi Otomatis Pengendalian Lampu Dan Suhu Untuk Lansia. *EDUSAINTEK: Jurnal Pendidikan, Sains dan Teknologi*, *11*(4), 1762-1782. https://doi.org/10.47668/edusaintek.v11i4.1315.

[19] Nurlistiani, R., Purwati, N., Komputer, I., Informatika, I., & Lampung, D. (2021). Interpretasi pengujian usabilitas e-learning di masa pandemi COVID-19 menggunakan system usability scale. *Seminar Nasional Hasil Penelitian dan Pengabdian Masyarakat*, *2020*, 164–171.