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Measuring the Acceptance Level of User Interface Design of ERP System at PT Allure Alluminio Using Technology Acceptance Model (TAM) Method

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ABSTRACT

The utilization of information technology and the internet in the industry is generally done through the implementation of Enterprise Resource Planning (ERP) systems to manage business processes. The success of ERP system implementation requires efforts to support and prevent failure risks. One of the risk factors for failure is the User Interface (UI) design of the ERP system. Good UI design that meets user needs needs to be considered. This research utilizes the Design Thinking (DT) method to create a good UI design and the Technology Acceptance Model (TAM) method to measure the acceptance of UI design in the manufacturing module of PT Allure Alluminio. The DT method was chosen as the UI design method for the ERP system because it is considered more creative in generating product concepts compared to other standard methods and TAM was chosen as one of the best methods for explaining technology acceptance and is a popular and commonly used approach. The UI design process is carried out in 6 phases of DT under the guidance of the Person in Charge (PIC), and the acceptance of UI design is measured after system implementation. Acceptance measurement is conducted using TAM with navigation and UI design variables as external variables, which are taken from previous research, and it tests the variables of Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention to Use (BITU) among 50 users of the ERP system in the manufacturing module at PT Allure Alluminio through a Google Form questionnaire. The collected data is analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 3.2.9. The research results indicate that the DT method is effective for UI design as it involves users. The analysis shows that the use of ERP systems is influenced by perceived usefulness and ease of use, but not influenced by UI design. Navigation and UI design provide ease of use.

1 Introduction

Information and communication technology continues to rapidly evolve over time. The internet, as a network that connects devices, has played a significant role in this progress. Data from Statista shows that as of July 2022, more than 5 billion people are using the internet (Statista, 2022a). Internet usage has also increased in various regions, with Asia being the largest region in 2021, with a total of 2.7 billion users (Statista, 2022b). This demonstrates the rapid development of technology and the internet, which has now become an integral part of our lives. Almost every aspect of life today relies on information technology and the internet, including the industry. One common way companies harness information technology and the internet is using Enterprise Resource Planning (ERP) systems. ERP systems are integrated systems that help companies streamline their business processes and have a significant impact on business success (Cadersaib et al., 2020). With the presence of ERP systems, companies can become more efficient and effective in their business operations.

PT Allure Alluminio, a growing company in Jakarta, has started using an ERP system. They are a provider of Alluminio for residential and commercial needs. The implementation of ERP at PT Allure Alluminio is the first of its kind in the company. They collaborated with the Department of Computer Science at Universitas Negeri Semarang through the Kedaireka 2022 program to develop the ERP system. Previously, PT Allure Alluminio only relied on computer technology with Excel documents as a means of communication between divisions. The use of complex Excel sheets required employees to read carefully, posing risks of errors and lack of precision in communication. Therefore, the company needs to enhance technology utilization by implementing an ERP system to improve operational efficiency (Madanhire & Mbohwa, 2016). However, the development of the ERP system at PT Allure Alluminio needs support to ensure successful implementation and achieve the expected benefits by addressing implementation challenges, including User Interface (UI) design (Menon et al., 2019). Therefore, this is important to be considered in the process of developing an ERP in a company.

UI design is the way we interact with a computer through a device (Churchiville, 2021). UI serves as a bridge between users and the system being used. Good UI design is crucial because it is the first thing seen and used by users. In addition to its appearance, UI should also be user-friendly (Kusuma et al., 2022). Good UI design can reduce users' fear of technology. Therefore, UI design influences users' intention to use technology (Cheng, 2021). There are several methods used in UI design, one of which is Design Thinking (DT). DT is a creative design method that focuses on user needs and can generate business innovations (Kwon et al., 2021). This method involves users throughout the design process until completion.

This study focuses on the application of the DT method to create the UI design of the first ERP system at PT Allure Alluminio, and it utilizes the Technology Acceptance Model (TAM) to measure user acceptance of the design. The DT method will be used to build the UI design that will be implemented in the ERP system, while the TAM method will be used to measure the level of acceptance of the implemented design. The DT method was chosen as the UI design method for the ERP system as it is considered more creative in generating product concepts compared to other standard methods (Meinel et al., 2020). Additionally, DT was selected to minimize the risk of innovation failure and ensure sustainable positive effects (Buhl et al., 2019). After the UI design is built and implemented into the ERP system, the acceptance level of the design will be analyzed using the TAM method.

The TAM method, developed by Davis in 1985 as an extension of the Theory of Reasoned Action (TRA) method, is used to examine the acceptance of information technology (Chau, 1996). This method is also useful for measuring the level of acceptance of UI design in a technology. TAM is considered one of the best methods for explaining the acceptance of information technology and is a popular and commonly used approach (Taherdoost, 2019). Acceptance measurement is crucial, especially in addressing UI design issues in the implementation of ERP systems (Menon et al., 2019). ERP systems require significant investment; therefore, support for the successful implementation of these systems is essential.

2 The Proposed Method

2.1 Enterprise Resource Planning (ERP)

ERP is an information system that can be configured to plan and manage organizational resources more efficiently, productively, and profitably (Laukkanen et al., 2007). Initially, ERP was developed from the Material Requirement Planning (MRP) system, which aimed to transform production plans into material requirements schedules (Sheik & Sulphey, 2020). The ERP system consists of various integrated modules that assist companies in their business operations by providing a shared database and consistent real-time information across all parts of the organization (Monk & Wagner, 2012; Woźniakowski et al., 2018). Although implementing ERP incurs significant costs, such as software expenses, additional hardware, training, and implementation support, the long-term benefits it provides, such as business sustainability, make it a worthwhile investment (Ragowsky & Somers, 2002; Anaya & Qutaishat, 2022). However, it is important to note that the benefits of implementing an ERP system are not instant and require time.

High implementation costs do not guarantee success and significant impact. Many cases of failure in implementing ERP systems have occurred. Several factors contributing to these failures include implementation team instability, interface issues, inadequate testing, tight time constraints, pressure, use of foreign labor, resistance to change, short maintenance periods, inadequate data processing, excessive customization, and lack of leadership understanding of its complexity (Menon et al., 2019). Therefore, thorough preparation is necessary to support the successful implementation of ERP systems in companies or organizations.

2.2 User Interface (UI)

UI design is a crucial aspect in software usage (Oppermann, 2002). UI design is the visible and user-interfaced part of software (Myers, 1996). UI plays a significant role in almost every computer system (Stone et al., 2005). UI design serves as a communication bridge between users and the system being used. The presence of UI enables users to interact with the system or software without the need to understand complex computer codes. Good UI design provides visually appealing impressions to users. However, not all visually appealing UI layouts align with user needs, and opinions about design quality can vary. (Kay, 1990) states that UI design should consider human cognitive abilities, such as the ability to perform actions, understand images, and symbols. In addition to aesthetic aspects, a good UI should also be easy for users to interact with (Kusuma et al., 2022). UI design also needs to consider user interaction habits with similar systems or devices (Miraz et al., 2021). This is related to user experience (UX), so discussions about UI are inherently linked to UX.

2.3 User Experience (UX)

UX is the interaction between users and a product or system (Zappa, 2022). It involves the personal experience perceived by users when using the product or system. UX is not only about how the product or system works but also about how people interact with that experience externally (Garrett, 2010). UX encompasses visual, aesthetic, and emotional aspects (Bollini, 2017). Benyon (2019) also states that UX involves the feelings, sensations, thoughts, and actions of users in an event or activity. UX is not just about technology, industrial design, or interfaces. It is about creating meaningful experiences through devices (Hassenzahl, 2013). Designing good UX is an essential part of technology that offers meaningful, engaging, valuable, and aesthetic experiences.

2.4 Design Thinking (DT)

The DT approach essentially involves a consistent mindset and thinking process of a designer (Liu & Group, 1996). DT is an approach that focuses on the user to solve problems and create innovations that make products unique and have a competitive advantage (Gibbsons, 2016). It is defined as a design approach that is oriented towards solving human problems (Nakata & Hwang, 2020). DT is an iterative process where designers strive to understand user needs, validate assumptions, and redefine problems to identify strategies and solutions (Dam & Siang, 2018). DT emphasizes a deep understanding of the target users in developing products. This approach involves experimentation and testing as concepts are materialized, and users are engaged in prototype development and research (Micheli et al., 2018). DT enables communication between the development team and users throughout the product creation project, ensuring that the resulting product meets user needs (Pereira & Russo, 2018). DT consists of six phases: empathize, define, ideate, prototype, test, and implement.

2.5 Technology Acceptance Model (TAM)

TAM is a method developed by Davis (1985). This method is an extension of the TRA method developed by Fishbein and Ajzen (1975). TAM is used to explain the user's tendency to accept systems or technologies (Tesis, 2018). This method provides a theoretical basis for understanding the factors that influence the acceptance of technology in organizations or society. TAM has been proven to be a useful theoretical model in understanding user behavior in implementing information systems (Chen et al., 2011). The TAM method can be applied in various fields, including measuring the level of user acceptance of applications, including in the field of UI/UX. Understanding the important role of TAM can help design UI that is user-friendly. The components of TAM by Davis (1985) can be seen in Figure 1.

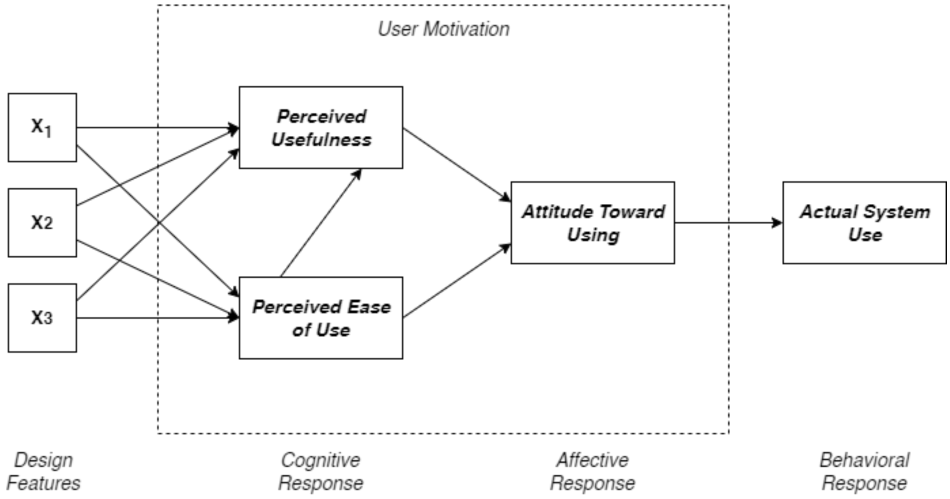

Figure 1. TAM Model 1 by Davis (1985)

3 Method

This study is a combination of qualitative and quantitative research methods that involve interviews, observations, and questionnaire surveys with respondents from PT Allure Alluminio. The aim is to explore how to create a good UI design that meets user needs using the DT approach and measure the level of acceptance of the implemented ERP system's UI design using TAM. The distribution of questionnaires aims to obtain user evaluations of the manufacturing system UI after the system implementation at PT Allure Alluminio. The research flowchart can be seen in Figure 2.

This research is part of the Kedaireka ERP 2022 internship program organized by the Department of Computer Science, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang. The activities were conducted at the Sekaran Campus of Semarang State University with the online participation of users or Persons in Charge (PIC) from PT Allure Alluminio. This study focuses on the design and development of UI for the manufacturing module within the ERP system using the DT method. It also focuses on measuring the acceptance of the UI design after the implementation of the ERP system at PT Allure Alluminio using the TAM method. This research also considers the external variables of navigation and UI design that support the use of the TAM method. The variables and research hypotheses can be seen in Figure 3.

The research variables used in this study consist of external variables and variables from the TAM method. The external variables used are navigation and UI design, which have been studied in previous research by Hong et al. (2011), Cheng (2021), and Pandito (2022). Meanwhile, the variables from the TAM method used are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Behavioral Intention to Use (BITU). Hafidz et al. (2022) have stated that not all variables from TAM are used in this study, but only the predetermined variables. Data to test the acceptance of the UI design system using the TAM approach will be collected through the distribution of questionnaires. These questionnaires will include questions related to the variables used in the study, both external variables and TAM variables. The questionnaires will be prepared in the form of Google Form and distributed to respondents who are users of the ERP system at PT Allure Alluminio, especially those who use the manufacturing system from February 13, 2023, until completion.

Based on the observations and interviews conducted, it was found that the number of users of the manufacturing ERP system in the population is 50 people. Therefore, in this study, the sample used is the entire population or 100% of that number. This approach refers to the opinion of Yount (2006), who stated that if the population is less than 100, the sample taken should include the entire population. Thus, the data obtained will be used in full even though the sample size is less than 100%.

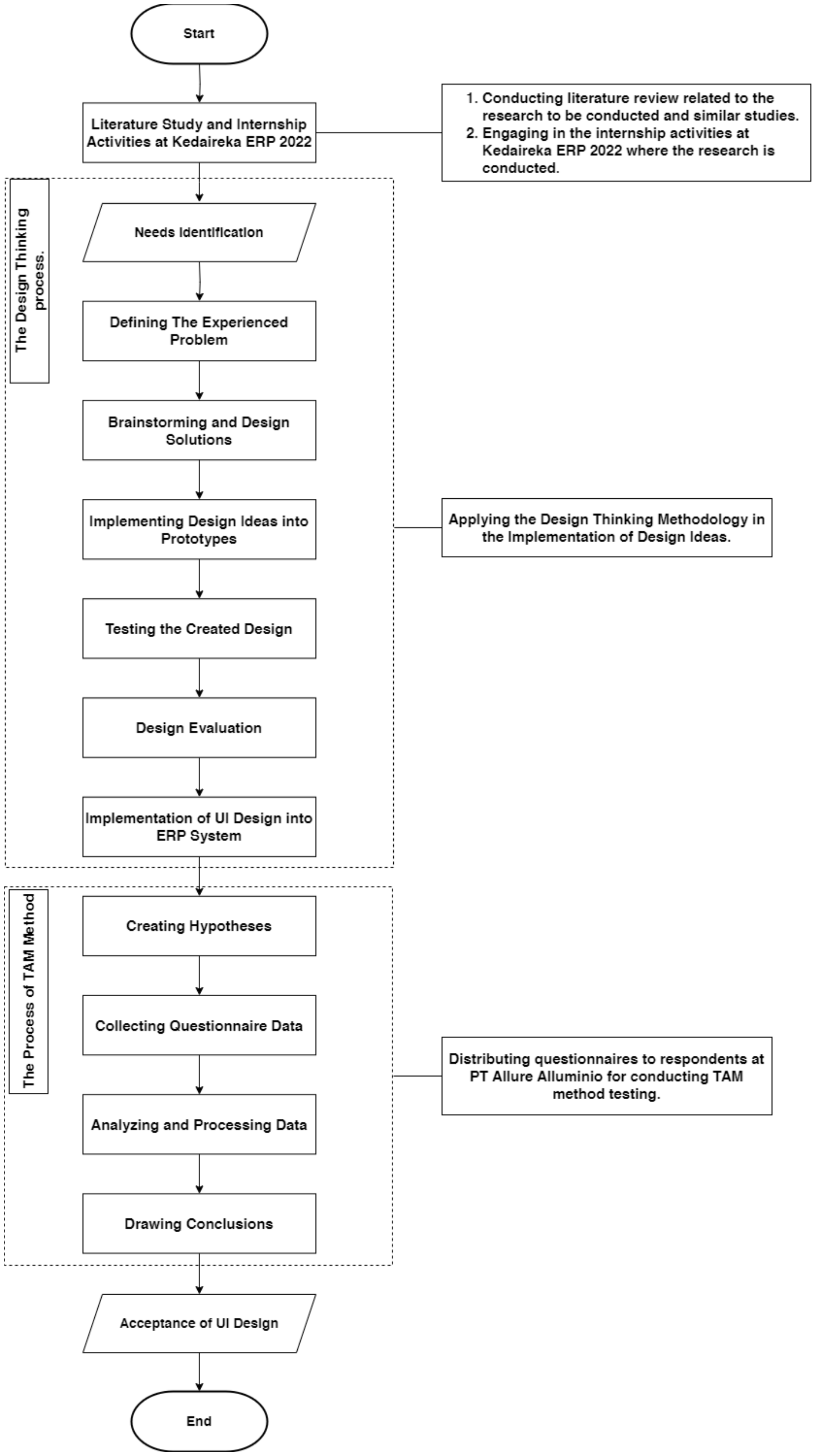

Figure 2. Research Flow

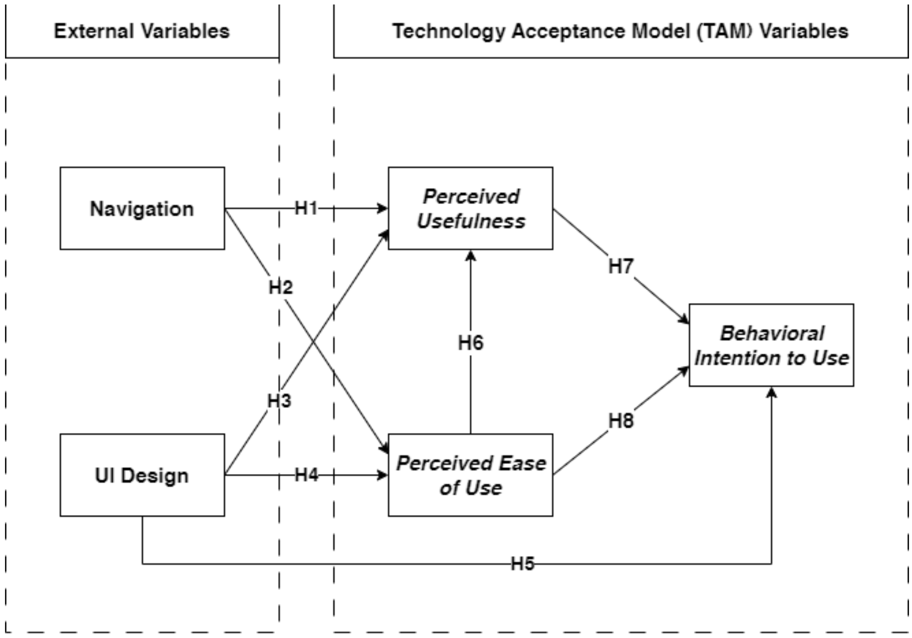

Figure 3. Research Variables and Hypotheses

The data collected through the questionnaire will be processed using SmartPLS 4 software, employing the Partial Least Squares Structural Equation Modeling (PLS-SEM) method. PLS-SEM is a statistical method introduced by Wold (1982) and further developed by Lohmöller (1989). This method involves weighted regression on the underlying components or variance vectors in the analysis (Ringle et al., 2022). The selection of PLS-SEM as the data analysis technique in this study is based on its ability to handle data with complex models involving multiple variables and constructs (Latifah et al., 2021). This approach also aligns with the views of Sarwono (2012), Wong (2013), and Hair and Alamer (2022), who suggest that PLS-SEM can be a good alternative for data analysis, especially when the sample size is limited. For example, Chin and Newsted (1999), cited by Sarwono (2012), stated that PLS-SEM can be properly applied with as few as 20 sample data points.

4 Results and Discussion

4.1 Design Thinking Process

4.1.1 *Empathize*

The empathize process is conducted to gain a deeper understanding of the challenges faced by the company. This research stage involves interviews and observations with 3 informants from PT Allure Alluminio. The maximum duration for interviews and observations is limited to 60 minutes to ensure that it does not disrupt the informants' work schedule. Interviews and observations are conducted in 2 stages. In the first stage, face-to-face interviews and observations are conducted with Informant 1 (Marketing Manager) and Informant 2 (PPIC Manager) at PT Allure Alluminio on July 21, 2022. In the second stage, online interviews and observations are conducted via Zoom Meeting with Informant 2 (PPIC Manager) and Informant 3 (PPIC Manager), who are also the PICs from PT Allure Alluminio in the Kedaireka ERP 2022 program on August 1, 2022.

4.1.2 *Define*

This phase is a step to understand the problem based on user research findings. The research involved three interviewed and observed participants from the previous stage. The research findings are then organized and developed into persona profiles. Persona is a user profile created based on research findings (Supadnomo, 2021). Personas provide an overview of the characteristics of users who will use the system. The personas created in this study can be seen in Figure 4.

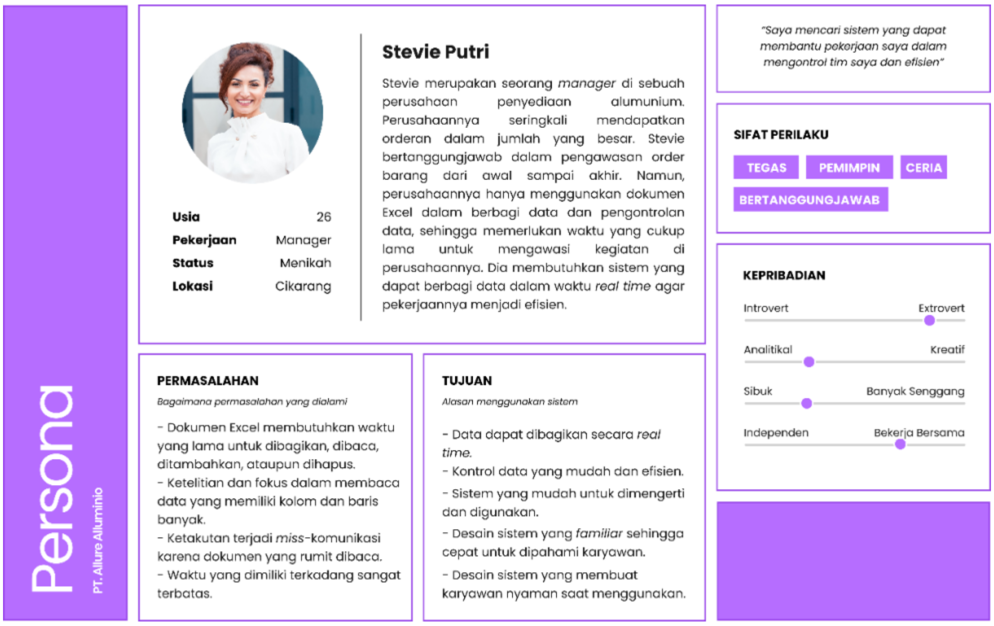

Figure 4. User Persona

4.1.3 *Ideate*

The ideate phase is a step to find solutions to the problems experienced by users through design ideas and brainstorming. Communication with the team and the Person in Charge (PIC) from PT Allure Alluminio is conducted to generate design ideas that align with the needs and research findings. Many design ideas are generated to provide users with various options for UI designs that suit their needs. The author (UI/UX 1) communicates with other designers (UI/UX 2) to determine the form of the UI design to be created. In addition, the selection of several UI design references that could be used is also done through the Pinterest website. Discussions are also held regarding the functions of elements such as buttons, dropdowns, and others that align with the requested user needs. The results of the communication and brainstorming with other designers in the manufacturing team are then presented and discussed with the team leader and members through an offline meeting. The purpose of the meeting is to gather suggestions and input regarding the design to be implemented. The design ideas that have been communicated and approved by the team are then materialized in the form of prototypes using Figma. The use of Figma was chosen because this platform allows collaboration and communication with the team, and it is one of the commonly used platforms for designing UI.

4.1.4 *Prototype*

The design ideas and brainstorming are then materialized into UI design prototypes in this phase. The designs will be created using the Figma platform, which enables online collaboration and team communication through the internet. The initial stage involves determining the design system to be applied to the ERP system, including font selection, font size, colors, buttons, and status displays. The details of the UI design can be seen in Figure 5 and Figure 6. After the design system is established, the creation of the initial UI design for the manufacturing module of the ERP system will proceed. Several examples of UI designs created in Figma are showcased in Figure 7, which is the dashboard page, Figure 8, which is the FPPP page, and Figure 9, which is the add lead page.

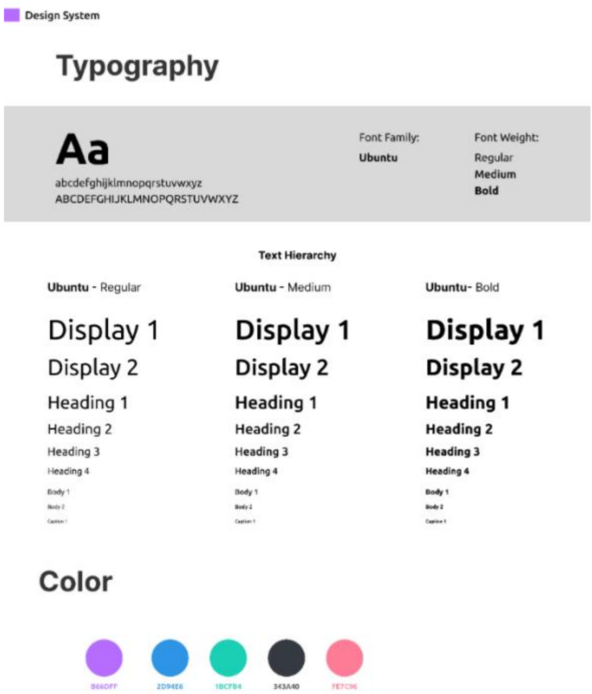

Figure 5. Design System Font and Color

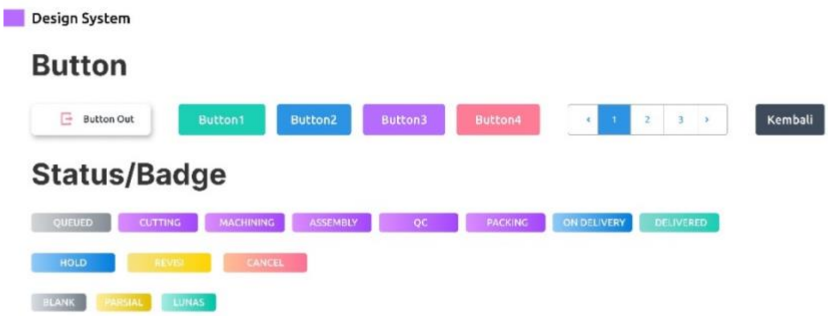

Figure 6. Design System Button and Badge

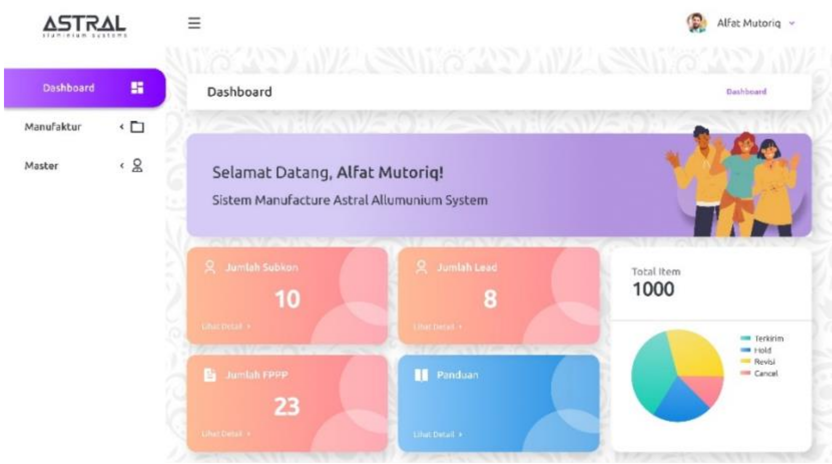

Figure 7. Manufacturing Dashboard Page UI Display

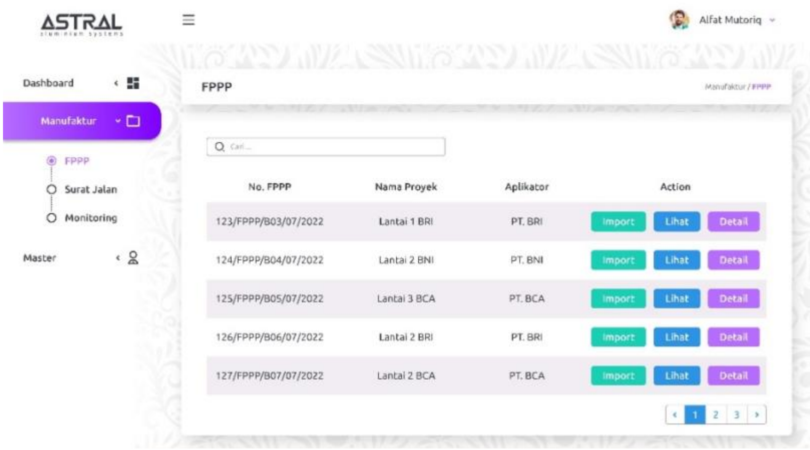

Figure 8. FPPP Manufacturing Page UI Display

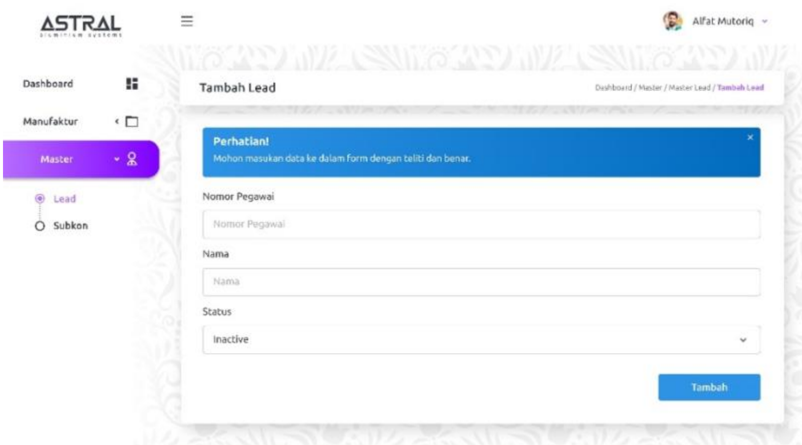

Figure 9. UI Display of Add Manufacturing Lead Page

4.1.5 *Test*

The created UI designs and prototypes are then presented and demonstrated to the PIC from PT Allure Alluminio through a 1-2 hour Zoom Meeting. The presentation and demonstration are conducted sequentially for each module implemented in the ERP system. The PIC provides feedback regarding the progress and changes that need to be made, including additions, deletions, and improvements to the system interface. The process in this testing phase falls under the category of black-box testing, where the PIC only sees the flow of the designs to be implemented and does not observe the system implementation details. Testing is carried out multiple times until reaching the final testing phase, where all UI designs have been approved by the PIC.

4.1.6 *Implement*

The approved and evaluated UI designs are then implemented in the form of a front-end connected to the back-end and database. The code for the manufacturing module and other modules is committed and pushed to GitHub. The use of GitHub was chosen so that the activities of the participants in the Kedaireka ERP 2022 program could be monitored by the lead and program chair. Monitoring is done by tracking the number of commits and pushes by participants on GitHub for each module. The modules that have been approved in terms of UI design and functionality are then integrated into a complete ERP system.

The UI design integrated into the front-end, back-end, and database has undergone testing stages together with the PIC. Therefore, the UI design implemented in the ERP system using the DT method can be considered valid as there were no change requests from the PIC regarding the UI design. The successful use of the DT method in this research is deemed effective in meeting user needs. This aligns with previous research by Suzianti and Arrafah (2019), which highlights that DT can provide suitable

UI designs that meet user requirements. This outcome is achieved because all UI designs have been approved and can be implemented in the ERP system without or with minimal revisions.

4.2 Measurement of Acceptance Rate of UI Design

4.2.1 *Respondent Data*

The research questionnaire was provided to the users of the manufacturing module in the ERP system at PT Allure Alluminio through Google Form. Subsequently, the distributed questionnaires were collected by the PPIC manager based on the respondents' availability to complete the questionnaire. Before processing the data, data cleaning was conducted to identify empty or duplicate data. The cleaning of empty and duplicate data was performed using Microsoft Excel. The results of the data cleaning can be seen in Table 1. After the data cleaning process, the data was processed to determine the level of acceptance towards the UI design that has been implemented in the ERP system.

Table 1. Research Respondent Data

	Amount	Percentage
Gender		
Male	45	90%
Female	5	10%
Age Range		
18 – 25 years old	20	40%
26 – 35 years old	21	42%
36 – 45 years old	7	14%
46 – 55 years old	2	4%
56 – 65 years old	0	0%
Length of Work		
Less than 1 year	8	16%
1 – 3 years	11	22%
3 – 5 years	23	46%
More than 5 years	8	16%
Position		
Manager PPIC	2	4%
Administrator PPIC	8	16%
Administrator	5	10%
Production Leads	6	12%
Productions Operator	18	36%
Logistics Leads	3	6%
Logistics Operator	8	16%

4.2.2 *Validity Test*

Validity is used to measure the accuracy of the data measurement being conducted (Yusup, 2018). The validity of the research instrument evaluates the extent to which the instrument measures what it is intended to measure (Mohajan, 2017). The validity test in this study utilizes SmartPLS and is divided into two parts, namely convergent validity test and discriminant validity test. The research instrument must pass both validity tests to be considered valid.

4.2.3 *Convergent Validity Test*

Convergent validity test is based on outer loading and Average Variance Extracted (AVE) values. The research instrument is considered to have convergent validity if the outer loading values of each indicator are > 0.7 and the AVE value is > 0.5 (Wong, 2013; Taherdoost, 2016; Lestari et al., 2019; Pering, 2020; Latifah et al., 2021). The results of the outer loading test can be seen in Table 2.

Table 2. Outer Loading Value

	Navigation	UI Design	PU	PEOU	BITU
NV1	0,846				
NV2	**0,695**				
NV3	0,781				
UI1		0,836			
UI2		0,864			
UI3		**0,083**			
PU1			0,882		
PU2			0,887		
PU3			**0,639**		
PEOU1				0,866	
PEOU2				0,884	
PEOU3				0,790	
BITU1					0,865
BITU2					0,842
BITU3					**0,373**

Based on Table 2, there are indicators NV2, UI3, PU3, and BITU3 with outer loading values < 0.7, indicated by bold font, which indicates non-compliance. According to (Tambun & Permana, 2019), indicators with outer loading values < 0.7 need to be removed. Therefore, the indicators with values < 0.7 are removed. The results of the outer loading after removing indicators NV2, UI3, PU3, and BITU3 can be seen in Table 3.

Table 3. Outer Loading Value After Deleting

	Navigation	UI Design	PU	PEOU	BITU
NV1	0,892				
NV3	0,810				
UI1		0,840			
UI2		0,860			
PU1			0,908		
PU2			0,911		
PEOU1				0,868	
PEOU2				0,886	
PEOU3				0,786	
BITU1					0,877
BITU2					0,866

After these indicators have passed the comparison of outer loading values, the research variables should also have AVE values > 0.5 to be considered valid in terms of convergent validity. The AVE values of these research variables are presented in Table 4.

Tabel 4. AVE Value

Variable	**AVE Value**
Navigasi	0,726
Desain UI	0,722
PU	0,827
PEOU	0,719
BITU	0,760

Based on the measurement of outer loading values and AVE, all tested variables are considered to have convergent validity. All variables have met the criteria with outer loading values > 0.7 and AVE > 0.5, indicating that they have passed the convergent validity test. Next, discriminant validity testing is conducted to ensure that the research variables are also valid in terms of discriminant validity.

4.2.3.1 *Discriminant Validity Test*

Discriminant validity testing is conducted by comparing the cross-loading values of each indicator. The cross-loading values of indicators within the same variable should be higher than the cross-loading values of indicators from other variables. In short, the cross-loading values of indicators NV1 and NV3 in the navigation variable column should be higher than the values of other variable indicators in the same row, and the same applies to other indicators. The cross-loading values can be seen in Table 5.

Table 5. Cross Loading Value

	Navigation	UI Design	PU	PEOU	BITU
NV1	0,892	0,587	0,597	0,734	0,595
NV3	0,810	0,449	0,474	0,554	0,443
UI1	0,553	0,840	0,373	0,569	0,498
UI2	0,495	0,860	0,425	0,561	0,553
PU1	0,566	0,458	0,908	0,764	0,791
PU2	0,588	0,398	0,911	0,746	0,819
POEU1	0,617	0,485	0,793	0,868	0,806
PEOU2	0,715	0,660	0,687	0,886	0,764
PEOU3	0,614	0,547	0,625	0,786	0,654
BITU1	0,460	0,571	0,839	0,689	0,877
BITU2	0,620	0,507	0,701	0,845	0,866

Based on Table 5, the comparison of cross-loading values on the indicators within each variable shows that these values are highlighted in gray and are higher than the values of other indicators in the same row. This indicates that all tested variables, namely navigation, UI design, PU, PEOU, and BITU, are declared to be valid discriminantly. These results also indicate that these variables are valid both convergently and discriminantly.

4.2.4 ***Reliability Test***

The data that has been tested for its validity is then subjected to a reliability test. Reliability refers to the measurement that provides consistent results with the same values. The reliability test is conducted to evaluate the accuracy of the research instrument. The values of Composite Reliability (CR) and Cronbach's Alpha are used as references to assess the reliability of the research instrument. If the CR value > 0.7 and Cronbach's Alpha value > 0.6, then the research instrument is considered reliable. The results of the CR values from the reliability test that has been conducted can be seen in Table 6, and the Cronbach's Alpha values can be seen in Table 7.

Table 6. CR Value

Variable	**CR Value**
Navigation	0,841
UI Design	0,839
PU	0,905
PEOU	0,884
BITU	0,863

Table 7. Cronbach's Apha Value

Variable	Cronbach's Alpha Value
Navigasi	0,628
Desain UI	0,616
PU	0,791
PEOU	0,803
BITU	0,684

Table 6 shows that the navigation and UI design variables have CR values of 0.841 and 0.839, respectively, exceeding the minimum value of 0.7 for reliability. Therefore, both variables can be considered reliable. The PU, PEOU, and BITU variables also have CR values of 0.905, 0.884, and 0.863, respectively, exceeding the minimum value of 0.7, indicating that these variables also meet the reliability criteria. All variables in this study are considered reliable as they have adequate CR values.

Based on Table 7, all tested variables have Cronbach's Alpha values above 0.6. This indicates that all variables meet the reliability criteria. These findings confirm that the variables in this study are dependable, with CR values exceeding the threshold of 0.7 and Cronbach's Alpha values surpassing 0.6. Therefore, this reliability testing concludes that the data used in this study are valid and reliable. This enables further analysis of the data to test the research hypotheses.

4.2.5 ***Multicollinearity Test***

The multicollinearity test aims to examine whether there is a linear relationship among the tested independent variables. According to Meiryani (2021), multicollinearity is an indication of a linear relationship between some or all of the independent variables in a regression model. The multicollinearity test in this study uses the Variance Inflation Factor (VIF) value. If the VIF value is < 5, there is no evidence of multicollinearity among the tested independent variables in the study (Sarstedt et al., 2019). The VIF values resulting from the multicollinearity test using SmartPLS can be seen in Table 8.

Table 8. VIF Value on Multicollinearity Testing

	Navigation	UI Design	PU	PEOU	BITU
Navigation			1,610	2,541	
UI Design			1,610	1,884	1,862
PU					3,346
PEOU			2,826		4,668
BITU					

Based on Table 8, the results of the multicollinearity test using SmartPLS show that all VIF values are below 5. This indicates that there is no multicollinearity among the tested variables. Thus, the research model can be used to predict the tested hypotheses.

4.2.6 ***Linearity Test***

The linearity test is important to examine whether the relationships between the variables are linear or not. In PLS-SEM, the linearity test is used to ensure that the constructed model meets the classical assumptions and that the statistical analysis results can be interpreted validly. This test is conducted using Quadratic Effect and Bootstrapping on each tested variable or hypothesis. The Bootstrapping results provide p-value for each variable. According to Sarstedt et al. (2019), if the p-value is > 0.05, then the tested variables are considered linear and meet the assumptions. The linearity test results, including the p-value from Quadratic Effect, can be seen in Table 9.

Table 9. Linearity Test Results

Variable	*P-Values*
Navigation → PU	0,243
Navigation → PEOU	0,271
UI Design → PU	0,188
UI Design → PEOU	0,221
UI Design → BITU	0,351
PEOU → PU	0,154
PU → BITU	0,253
PEOU → BITU	0,478

Based on Table 9, the p-values of all tested variables in this study have values > 0.05. This indicates that the tested variables exhibit linearity. These results indicate that the variables in this study satisfy the assumption of linear effects in the model.

4.2.7 *Endogenity Test*

In the endogeneity test, statistical methods such as Gaussian Copula and Bootstrapping are used to examine whether there is a causal relationship or reciprocal influence between variables in the model. The endogeneity test is important to ensure that the relationship between endogenous and exogenous variables in the model represents valid causality rather than a feedback relationship. In the endogeneity testing using SEM-PLS in SmartPLS, the p-value from Gaussian Copula is used. If the p-value is greater than 0.05, there is endogeneity in the tested variables (Hult et al., 2018; Hair et al., 2019; Isabel et al., 2021). The results of the endogeneity test can be seen in Table 10.

Table10. Endogenity Test Results

Variable	*P-Value*
Navigation → PU	0,458
Navigation → PEOU	0,377
UI Design → PU	0,426
UI Design → PEOU	0,407
UI Design → BITU	0,271
PEOU → PU	0,060
PU → BITU	0,202
PEOU → BITU	0,471

Based on Table 10, the results of the endogeneity test using Gaussian Copula and Bootstrapping show that all variables tested in this study obtained p-values > 0.05. This indicates that there is a reciprocal relationship or mutual influence between the variables involved in the tested model.

4.2.8 *R-Square Test (R^2)*

The R2 test aims to measure the extent to which the dependent variable is explained by its independent variables in the Goodness of Fit (GoF) test. The R2 value ranges from 0 to 1, and there are classifications of significance levels based on the range of R2 values. The range of 1 to 0.75 indicates a high level, the range of 0.74 to 0.5 indicates a substantial level, the range of 0.49 to 0.25 indicates a moderate level, and the range of 0.24 to 0 indicates a weak level. The results of the R2 test can be seen in Table 11.

Table 11. R^2 Value

Variable	R^2 Value	Explanation
PU	0,702	Substantial
PEOU	0,646	Substantial
BITU	0,860	High

Based on Table 11, the PU variable has an R2 value of 0.702, which means that approximately 70.2% of the variation in the PU variable can be explained by the navigation, UI design, and PEOU variables as independent variables. The remaining 28.8% is influenced by other factors. Furthermore, the PEOU variable has an R2 value of 0.646, indicating that around 64.6% of the variation in the PEOU variable can be explained by the navigation and UI design variables as independent variables. Other factors account for 35.4%. Finally, the BITU variable has an R2 value of 0.860, or approximately 86.0% of the variation in the BITU variable is influenced by its independent variables, namely PU, PEOU, and UI design. The remaining 14.0% is affected by other factors.

4.2.9 *Path Coefficient Test*

In the final testing, the formulated hypotheses were examined using path coefficient analysis. This test was conducted using Bootstrapping in SmartPLS with a subsample of 5000 to obtain more stable and accurate results (Hair et al., 2017). The path coefficient analysis refers to the t-statistic values and p-values presented in the SmartPLS output. In this study, we use the t-statistic values as references, where the hypotheses are accepted if the t-statistic value is greater than 1.64 (one-tailed t-table) (Jogiyanto, 2017; Fahleti, 2018). The results of the path coefficient analysis can be seen in Table 12.

Tabel 12. Hasil Uji Koefisien Jalur

Hypothesis	*T-Statistic*	*P-Value*	Explanation
Navigation → PU (H1)	0,289	0,386	Rejected
Navigatiom → PEOU (H2)	5,362	0,000	Accepted
UI Design → PU (H3)	1,302	0,096	Rejected
UI Design → PEOU (H4)	2,549	0,005	Accepted
UI Design → BITU (H5)	1,632	0,051	Rejected
PEOU → PU (H6)	6,896	0,000	Accepted
PU → BITU (H7)	5,612	0,000	Accepted
PEOU → BITU (H8)	2,773	0,003	Accepted

Based on Table 12, three out of eight hypotheses were rejected in this study, indicated by the red-colored columns. The three rejected hypotheses are the influence of navigation on PU (H1), the influence of UI design on PU (H3), and the influence of UI design on BITU (H5). The t-statistic values for H1, H3, and H5 are < 1.64, indicating that these hypotheses are rejected. On the other hand, H2, H4, H6, H7, and H8 are accepted as their t-statistic values are > 1.64.

4.3 Hypothesis Discussion

Based on the analysis, H1 is rejected as the navigation variable does not positively influence PU. This differs from the findings of Calisir and Calisir (2004) and Pandito (2022), where they found a significant impact of navigation on perceived usefulness. However, the analysis shows that the navigation variable has a positive influence on PEOU (H2), aligning with the findings of Nangin et al. (2020) and Manalu et al. (2022) regarding the impact of clear navigation, functional buttons, and page clarity on system usability. Additionally, H3 is rejected as the t-statistic for H3 is 1.302 < 1.64. Consequently, it can be concluded that the UI design of the manufacturing module in the ERP system does not significantly influence PU. This contradicts the findings of Tsai et al. (2017) and Pandito (2022), who demonstrated a positive impact of UI design on PU. Furthermore, the analysis of the t-statistic value for the H4 test in Table 12 indicates a value of 2.549 > 1.64, supporting the acceptance of H4. This is consistent with the findings of Ramayah (2006), Hong et al. (2011), Nikou and Economides (2017), and Eraslan Yalcin and Kutlu (2019), who found a positive influence of UI design on PEOU perceived by users.

The UI design variable does not have a positive influence on BITU, leading to the rejection of H5. This contradicts the findings of Hong et al. (2011) who found a positive influence of UI design on BITU. On the other hand, the t-statistic value from the H6 test in Table 12 is 6.896 > 1.64, indicating that H6 is accepted. This demonstrates the positive influence of PEOU on PU, aligning with the research findings of Nikou and Economides (2017) and Eraslan Yalcin and Kutlu (2019). Similarly, the t-statistic value from the H7 test in Table 12 is 5.612 > 1.64, confirming the acceptance of H7. This highlights the positive influence of PU on BITU, consistent with the research by by Tsai et al. (2017) and Eraslan Yalcin and Kutlu (2019). Lastly, the t-statistic value from the H8 test in Table 12 is 2.773 > 1.64, indicating the acceptance of H8. This supports the research findings of Nikou and Economides (2017) regarding the positive influence of PEOU on BITU.

Based on the explanation, the ERP system's manufacturing module at PT Allure Alluminio is well-received by users, specifically in terms of navigation (H2) and UI design (H4). The navigation and UI design have an intuitive flow compared to the previous use of Excel documents. Despite minor changes, the users find the implemented navigation and UI design easy to use. However, the perceived usefulness of the navigation (H1) and UI design (H3) is not strongly felt by the users due to the lack of significant changes. The ease of data sharing among divisions or modules contributes to its perceived usefulness (H6) and enhances work effectiveness. The analysis reveals that users' intention to use the ERP system is primarily influenced by perceived usefulness (H7) and ease of data sharing (H8) with other modules, while the UI design does not impact their intention to use the system (H5).

Based on these results, it can be concluded that the ERP system's manufacturing module has perceived usefulness and ease of use, enabling users to communicate with other modules easily. However, the UI design of the system is not fully accepted. Therefore, it is recommended to make improvements to the UI design for future system updates. UI design improvements can be made by making it simpler so that users feel a change in the implemented system. The enhancement of UI design is also expected to increase users' intention to use the system and achieve successful ERP system implementation in the company.

5 Conclusion

Based on the findings of this research, several conclusions can be drawn. The Design Thinking (DT) method was used in the UI design process of the ERP system's manufacturing module at PT Allure Alluminio. This method involved the participation of the PIC in each phase, which aligns with previous research (Suzianti & Arrafah, 2019). The UI design produced using the DT method meets the users' expectations, eliminating the need for changes during implementation.

The questionnaire data analysis shows that all eight hypotheses in this study have been tested regarding the relationships between the external variables (navigation and UI design) and the TAM variables (PU, PEOU, BITU). These five variables are considered valid after passing tests for validity. The research variables are also reliable and meet the standards. The data also meets the assumptions of classical tests as it passes tests for multicollinearity, linearity, and endogeneity. Furthermore, the R2 values indicate that PU is influenced by its independent variables (navigation, UI design, and PEOU) at 70.2%, PEOU is influenced by its independent variables (navigation and UI design) at 64.6%, and BITU is influenced by its independent variables (PU, PEOU, and UI design) at 86.0%. Hypothesis testing using path coefficient analysis reveals that three hypotheses (H1, H3, H5) were rejected due to t-statistic values < 1.64, while five hypotheses (H2, H4, H6, H7, H8) were accepted as their t-statistic values > 1.64.

From the hypothesis testing results, it can be concluded that the UI design of the manufacturing module ERP system at PT Allure Alluminio is easy to use (PEOU) due to its similarity with Excel. However, the UI design falls short in providing perceived usefulness (PU), which does not motivate users to utilize the ERP system (BITU) based on the UI design. Users tend to utilize the system due to the ease offered by the system (PEOU) and the usefulness of the system itself (PU) in data sharing.

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