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Integration of Kansei Engineering and Design Thinking for Mobile UI/UX Development in Manufacturing

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ABSTRACT

The increasing digitalization of the manufacturing industry has encouraged companies to develop mobile applications that can optimize operational and administrative processes. However, limited studies have specifically addressed integrating emotional and functional aspects in designing user interfaces (UI) and user experiences (UX) for mobile applications in the manufacturing context. This study aims to develop a mobile application UI/UX design that aligns with users' emotional preferences and usability needs across three departments: logistics, maintenance, and production. The research integrates the Kansei Engineering method and Design Thinking framework through five stages: empathize, define, ideate, prototype, and test. In the empathize stage, in-depth interviews and empathy mapping were conducted to capture user needs, utilizing a qualitative approach to gain deep insights into users' emotional preferences. The ideate phase utilized Kansei Engineering Type I and factor analysis to classify emotional preferences (Kansei words) into two design modes: professional and simple. Quantitative analysis using Partial Least Squares (PLS) Regression was applied to map emotional preferences with design elements. Prototypes were developed based on these mappings and evaluated through usability testing, using metrics such as completion rate, time on task, error rate, and PSSUQ (Post-Study System Usability Questionnaire). The results show that the professional concept design performed better in usability and user satisfaction. This research provides a practical framework for integrating emotional and functional needs into UI/UX design, combining qualitative and quantitative methods, and offers insights for future digital application development in the manufacturing industry.

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Introduction

The rapid digital transformation in the manufacturing sector is redefining the operational landscape by shifting from traditional automation to intelligent, interconnected, and sustainable production systems. (Pratama et al., 2020; Santoso & Kusuma, 2023). Digital transformation is no longer limited to adopting digital tools but encompasses a comprehensive reconfiguration of organizational capabilities, business models, and customer value propositions. (BCG, 2022). In the era of smart manufacturing, technologies such as IoT, AI, cloud computing, and data analytics facilitate real-time decision-making, predictive maintenance, and end-to-end supply chain visibility, thereby transforming both the physical and digital dimensions of production. (VisualSP, 2024).

Because of the absence of robust information systems, manufacturing operations face severe bottlenecks in monitoring, decision-making, and responsiveness. Manual or paper-based monitoring systems often result in delayed information flow, lack of transparency, and high error rates, leading to production downtime, increased operational costs, and reduced customer satisfaction. (Meng et al., 2025). Moreover, traditional systems hinder real-time supervision of equipment status, material flows, and task approvals, especially in decentralized shopfloor environments where agility and responsiveness are critical. (Fang et al., 2025). Without proper digital interfaces, approval processes remain fragmented and non-integrated, causing critical delays in document handling and cross-department coordination. Inaccurate or delayed feedback loops contribute to inefficient scheduling, quality defects, and poor traceability. These inefficiencies accumulate into significant productivity losses and can erode competitive advantage, especially in fast-paced industrial settings (Meng et al., 2025; Ryandono et al., 2022). Thus, the lack of a well-designed, user-centric mobile interface poses usability issues and strategic operational risks. Given these stakes, the design of a UI/UX system that integrates functional and emotional user needs is not merely a design initiative. It is a foundational investment to support data-driven operations and maximize returns from digital transformation efforts. (BCG, 2022; Liu et al., 2025).

Despite many indicators of active digitalization progress, the majority of production systems still face the challenge of technological advancement and human-centered design in the context of mobile applications. Although many manufacturing companies have been well supported by traditional web-based systems, such systems usually heavily depend on uninterrupted access to the internet, and have no access to offline situations, without much user interface (UI) design for customization. (Tian et al., 2023). Mobile applications provide more flexibility and better responsiveness, which allows access in real-time and provides offline capabilities and features more and more relevant for dynamic and decentralized shop floor settings. (Gröger et al., 2013). Yet, the overall success of these systems is not only determined by the technical performance, but also by how much the users are involved, satisfied, and emotionally involved in the product. (Ristias et al., 2023).

The research has recently pointed out the high priority for industrial digital solutions to fill the gap between technical effectiveness and emotional usability. Although several investigations have focused on digital transformation strategies (Yudha et al., 2024; Zhang et al., 2023). The focus is mainly on structural and technological adjustments, with less emphasis on the user experience. Additionally, various applications of Design Thinking in other industries, including healthcare, tourism, and education (Rohwana & Irawan, 2024; Suzianti et al., 2024; Suzianti & Arrafah, 2019), as well as Kansei Engineering in UI design (Hadiana, 2017, 2018; Hartono, 2020) Have not been widely adopted in mobile industrial applications. The need exists for studies that combine emotional design and perceived usefulness in digital interfaces within manufacturing industries, where workers are subject to high-demand situations and require intuitive and interactive tools that support operational decisions. (Adirestuty et al., 2025; Liu et al., 2025).

In designing user interfaces that are not only functional but also emotionally resonant, Kansei Engineering (KE) offers distinct advantages over other design methodologies. KE enables the translation of users' psychological and emotional impressions referred to as *Kansei* into specific design elements through a structured quantitative approach. This makes it particularly suitable for UI/UX design, where visual harmony, emotional response, and interaction comfort are as important as usability (Hartono et al., 2025). Unlike other approaches that focus solely on technical performance or task efficiency, KE places the user's affective needs at the center of the design process. It allows designers to capture and quantify emotional responses such as "professional," "trustworthy," or "simple," and systematically map them to interface elements such as layout, icons, or color schemes (Hartono et al., 2025). This mapping helps designers proactively align emotional preferences with interface attributes, even before usability testing begins.

Moreover, KE supports the identification of emotional needs across varied user personas, making it adaptable in environments like manufacturing, where users from different departments (e.g., production, logistics, maintenance) have diverse expectations. (Hartono et al., 2025). As demonstrated for healthcare, KE was instrumental in identifying and incorporating patient emotions into service space design, ultimately enhancing perceived comfort and functional effectiveness. (Febriyanti et al., 2022; Riduwan & Wardhana, 2022). By integrating KE into the ideation and prototyping stages of Design Thinking, this study ensures that the resulting mobile UI/UX design could meet usability standards and deliver a positive emotional experience. This combination bridges the gap between cognitive usability and emotional satisfaction, making it highly relevant for digital transformation initiatives in industries where user adoption is critical (Hartono et al., 2025; Rinawiyanti et al., 2025). This study focuses on creating a UI/UX design framework that matches emotional values and functional performance for document signing and producing processes. The anticipated results include practice-oriented design recommendations for increased engagement, efficiency, and theoretical insights for human-centered digital transformation in manufacturing.

Literature Review

Design Thinking

Design Thinking is a human-centered, iterative process of solving problems that primarily involves understanding the user, and redefining the problems in searching for alternative strategies and solutions that might not be the most obvious choice. (Liedtka & Ogilvie, 2011; Qosim et al., 2023). The technique is divided into five stages: empathize, define, ideate, prototype, and test. (Susanto et al., 2025; Tschimmel, 2012). Design Thinking provides the means to enable digital product creators to create practical, user-centered systems that fathom the tacit needs of users.

Some studies proved the utility of Design Thinking across domains. For instance, (Suprayogi et al., 2025; Suzianti et al., 2020) used the model to enhance mobile applications based on disaster mitigation management, and (Mendo et al., 2023; Yudhanto et al., 2024) Used it in the design of the digital ticketing system. In the manufacturing sector, (Muhaimin et al., 2023; Suzianti & Arrafah, 2019) Proved that Design Thinking could leverage user interaction to overcome errors on ERP interfaces.

Kansei Engineering

Kansei Engineering is a user-oriented product development approach that converts the emotional response of users into design features (Mohd Lokman, 2010; Nagamachi, 2011). It seeks to create products that are enjoyable to use and foster emotional appeal. Kansei Engineering application covers a variety of domains, including consumer products, and website interface, among others (Fauzi et al., 2024; Hadiana, 2017; Noori et al., 2015).

Types of Kansei Engineering. There are different types of Kansei Engineering, but this study is based on type I, where Kansei words from users are obtained and matched with a product attribute. This technique allows consideration of UI elements whose emotional compatibility corresponds to emotional requirements, such as indicators of clarity, simplicity, and professionalism (Shakoor, 2024; Sutcliffe, 2017). Highlighted the necessity of integration of Kansei Engineering with other methods, such as the Kano Model and TRIZ, to enhance service innovation (Hartono, 2020).

Usability Evaluation

The usability testing technique is used to measure the efficiency of a computer interface. A commonly used instrument is IBM's Post-Study System Usability Questionnaire (PSSUQ), designed to assess user satisfaction along three dimensions: system usefulness, information quality, and interface quality (Lewis & Sauro, 2021). Moreover, performance-based measures like completion time, time on task, and error rate can give objective evidence of the pragmatic efficiency of a design (Hanington & Martin, 2019).

Methodology

This paper uses mixed methods to combine the Design Thinking framework with Kansei Engineering Type I and adapt it to the design of a mobile application UI/UX for an industrial environment. The study was done in a cable manufacturing company in Jakarta, Indonesia, involving the logistics, maintenance, and production departments as the main units. The research is conducted following the traditional Design Thinking approach with five phases: Empathize, Define, Ideate, Prototype, and Test (Arifin et al., 2024). During the qualitative phase, 19 participants had in-depth interviews to gather emotional preferences and usability requirements. In the quantitative study, 19 participants filled out the Kansei-Engineering survey to group the emotional preference, which was analyzed with factor analysis and PLS. Lastly, in the Usability testing phase, 15 participants tested the prototypes and were evaluated in terms of completion rate, task time, error rate, and PSSUQ.

At the Empathize phase, this study interviewed 19 people to get a qualitative understanding of their daily operational struggles user expectations, and emotional preferences regarding mobile system usage. These interviews were structured using empathy mapping to categorize user inputs into emotional and behavioral patterns. Based on the mapping results, three main user personas were constructed to represent archetypes from each department.

The Define stage involved synthesizing the interview findings to generate clear problem statements and user needs specific to each persona. These findings were then used as the foundation for the Ideate stage, where Kansei Engineering was applied. Eleven Kansei words were selected from prior studies and refined through expert judgment and user validation. Respondents rated three sample UI designs based on these Kansei words using a 5-point semantic differential scale. The resulting data were analyzed using factor analysis using SPSS statistical software to reduce and group the Kansei words into two dominant emotional themes: Professional Mode and Simple Mode.

To establish the link between Kansei words and UI design elements, Partial Least Squares (PLS) regression was conducted using XLSTAT software. From PLS regression, we know which design features, such as header color and font size, background layout, etc, were more likely to be associated with each emotion theme discussed above. The insights gained could generate two prototype concepts in Figma, where one concept is a professional design approach and the other makes a tradeoff towards simplicity and smoothness.

For the Prototype stage, both ideas were implemented as interactive high-fidelity mockups. The prototypes were tested in the Test phase with usability testing and by a standard questionnaire. Three performance indicators, including the rate of task completion, the task time, and the recorded errors, were used to evaluate the performance of the app. Furthermore, we administered the Post-Study System Usability Questionnaire (PSSUQ) to all participants to measure perceived system usefulness, information quality, and interface quality. 15 participants were involved in the evaluation (five participants per each of the three defined personas).

Taken together, it provides a deep understanding of the functional and emotional aspects of the user needs and their translation into measurable design specifications. Design Thinking and Kansei Engineering combine to ensure this final UI/UX design remains not only highly useable and effective but also emotionally conformant with what users in the manufacturing context prefer.

Table 1. Design Thinking Frame Work

Empathize		Define		Ideate		Prototype	Test	
In-depth Interview	Understanding User Needs	Empathy Mapping	Identifying Key User Needs	Kansei Engineering	Determining Design Elements for Mobile Application Interface Design	Generating Solutions that Can Be Tested by the User	Usability testing & PSSUQ SURVEY	Collecting UI/UX usage data to evaluate usability and user satisfaction

Source: Author (2025)

Results

Empathize

In the Empathize phase, 19 participants were interviewed from the production, maintenance, and logistics departments. By applying empathy mapping, we came up with some of the common pain points, including challenges in carrying out administration tasks due to reliance on desktop-based systems, delays in reporting while making decisions, and the absence of real-time access to operational data. These findings were summarized into three user personas: Budi (Production), Andi (Maintenance), and Tono (Logistics). Each persona described a certain profile of user needs and emotional attitudes toward the use of mobile applications in the factory. For instance, Tono (Logistics) needed stock visibility while in the field, while Andi (Maintenance) wanted to report work orders directly without returning to his office desktop.

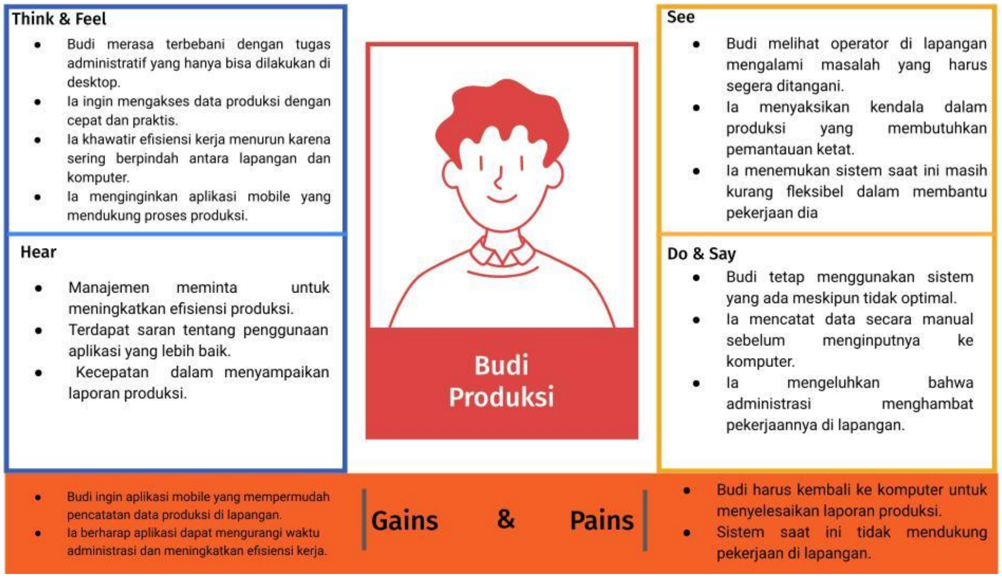


Figure 1. Empathy Mapping For the Production Department

Source: Author (2025)

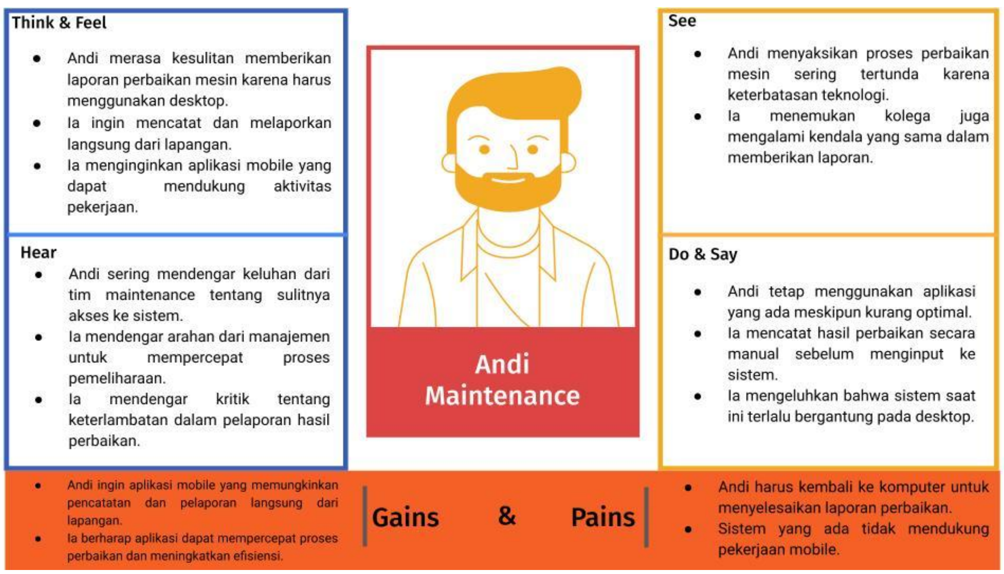


Figure 2. Empathy Mapping For the Maintenance Department

Source: Author (2025)

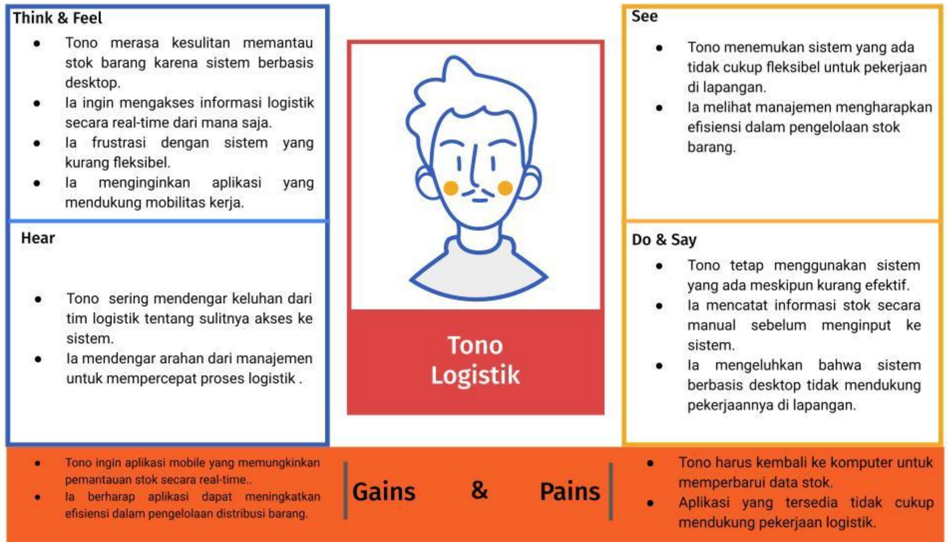


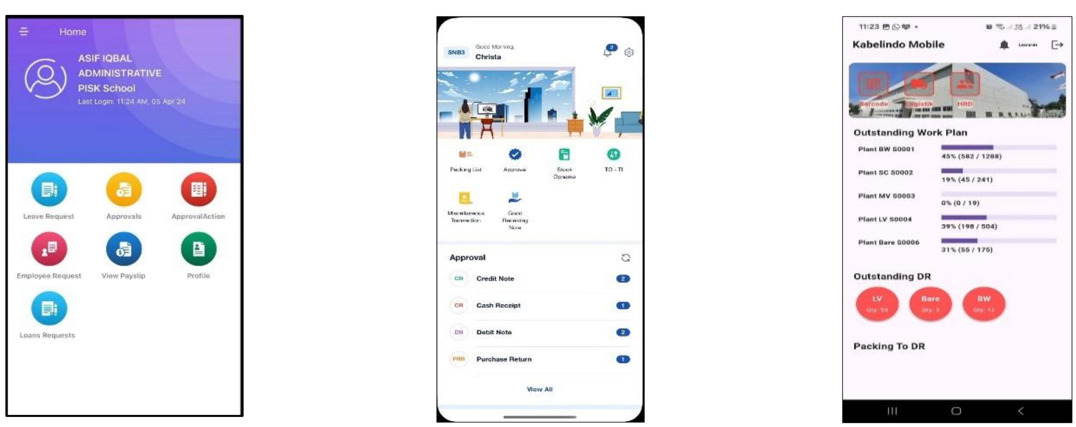
Figure 3. Empathy Mapping for the Logistics Department
Source: Author (2025)

Define

From the empathy maps, key user problems were structured into need statements. For example, the logistics persona needed "a mobile system that allows real-time barcode scanning and stock monitoring from any location." Meanwhile, the maintenance persona required "a tool to simplify work order confirmation and documentation without returning to a terminal." These statements highlighted that existing systems lacked mobility, contextual flexibility, and emotional resonance. Additionally, users voiced expectations for an interface that was *clear*, *professional*, and *simple*, which later formed the foundation for emotional design exploration.

Ideate

In the Ideate stage, Kansei Engineering Type I was applied to interpret emotional design needs. Eleven Kansei words (Easy, Professional, Tidy, Modern, Bright, Clear, Simple, Comfortable, Colorful, Systematic, and Structured) were selected from previous research and validated through a semantic differential questionnaire using three UI interface specimens UI of the ERP Ledger application, Pro-Int ERP application, and kabelindo mobile application as shown in the figure 4. Table 2 presents the evaluation results of each UI specimen based on the Kansei questionnaire responses.



ERP LEDGER Pro-Int ERP Kabelindo Mobile

Figure 4. User Interface Specimen

Source: ERP Ledger Application, Pro-Int ERP Application, Kabelindo Mobile Application (2025)

Table 2. The Average Respondent Rating.

No	Kansei Word	Specimen		
		ERP Ledger	**Pro Int ERP**	**Kabelindo Mobile**
1	Easy	3.9	4.1	3.6
2	Professional	3.6	4.15	3.6
3	Tidy	3.95	4.2	3.7
4	Modern	3.6	4.25	3.6
5	Bright	3.55	4.25	3.45
6	Clear	3.75	4.05	3.8
7	Simple	4	3.95	3.75
8	Comfortable	3.8	4.1	3.7
9	Colorful	3.45	3.85	3.35
10	Systematic	3.7	4.15	3.5
11	Structure	3.7	4.05	3.75

Source: Author (2025)

A factor analysis was conducted on the questionnaire data using SPSS version 25, revealing two dominant emotional dimensions: the Professional Mode, comprising words such as (Clear, Structured, Modern, Professional, Bright, Colorful, Comfortable, and Systematic) and the Simple Mode, consisting of (Simple, Easy, and Tidy). The component results derived from the factor analysis are shown in Figure 5. These include the Rotated Component Matrix and the Total Variance Explained. It confirms the extraction of two primary components based on eigenvalues greater than 1.

Table 3. Result of Factor Analysis (Total Variance Explained)

Compo-nent	Initial Eigenvalues			Extraction Sums of Squared Loading			Rotation Sums of Squared Loading		
	Total	**% of Variance**	**Cumulati ve %**	**Total**	**% of Variance**	**Cumula-tive %**	**Total**	**% of Vari-ance**	**Cumula-tive %**
1	9.653	87.752	87.752	9.653	87.752	87.752	7.665	69.686	69.686
2	1.347	12.248	100.000	1.347	12.248	100.000	3.335	30.314	100.000
3	5.703 E-16	5.185E-15	100.000						
4	3.924 E-16	3.567E-15	100.000						
5	3.717 E-16	3.380E-15	100.000						
6	9.647 E-17	8.770E-16	100.000						

7	7.119 E-17	6.472E-16	100.000
8	-8.293 E-17	-7.539E-16	100.000
9	-2.243 E-16	-2.039E-15	100.000
10	-3.121 E-16	-2.837E-15	100.000
11	-2.190 E-15	-1.991E-14	100.000

Extraction Method: Principal Component Analysis

Source : IBM SPSS Statistics 25 (2025)

Table 4. Result of Factor Analysis (Rotated Component Matrix)

Kansei Word	Component 1	Component 2
Clear	0.991	0.136
Structured	0.987	0.160
Modern	0.957	0.289
Professional	0.957	0.289
Bright	0.918	0.397
Colorful	0.886	0.464
Comfortable	0.860	0.510
Systematic	0.826	0.563
Simple	0.041	0.999
Easy	0.597	0.802
Tidy	0.685	0.729

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Source : IBM SPSS Statistics 25 (2025)

The next step in this research is data processing using the Partial Least Squares (PLS) Regression method, which is based on the identification of the number and details of Kansei words with significant influence as obtained through factor analysis. The PLS regression is performed using XLSTAT 2019 software. This analysis aims to identify the design elements most strongly associated with the Kansei words selected by the respondents. After conducting the PLS regression, the coefficient table shows the level of influence on each of Kansei words. For the first component of Kansei words, the average coefficient value includes words such as clear, structured, modern, professional, bright, colorful, comfortable, and systematic are evaluated. For the second component, which consists of words such as simple, easy, and neat, the average coefficient value is also computed. The results are then compared and adjusted with the previously prepared dummy elements (as shown in Table 3) and visualized into a design element matrix. The results of the PLS regression for the Professional and Simple concepts are presented in Tables 4 and 5.

Table 5. Dummy Element for Specimen

Specimen \ Design Element	Header Color - White	Header Color – Blue	Header Logo Position - Middle	Header Logo Position -	Title Font – Small	Title Font - Medium	Title Font – Big	Header Size - Medium	Header Size - Big	Header Size - Small	……
ERP Ledger	0	1	1	0	1	0	0	1	0	0	…
Pro-Int ERP	1	0	1	0	1	0	0	0	0	1	….
Kabelindo Mobile	1	0	0	1	0	1	0	1	0	0	….

Source: Author (2025)

Table 6. Recommended Design Elements Based on PLS Analysis for Professional Mode

Design Element	Impact Direction on Professional Mode	Coefficient (AVG =0.0030)	Recommendation
Header Color – White	Negative	-0.012	Avoid
Header Color – Red	Positive	0.012	Applied
Header Title Position -Middle	Positive	0.044	Applied
Header Title Position -Left	Negative	-0.044	Avoid
Title Font Position - Small	Positive	0.044	Applied
Title Font Position - Small	Negative	-0.044	Avoid
Title Font Position - Big	-	0	Not Significant
Header Size – Small	Positive	0.032	Applied
Header Size – Medium	Negative	-0.032	Avoid
Header Size – Big	-	0	Not Significant
Footer Size – Small	Positive	0.032	Applied

Footer Size – Medium	Negative	-0.044	Avoid
Footer Size - Big	-	0	Not Significant
Body Background Color - White	Positive	0.012	Applied
Body Background Color - Colourful	Negative	-0.012	Avoid

Source: XLSTAT (2025)

Table 7. Recommended Design Elements Based on PLS Analysis for Simple Mode

Design Element	Impact Direction on Professional Mode	Coefficient (AVG =0.0046)	Recommendation
Header Color - White	Positive	0.042	Applied
Header Color - Red	Negative	-0.042	Avoid
Header Title Position -Middle	Positive	0.037	Applied
Header Title Position -Left	Negative	-0.037	Avoid
Title Font Position - Small	Positive	0.037	Applied
Title Font Position - Medium	Negative	-0.037	Avoid
Title Font Position - Big	-	0	Not Significant
Header Size – Small	Positive	0.079	Applied
Header Size – Medium	Negative	-0.079	Avoid
Header Size – Big	-	0	Not Significant
Footer Size – Small	Positive	0.037	Applied

Footer Size – Medium	Negative	-0.079	Avoid
Footer Size - Big	-	0	Not Significant
Body Background Color - White	Positive	0.042	Applied
Body Background Color - Colorful	Negative	-0.022	Avoid

Source: XLSTAT (2025)

Prototype

The prototype development stage was carried out after obtaining the mapping results of design elements based on the coefficient values from the Partial Least Squares (PLS) regression. The elements that influenced mostly each emotional dimension were professional and *simple*. Those things were selected as the foundation for the design development.

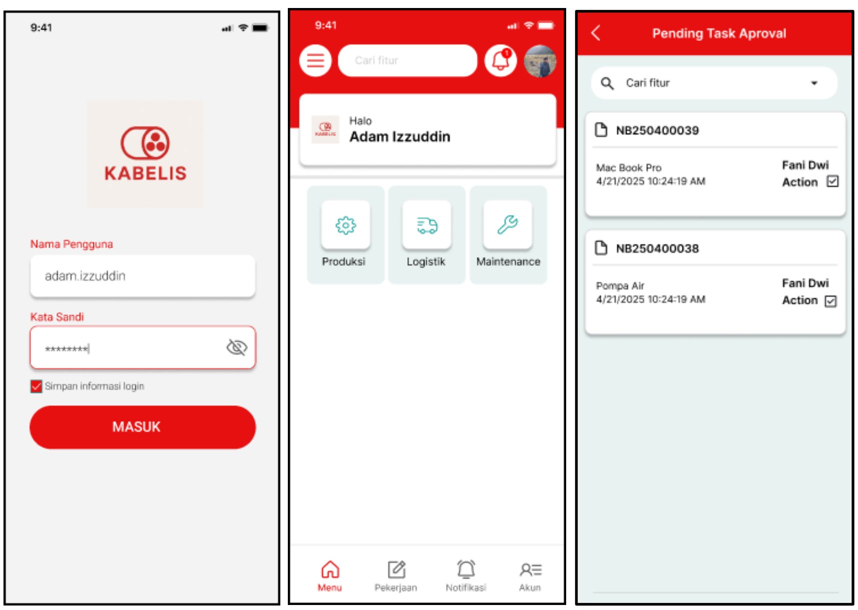


Figure 5. User Interface Design of Professional Mode

Source: Author (2025)

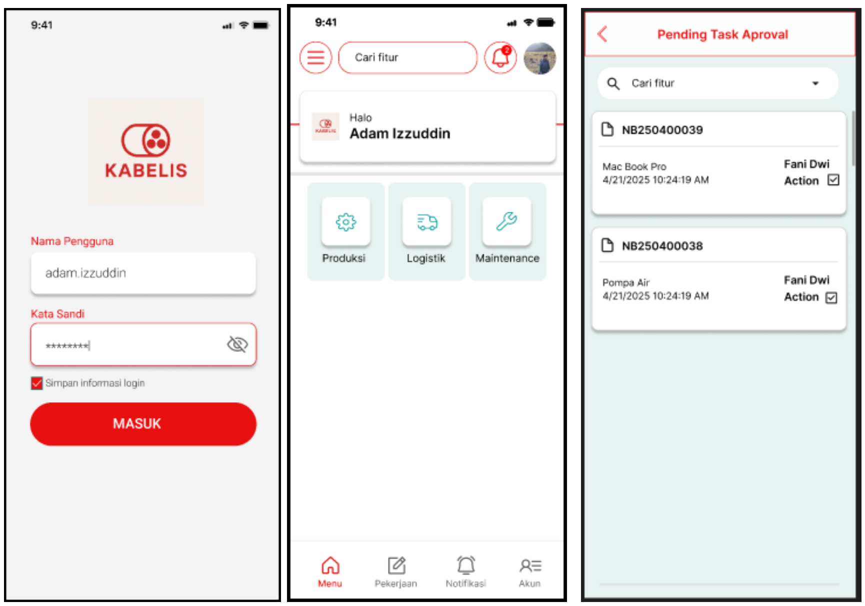


Figure 6. User Interface Design of Simple Mode

Source: Author (2025)

Testing

Both prototype versions were tested by 15 respondents using predefined task scenarios. The usability testing evaluated completion rate, time on task, and error rate, and also included PSSUQ surveys. All users completed tasks in both prototypes (100% completion rate), but the Professional Mode showed slightly better efficiency, with shorter task times and fewer errors, especially for tasks involving multiple steps or higher data complexity.

PSSUQ results supported these findings: the Professional Concept scored lower (better) on overall satisfaction (2.05 vs. 2.23 in Simple Mode), system use, information clarity, and interface quality, indicating higher user approval. Compared to IBM's PSSUQ Norm (2.82), both designs were well-received, but the structured presentation and professionalism of the Professional Mode appeared to better align with the operational needs and emotional expectations of manufacturing users.

Table 8. PSSUQ Results for Persona Logistics

PSSUQ	System Use	Information Quality	Interface Quality	Overall satisfaction
Professional Concept	1.77	2	1.83	2.05
Simple Concept	1.93	2.42	2	2.23
PSSUQ Norm	2.8	3.02	2.49	2.82

Source: PSSUQ Result (2025)

Table 9. PSSUQ Results for Persona Maintenance

PSSUQ	System Use	Information Quality	Interface Quality	Overall satisfaction
Professional Concept	1.76	1.87	1.64	2.03

Simple Concept	1.90	2.31	2.15	2.20
SSPSSUQ Norm	2.8	3.02	2.49	2.82

Source: PSSUQ Result (2025)

Table 10. PSSUQ Results for Persona Production

PSSUQ	System Use	Information Quality	Interface Quality	Overall satisfaction
Professional Concept	1.75	2.02	1.69	2.08
Simple Concept	1.96	2.48	2.45	2.24
PSSUQ Norm	2.8	3.02	2.49	2.82

Source: PSSUQ Result (2025)

Discussion

The *Empathize* stage begins with data collection through in-depth interviews to understand the needs and challenges faced by users from three main divisions: production, maintenance, and logistics. The interviews revealed that the biggest difficulty users face is the dependence on desktop-based systems, which limit flexibility and work efficiency, especially in the field (Pratama et al., 2020; Susanto et al., 2025). By using empathy mapping, the users' needs and problems were organized and summarized. From this mapping, several key pain points were identified, such as the limitation in real-time stock monitoring in the logistics division, difficulties in reporting machine repairs directly in the field for the maintenance division, and administrative burdens disrupting work efficiency in the production division. These findings are aligned with previous studies that highlight the importance of mobile access and flexibility in UI/UX design in the industrial arena (Suratno & Shafira, 2022; Suzianti & Arrafah, 2019), reiterating the importance the design solutions that fit user personas.

In the Ideate phase, information was analyzed by employing Kansei Engineering with a quantitative method to reveal the users' emotional perceptions of the product. 11 Kansei words in total were captured and analyzed by PCA. Two principal components with eigenvalues >1 were extracted, which accounted for 100% of the variance in the data, with the eigenvalues equal to 9.653 and 1.347. The first factor was constructed as a perception dimension of professional and tidy looks, and the second factor is represented as a simple and convenient design. This technique aligns with previous works that have successfully employed Kansei Engineering to capture the affective component in product and service design (Hartono, 2020; Hartono et al., 2025; Nugroho et al., 2019; Turumugon & Baharum, 2018)

After varimax rotation, four words (Clear, Professional, Modern, Systematic) were loaded into the first dimension, which was termed the Professional Concept. The second subscale is called the Simple Concept, with items (Simple, Easy, and Neat). These elements are two emotional dimensions that drive the design activity to formulate the principles as a basis for implementing design artifacts in the application prototype. During development, efforts were made to accommodate different user preferences in the interface design.

Subsequent analysis with the Partial Least Squares (PLS) Regression process preserved design features corresponding to values greater than the average coefficient and removed features with negative or lower values. For the professional concept, 7 design elements remained, and for the simple concept, 7 elements. These form the foundations of an interface with emotional resonance with how users feel. This approach is shown to be a delicate tool in mapping user perceptions to design elements, as demonstrated by previous research that incorporates PLS with Kansei Engineering in UI decision-making (Hartono, 2020; Nugroho et al., 2019)

In the Testing, 15 subjects tested each prototype. The findings indicated that all tasks were successfully performed and the Professional Concept was more effective and efficient with faster completion times and fewer errors than the Consumer Concept, especially for complex tasks. The PSSUQ findings confirmed these findings, with Professional Concept scoring significantly higher regarding overall satisfaction (2.05 versus 2.23), system quality, clarity of information, and interface quality. Both designs were well accepted in comparison with IBM's PSSUQ Norm (2.82), and the Professional Concept was the highest, representing a better fit with the operational requirements and emotional expectations of manufacturing industry users.

Conclusion

This study proves the viability of combining Kansei Engineering and Design Thinking for the creation of user-centric mobile UI/UX designs in a manufacturing setting. Based on a systematic integration of affective preferences and usability requirements, the study developed two design prototypes - Professional Mode and Simple Mode, which were then evaluated in terms of task performance and user satisfaction measures.

The findings indicate that it is Professional Mode, focusing on a structured layout and serious visual tone, that did better in terms of both usability and emotional alignment, especially for users with production and maintenance tasks. The results confirm that linking emotional expectations to interface components through PLS analysis can positively affect system usage and user satisfaction.

In addition, this study offers a pragmatic design model that manufacturing companies can utilize to build in-house applications that are not only useful but also emotionally engaging. The combination of empathy-based design exploration and data-driven design decision-making offers a powerful strategy for improving digital transformation efforts in industrial contexts.

Future studies are encouraged to expand the scope of user personas, explore adaptive UI elements for cross-role usage, and evaluate long-term user engagement using behavioral analytics. Overall, this study contributes to the growing field of emotionally intelligent interface design and reinforces the importance of user-driven innovation in enterprise system development.

Author's Contribution

The author independently conducted all stages of the research and writing process, including formulating research objectives, literature review, data collection, UI/UX prototype development, data analysis using factor analysis and PLS, usability testing, and interpretation of results. The author also designed the paper's draft, revised the paper, and ensured the coherence of the theoretical and methodological framework.

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Declaration of Competing Interest

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