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Designing and Evaluating a User-Centered Cash Flow Monitoring Dashboard for Higher Education Using Design Thinking and UEQ Framework

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ABSTRACT

Although cash flow monitoring dashboards have been widely implemented in higher education institutions, existing studies predominantly focus on technical development or usability testing, with limited attention to how user-centered design frameworks contribute to financial decision-making effectiveness. This creates a research gap regarding the systematic application of design thinking as a methodological approach for developing and evaluating financial dashboards in university contexts. This study addresses this gap by proposing and evaluating a user-centered cash flow monitoring dashboard developed using a design thinking approach. A descriptive quantitative method was employed through a case study conducted at Sekolah Tinggi Teknologi Terpadu Nurul Fikri. Data were collected through stakeholder interviews and prototype evaluation using the User Experience Questionnaire (UEQ). The design thinking process was implemented across the empathize, define, ideate, prototype, and test stages to ensure alignment between user needs and dashboard functionality. The findings indicate that the proposed dashboard achieved strong performance across key UEQ dimensions, particularly attractiveness, efficiency, and dependability, demonstrating its effectiveness in supporting cash flow monitoring and managerial financial decision-making. Unlike previous studies that emphasize system implementation outcomes, this research provides empirical insights into how design thinking facilitates the translation of user needs into actionable financial information. This study contributes to the literature by offering a structured framework for applying design thinking in the development of financial monitoring dashboards within higher education institutions. The results also have practical implications for universities seeking to improve data-driven financial governance through user-centered financial information systems.

Keywords: Financial Information System, Cash Flow Monitoring Dashboard, Higher Education, Design Thinking, User Experience Questionnaire

1. INTRODUCTION

With the rapid advancement of digital technology, the demand for integrated, efficient, and technology-based financial management systems has become increasingly important, particularly for educational institutions. This is because many educational institutions continue to face challenges in financial management due to the lack of structured and data-driven systems (Mesiono et al., 2024). Effective financial management is essential to generate accurate and relevant information that supports decision-making processes. Properly managed data can reveal valuable insights for institutions, which may influence managerial-level decision-making (Mufiro et al., 2025). Therefore, educational institutions need to implement effective and transparent financial management systems supported by optimal data utilization, one of which is through cash flow management. Cash flow represents a financial statement that presents cash inflow and outflow activities within a specific period, reflecting an organization's financial condition and its ability to meet obligations and support operational activities (Zega, 2023).

Efficient cash flow management is a crucial element in supporting the smooth operation and sustainability of an institution, including educational institutions such as Sekolah Tinggi Teknologi Terpadu Nurul Fikri. In addition to academic activities, Sekolah Tinggi Teknologi Terpadu Nurul Fikri also manages various business units that contribute to the sustainability of campus operations. The implementation of activities within Sekolah Tinggi Teknologi Terpadu Nurul Fikri involves various types of financial transactions derived from multiple funding sources, which are used to support the implementation of the tridharma of higher education as well as the operation of the institution's business units.

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As a higher education institution, Sekolah Tinggi Teknologi Terpadu Nurul Fikri requires a cash flow monitoring system capable of presenting comprehensive and integrated financial information. Although cash flow monitoring has undergone digitalization, the presentation of financial data remains insufficiently structured in a concise and visual format. This condition limits financial managers in making quick and accurate decisions, particularly in coordinating with the foundation and the finance department. In the decision-making process, management requires information that is presented clearly, relevantly, and in an easily understandable manner. One technological solution that can support these needs is a dashboard, which functions to visually present data and information so that they become more informative and easier for users to understand. Through a dashboard interface, decision-makers, namely the foundation, can quickly and efficiently obtain summaries of key financial data, which can serve as a basis for formulating policies or strategic decisions for the institution. Interactive information dashboards not only assist managers and policymakers in understanding complex data sets but also facilitate the finance department in accessing, monitoring, and supporting more efficient and accurate data analysis (Hutagaol et al., 2024).

The Design Thinking method offers an innovative approach to addressing these challenges and assists developers in understanding users' goals and needs when using an application (Fajar et al., 2025). This method emphasizes a deep understanding of users (empathize), systematic problem formulation (define), the development of alternative solutions (ideate), prototype design (prototype), and iterative solution testing (test). This series of stages aims to ensure that the resulting solutions align with user needs and can be effectively implemented within the working environment. Through this approach, a financial monitoring dashboard functions not only as a data visualization tool but also as a relevant, user-friendly, and responsive decision support system.

Therefore, research on innovation in higher education financial monitoring dashboards using the Design Thinking approach is important to be developed. This study is expected to produce a more adaptive and user-centered dashboard design that can enhance the effectiveness of financial monitoring in higher education institutions. Furthermore, the findings of this study are expected to contribute to the development of information technology in the higher education sector, particularly in improving more transparent and data-driven financial governance.

2. LITERATURE REVIEW

2.1 Financial Dashboards in Higher Education

Financial dashboards have been widely adopted in higher education institutions as tools to support financial monitoring, transparency, and managerial decision-making. Previous studies highlight that dashboard enable decision-makers to access summarized financial information through visual representations, thereby improving reporting efficiency and institutional accountability (Hidayat & Fadillah, 2021; Maulachela et al., 2021). In the context of higher education and the public sector, digital transformation has encouraged the adoption of dashboard-based information systems to enhance financial transparency and accountability. Studies published in *Computers & Education* and *Government Information Quarterly* indicate that financial information systems in educational institutions should be designed using a user-centered approach in order to effectively support governance and decision-making processes (Alammary et al., 2021; Gil-Garcia et al., 2021).

Recent studies in international journals position dashboards as a core component of decision support systems that integrate real-time data visualization with managerial decision-making processes. Research published in *Decision Support Systems* and *Information & Management* indicates that well-designed financial dashboards can enhance situational awareness, improve decision quality, and increase the effectiveness of organizational financial control (Arnott & Pervan, 2021; Rikhardsson & Yigitbasioglu, 2021).

Several studies emphasize the role of dashboards in supporting data-driven decision-making at both program and institutional levels. Dashboards provide concise yet comprehensive overviews that assist stakeholders in evaluating financial conditions and fulfilling accountability requirements, including accreditation processes. The interactive nature of dashboards also allows users to explore financial data at varying levels of detail, making them suitable for complex organizational environments such as universities.

However, a synthesis of existing studies indicates that most financial dashboards in higher education focus primarily on general financial reporting rather than on real-time cash flow monitoring. In addition, prior research tends to emphasize system functionality and reporting outcomes, while user interaction and user experience

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aspects receive limited attention. Consequently, the extent to which such dashboards effectively support managerial decision-making from a user-centered perspective remains underexplored.

However, previous studies primarily focus on general financial reporting dashboards in higher education and do not specifically address real-time cash flow monitoring supported by a user-centered design approach.

2.2 Cash Flow Monitoring Systems in Financial Information Systems

Cash flow monitoring is a critical component of financial accounting information systems, as it reflects an organization's ability to sustain operations and meet financial obligations. Prior studies indicate that integrated financial information systems enhance reporting accuracy, reduce human error, and accelerate the preparation of financial statements through process automation (Simamora et al., 2023). Within such systems, cash flow information serves as a key indicator for financial planning and control.

Existing research on cash flow monitoring systems mainly concentrates on data accuracy, system integration, and automation. These systems are typically designed to support back-office financial processes and ensure compliance with accounting standards. As a result, the technical reliability of cash flow data has been the dominant concern in system development.

Nevertheless, the literature reveals that cash flow monitoring systems are rarely designed as interactive decision support tools. Visual representations that facilitate rapid understanding of cash inflows and outflows are often limited, and usability considerations are not systematically addressed. This condition may reduce the effectiveness of cash flow information for managerial decision-making, particularly for users who require intuitive and real-time insights.

However, most cash flow monitoring systems emphasize data accuracy and system integration, while limited attention is given to interactive dashboards that enhance usability and support managerial decision-making.

2.3 Design Thinking in Information System Development

Design thinking has emerged as a prominent approach in information system development due to its emphasis on understanding user needs and creating user-centered solutions. This approach typically involves iterative stages such as empathizing with users, defining problems, ideating solutions, prototyping, and testing (Rosiana et al., 2023). Prior studies suggest that design thinking improves alignment between system functionality and user expectations, thereby increasing system acceptance.

In the context of information systems, design thinking has been applied to develop various applications, particularly in the early stages of system design. The approach enables developers to explore alternative solutions and refine system features based on user feedback. As such, design thinking is considered effective in addressing complex and ill-defined problems.

However, a review of previous studies shows that the application of design thinking is often limited to the development phase, with insufficient emphasis on post-development evaluation, especially in terms of user experience. Moreover, empirical studies that apply design thinking to financial information systems, particularly within higher education institutions, remain scarce.

However, most studies apply design thinking mainly as a development approach without systematically evaluating its impact on user experience, especially in financial information systems.

2.4 User Experience Evaluation in Decision Support Systems

User experience (UX) plays a crucial role in determining the success and acceptance of decision support systems. UX encompasses users' perceptions, emotions, and overall impressions formed during interaction with a system (Sharma & Tiwari, 2021). Prior research consistently demonstrates that positive user experience contributes to higher user satisfaction, efficiency, and continued system use.

From a user experience perspective, foundational studies in the field of human–computer interaction emphasize that analytical systems are required not only to be usable but also to provide cognitive simplicity and visual clarity to support the interpretation of complex data. Research published in *Computers in Human Behavior* and the

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International Journal of Human–Computer Interaction highlights that interface designs aligned with users' perceptions and emotions contribute significantly to the effectiveness of decision support systems (Bargas-Avila & Hornbæk, 2021; Thüring & Mahlke, 2021).

Various instruments have been developed to evaluate UX, among which the User Experience Questionnaire (UEQ) is widely used due to its efficiency and comprehensive measurement dimensions. UEQ evaluates UX across six dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty (Juniantari & Putra, 2021). These dimensions allow researchers to assess both pragmatic and hedonic qualities of a system.

Despite extensive use of UEQ in different application domains, the literature indicates that UX evaluation using UEQ is still limited in the context of financial dashboards, particularly within higher education institutions. Furthermore, UX evaluation is often conducted independently, without being explicitly linked to the system development approach employed.

However, limited studies evaluate the user experience of financial dashboards in higher education using standardized instruments such as the User Experience Questionnaire (UEQ).

2.5 Research Gap and Positioning of the Study

Based on the synthesis of previous studies, several research gaps can be identified. First, although financial dashboards are widely implemented in higher education, existing studies primarily focus on general financial reporting rather than real-time cash flow monitoring. Second, cash flow monitoring systems emphasize technical accuracy and integration but lack interactive and user-centered dashboard designs. Third, while design thinking is recognized as an effective development approach, its impact on user experience in financial information systems is rarely evaluated. Finally, UX evaluation using UEQ is seldom applied to financial dashboards in higher education contexts.

To clarify the position of this study, Table 1 presents a comparison of prior studies and highlights the distinct contribution of the present research.

Table 1
Research Positioning

Author(s)	Context	System Focus	Development Method	UX Evaluation	Identified Limitation
Hidayat & Fadillah (2021)	Higher education	Financial dashboard	System design	Not evaluated	Focus on visualization, no UX assessment
Maulachela et al. (2021)	Higher education	Performance dashboard	Descriptive design	Not evaluated	No cash flow monitoring
Simamora et al. (2023)	Organization	Financial accounting IS	Integrated FAIS	Not evaluated	No dashboard & UX focus
Rosiana et al. (2023)	Information systems	Application development	Design thinking	Informal feedback	No standardized UX evaluation
Widyantoro et al. (2022)	Application systems	System prototype	Design thinking	Not evaluated	UX impact not measured
Juniantari & Putra (2021)	DSS	System interface	UX evaluation	UEQ	Not financial dashboard
This study	Higher education	Cash flow monitoring dashboard	Design thinking	UEQ	—

As shown in Table 1, none of the previous studies integrate real-time cash flow monitoring, a user-centered development approach using design thinking, and a standardized UX evaluation using UEQ within the context of higher education. This combination constitutes the main novelty of the present study.

3. METHOD

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3.1 Research Design

This study employs a case study research design conducted at *Sekolah Tinggi Teknologi Terpadu Nurul Fikri*. The research focuses on the development and evaluation of a financial dashboard tailored to user needs within a specific organizational context.

A design thinking approach is adopted as the system development framework to ensure a user-centered design process, while descriptive quantitative analysis is applied to evaluate the user experience of the developed prototype.

3.2 Research Procedure

The research was conducted through several structured stages:

1. Problem Identification
   Initial observations and discussions were carried out to understand existing issues in financial data monitoring and reporting.
2. Requirement Elicitation
   Qualitative interviews were conducted with the finance team and foundation representatives to identify user needs, constraints, and expectations regarding the dashboard system.
3. System Development
   The design thinking approach was implemented through the stages of empathize, define, ideate, prototype, and test to develop a dashboard prototype aligned with user requirements.
4. Evaluation
   The developed prototype was evaluated using the User Experience Questionnaire (UEQ) to assess usability and overall user perception.

3.3 Research Participants

The research participants consisted of four users, comprising two staff members from the finance department and two representatives of the foundation, who were directly involved in managing and reporting financial data. Purposive sampling was applied as the sampling technique, considering that the participants had relevant roles and experience in using the developed system.

3.4 Instruments

Two main instruments were used in this study:
a) Interview Guidelines
Semi-structured interview guidelines were used to collect qualitative data regarding user needs, system constraints, and expectations.
b) User Experience Questionnaire (UEQ)
The UEQ was employed to evaluate the user experience of the developed dashboard prototype. The questionnaire measures six dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The UEQ was selected due to its proven validity and reliability in evaluating interactive systems and its suitability for assessing early-stage prototypes.

3.5 Data Analysis

Qualitative data obtained from interviews were analyzed using descriptive analysis to extract key user requirements and design insights. Quantitative data from the UEQ were analyzed using descriptive statistical methods, including the calculation of mean scores for each UEQ dimension. The analysis results were interpreted to determine the overall user experience and usability level of the developed dashboard.

3.6 Validity and Reliability

The validity of the study was supported by:

1. The use of real users who are directly involved in the system's operational context.
2. The application of the UEQ instrument, which has been widely validated and used in previous user experience studies.

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To maintain reliability, the UEQ was administered consistently to all respondents without modification to the original questionnaire items.

3.7 Methodological Limitations

This study is limited by its focus on a single case study within one institution, which may restrict the generalizability of the findings. Additionally, the evaluation relies on descriptive quantitative analysis and does not include inferential statistical testing.

To develop the dashboard, the development methodology employed the design thinking approach. This approach emphasizes active user involvement in a collaborative process to formulate solutions to the problems encountered. It is oriented toward the development of innovative services that align with user needs and are capable of responding to various existing challenges. Furthermore, the research stages are defined as a series of structured activities carried out systematically by the researchers throughout the research process. These stages include problem identification, formulation of research objectives, determination of research methods, data processing and analysis, and the formulation of conclusions, which are organized comprehensively from the beginning to the end of the study.

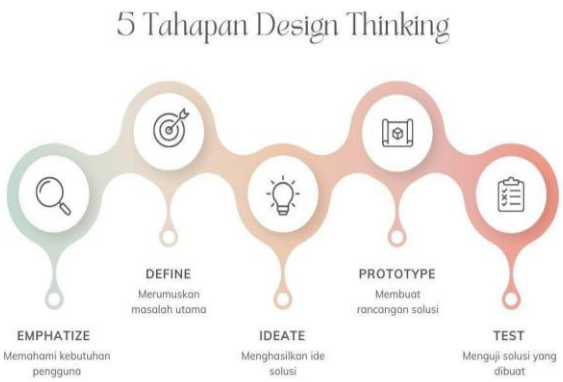

Figure 1 Design Thinking

Figure 1 illustrates the design stages applying the design thinking method, which consists of five stages: empathize, define, ideate, prototype, and test. Each stage is interconnected and serves as the foundation for the subsequent stage, forming a systematic research workflow. These stages encompass problem formulation, the establishment of research objectives, the selection of appropriate methods, data collection and analysis, and the structured formulation of conclusions. However, due to the adaptive nature of the design thinking approach, the implementation sequence does not always follow a rigid linear pattern, allowing researchers to conduct certain stages more dynamically (Isadora et al., 2021).

The empathize stage is the initial phase focused on gaining a deep understanding of users, allowing their needs and preferences to be accurately identified (Mahendra & Sutanto, 2021). At this stage, data collection was conducted through observations and direct interviews with users of the cash flow monitoring system, including members of the finance department and representatives of the foundation. The collected data were subsequently analyzed to identify users' primary needs and the problems they encounter in managing and monitoring cash flow, serving as the basis for the development of the proposed system.

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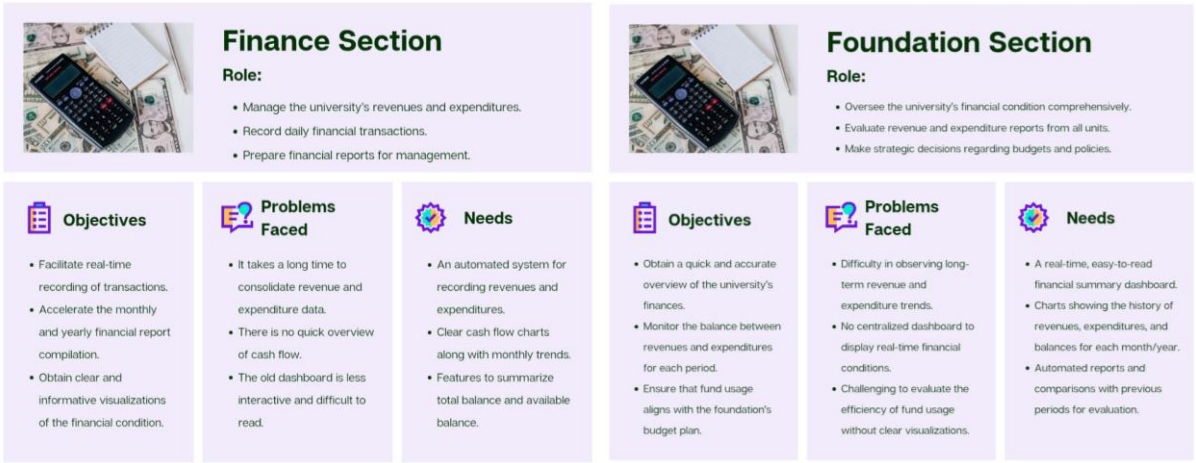

Figure 2 User Persona

Figure 2 illustrates the user personas that represent the characteristics and needs of users of the cash flow monitoring system. The user personas consist of two main roles, namely the finance department and the foundation, each of which has different functions and responsibilities in managing campus finances. The finance department is responsible for inputting income, expenses, and balances, while the foundation monitors the income, expense, and balance dashboards to support decision-making. Based on the interview results, both user groups exhibit relatively similar needs, particularly the availability of a dashboard that can present comprehensive, concise, and easily understandable financial information. However, the current system has not fully met these needs, resulting in constraints in data processing and financial decision-making.

In the define stage, data obtained from the empathize stage were analyzed to identify and formulate the main problems faced by users (Rizky, 2021). To determine categories that align with user needs, the researchers analyzed data derived from interviews, observations, and literature studies. To gain a more comprehensive understanding of the users' key problems, an empathy map was developed to illustrate what users say, think, do, and feel. Table 2 presents the empathy map constructed based on insights gathered from the informants, which served as the foundation for formulating the research problem.

Table 2
Empathy Map

No	Says	Thinks	Does	Feels
1	"I need a summary of income and expenses that can be accessed quickly."	Wants accurate financial data with minimal errors because it affects official campus reports.	Checks the financial dashboard daily to monitor cash conditions.	Feels helped when data are concise and easy to understand.
2	"Monthly cash flow report recaps take too long when done manually."	Expects an integrated system to avoid data duplication.	Prepares monthly and annual cash flow reports.	Feels burdened when required to compile cash flow reports within a short time.
3	"The dashboard must be able to present financial information clearly and comprehensively."	Considers the need to understand long-term cash flow developments.	Accesses income and expense charts for trend analysis.	Feels more confident when data are presented through clear visualizations.
4	"The recording process should be simple so it does not increase workload."	Thinks about ways to accelerate the reporting process to management and the foundation.	Inputs income and expense transactions on a daily basis.	Feels stressed when the recording process is too complex or slow.
5	"Informative data visualizations are very helpful when	Wants to ensure that all transactions are transparently documented.	Presents financial reports during meetings or monthly evaluations.	Feels more at ease when the system displays complete and accurate data.

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	presenting reports to management."			

Table 2 presents the empathy map of the informants, which serves as the analytical foundation for formulating the research problems. The empathy map was developed based on interviews with the primary users of the system, enabling a comprehensive representation of users' perspectives, thoughts, actions, and feelings during the campus financial management process. Based on the interview results and the empathy map analysis, it was found that users experience various challenges in monitoring campus income, expenses, and overall cash flow. These challenges mainly relate to limitations in visualizing financial progress, the need for more systematic and easily understandable data summaries, the availability of real-time updated balance information, and the need to compare income, expenses, and balance data across daily, monthly, and annual periods. The analysis of these user needs and constraints subsequently served as the basis for identifying several key problems, which are structured and presented in Table 3.

Table 3
Problem Statements

No	Code	User Problem Statement
1	PM-1	Revenue and expenditure records are not integrated into a single system, making it difficult to access data quickly and accurately.
2	PM-2	Cash flow reports are still prepared manually, resulting in long processing times and an increased risk of data duplication.
3	PM-3	There is no visualization available to help users easily view cash flow trends and compare revenue and expenditure.
4	PM-4	Balance information is not presented concisely or in real-time, making financial monitoring difficult.
5	PM-5	Cash flow reporting to management is not efficient due to the lack of a clear and easy-to-understand dashboard.

Based on Table 3, various problems faced by users in managing and presenting financial information can be identified. These issues include system limitations in data integration, recording and reporting processes that are still performed manually, and the absence of information visualizations that support effective financial monitoring. Understanding these problems serves as an important foundation for developing an optimal and appropriate dashboard design that can comprehensively address user needs. After the problems are defined, the next step is to formulate solutions that align with the characteristics and requirements of the users.

The third stage of the design thinking method, namely ideate, focuses on idea generation. At this stage, various creative and innovative ideas are formulated as alternative solutions to the problems identified in the previous stage (Yulius & Pratama, 2021). In this study, brainstorming techniques were applied to generate a wide range of ideas and potential solutions. The ideate stage aims to identify and evaluate alternative solutions that are considered effective and aligned with user needs, serving as the basis for solution development in the subsequent stage. User requirements become the primary consideration in determining solution priorities. The outcomes of the ideate stage are presented in Table 4.

Table 4
Solution Ideas

No	Problem Statement Code	Solution Code	Solution Idea
1	PM-1	S-1	Build a cash flow monitoring dashboard system that integrates

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			revenue and expenditure data into a single platform for faster and more accurate information access.
2	PM-2	S-2	Develop an automated cash flow reporting feature to accelerate monthly and yearly recaps and reduce the risk of data duplication.
3	PM-3	S-3	Design data visualizations showing cash flow trends, revenue and expenditure graphs, and transaction summaries to facilitate financial analysis.
4	PM-4	S-4	Provide an informative real-time balance summary through information card elements on the main dashboard.
5	PM-5	S-5	Create a clearer, more structured, and easy-to-understand dashboard design to support efficient cash flow reporting to management.

Based on Table 4, each identified problem is mapped to a proposed solution designed in accordance with user needs. The formulated solution ideas focus on the development of an integrated cash flow monitoring dashboard, the presentation of clear and informative data visualizations, and the automation of financial reports to improve data management efficiency. In addition, the provision of real-time balance summaries and a well-structured interface design is expected to facilitate users in monitoring financial conditions and communicating information to management. All proposed solution ideas serve as the foundation for designing the user interface and user experience of the cash flow monitoring dashboard and are used as references in developing the prototype at the subsequent stage.

4. RESULTS

4.1 Summary of Design Findings

The results of this study were obtained from the prototype development stage, in which user requirements identified during the empathize, define, and ideate phases were translated into an initial dashboard design. Through the prototype, evaluators were able to visualize the concept more clearly and conduct preliminary testing before the system was further developed or implemented. The prototype was then re-evaluated through observation and analysis to assess both the effectiveness and limitations of the developed media (Suryadana et al., 2023).
Rather than focusing solely on the user interface, this study highlights key design findings that reflect how users perceive, access, and interpret financial information within an institutional context. The developed prototype demonstrates that clear, accessible, and well-structured financial data visualization can support monitoring activities and decision-making processes. The implementation of the design findings is illustrated through prototype screenshots as supporting evidence.

4.2 User Needs and User Experience (UX) Patterns

The analysis of user needs identified several key patterns in financial monitoring activities. First, users require a quick overview of financial conditions without navigating multiple pages, which is addressed by presenting key indicators such as total balance, income, and expenses within a single dashboard view. Second, users tend to rely more on trend-based information than on raw numerical data to understand financial performance over time, making cash flow trend visualizations and comparative charts essential elements. Third, users generally explore information progressively, starting from summary data before accessing more detailed information. These patterns indicate that an effective financial dashboard should apply an overview-first approach followed by access to more detailed analysis.

4.3 Resulting UX and Design Principles

Based on the identified user needs and interaction patterns, this study formulates three main design principles. First, real-time financial visibility through summary indicators and trend visualizations enables users to quickly assess financial conditions. Second, an information structure aligned with user roles, as reflected in the separation

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of income and expense dashboards, supports more focused analysis. Third, visual simplicity through the use of concise charts and minimal visual complexity enhances data comprehension and reduces cognitive load. These principles represent the main conceptual contributions of the study and are not limited to a specific system implementation.

4.4 Design Implications

The findings of this study provide several design implications for the development of financial monitoring dashboards in educational institutions. Dashboards should prioritize summary-level information visibility to support rapid situational awareness. Trend visualizations play an important role in facilitating data interpretation and identifying potential financial issues. In addition, the information architecture should support progressive information disclosure, while visual simplicity has been shown to improve system usability and support decision-making, particularly for non-technical users. These implications may serve as a reference for the development of similar financial monitoring systems in comparable organizational contexts.

The resulting prototype consists of three main views: the main dashboard, the income page, and the expense page. These three views were designed to support campus financial monitoring in a more effective, informative, and user-friendly manner.

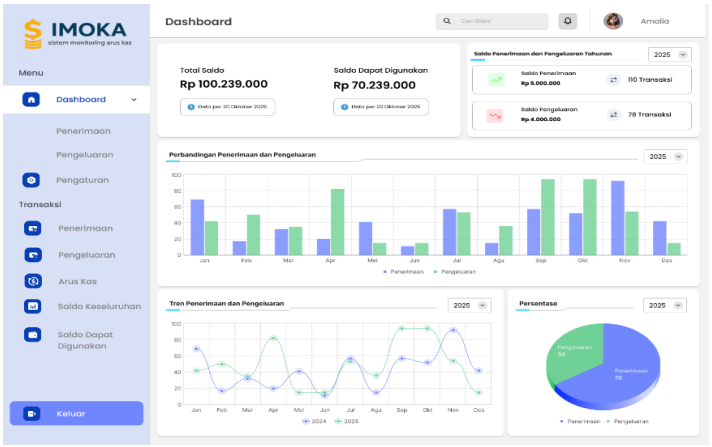

Figure 3 Main Dashboard

Figure 3 shows the main dashboard interface of SIMOKA, which is designed to provide a comprehensive overview of the campus financial condition in a clear and easily understandable manner. The dashboard presents key information such as total balance, total income, and total expenses in concise visual formats, enabling users to quickly understand the financial status without accessing other pages. In addition, comparative charts and cash flow trend visualizations are displayed to illustrate changes in income and expenses over time, allowing users to identify transaction patterns and evaluate financial stability more accurately. Various visual elements, including bar charts, line charts, and pie charts, are utilized to enhance information delivery and facilitate data interpretation. Overall, the main dashboard functions as a central monitoring hub that supports users in understanding, tracking, and making decisions related to campus cash flow management based on structured and informative data presentations.

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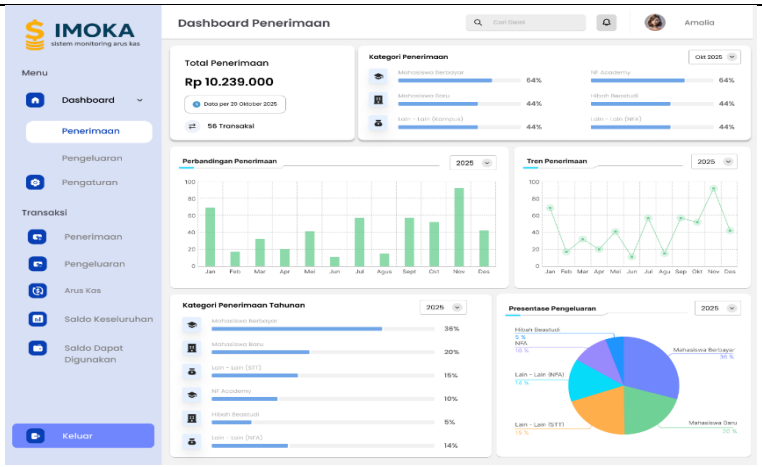

Figure 4 Revenue Dashboard

Figure 4 presents the income dashboard, which is designed to provide detailed information regarding all campus revenue. This dashboard displays the total income along with the number of transactions within a specific period, enabling users to quickly and accurately assess revenue conditions. Income categories are presented in percentage form to indicate the contribution of each source, such as paid students, new students, scholarship grants, NF Academy, and other categories. In addition, comparative charts and income trend graphs are provided to illustrate monthly revenue patterns and changes over time, thereby assisting users in identifying periods with the highest and lowest income levels. The lower section of the dashboard displays annual income categories along with percentage diagrams to provide a comprehensive overview of each category's contribution. Overall, the income dashboard is designed to facilitate the monitoring, analysis, and evaluation of campus revenue through visual, structured, and informative data presentation.

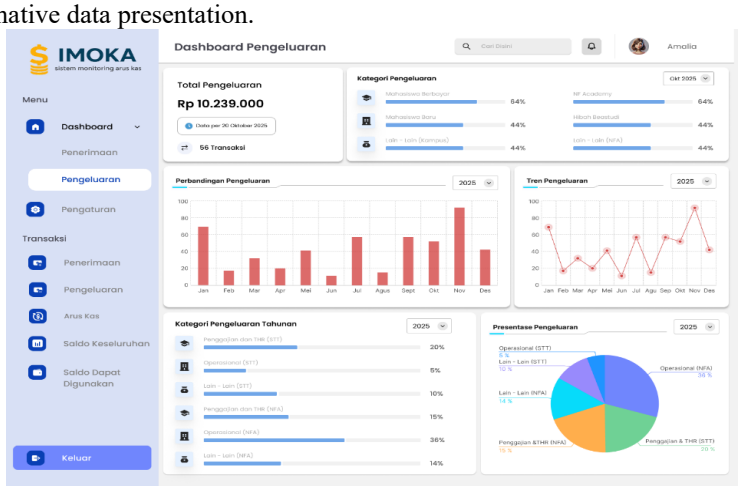

Figure 5 Expenditure Dashboard

Figure 5 illustrates the expense dashboard, which is designed to present detailed information on all campus expenditure activities within a single, structured view. The top section displays total expenses along with the number of transactions within a specific period, enabling users to quickly and accurately identify the amount of costs incurred. Expense categories are presented in percentage form to show comparisons among different types of expenditures, such as operational needs, payroll, and other categories. Comparative charts and expense trend graphs are also included to illustrate changes in expenditures from month to month, helping users identify increases or decreases in spending activities during specific periods. The lower section of the dashboard is equipped with a list of annual expense categories and diagrams that depict comparisons across categories, allowing users to evaluate dominant areas of expenditure. Overall, the expense dashboard functions as a monitoring tool that supports the analysis and control of campus expenditures through informative, clear, and easily understandable data presentation.

5. DISCUSSION

This study evaluated the user experience of the SIMOKA dashboard prototype using the User Experience

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Questionnaire (UEQ), which consists of six dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The evaluation process directly involved users so that the feedback obtained could be used as a basis for improvement, ensuring that the developed solution better meets user needs (Farhan & Arifin, 2024). The evaluation results not only indicate the usability level of the system but also provide insights into how users perceive the balance between pragmatic and hedonic qualities in an institutional financial monitoring system. In addition, the UEQ results illustrate the extent to which the SIMOKA dashboard design supports users in monitoring campus financial activities.

HALAMAN PENGISIAN KUESIONER UEQ

	1	2	3	4	5	6	7		
menyusahkan	☐	☐	☐	☐	☐	☐	☐	menyenangkan	1
tak dapat dipahami	☐	☐	☐	☐	☐	☐	☐	dapat dipahami	2
kreatif	☐	☐	☐	☐	☐	☐	☐	monoton	3
mudah dipelajari	☐	☐	☐	☐	☐	☐	☐	sulit dipelajari	4
bermanfaat	☐	☐	☐	☐	☐	☐	☐	kurang bermanfaat	5
membosankan	☐	☐	☐	☐	☐	☐	☐	mengasyikkan	6
tidak menarik	☐	☐	☐	☐	☐	☐	☐	menarik	7
tidak dapat diprediksi	☐	☐	☐	☐	☐	☐	☐	dapat diprediksi	8
cepat	☐	☐	☐	☐	☐	☐	☐	lambat	9
berdaya cipta	☐	☐	☐	☐	☐	☐	☐	konvensional	10
menghalangi	☐	☐	☐	☐	☐	☐	☐	mendukung	11
baik	☐	☐	☐	☐	☐	☐	☐	buruk	12
rumit	☐	☐	☐	☐	☐	☐	☐	sederhana	13
tidak disukai	☐	☐	☐	☐	☐	☐	☐	menggembirakan	14
lazim	☐	☐	☐	☐	☐	☐	☐	terdepan	15
tidak nyaman	☐	☐	☐	☐	☐	☐	☐	nyaman	16
aman	☐	☐	☐	☐	☐	☐	☐	tidak aman	17
memotivasi	☐	☐	☐	☐	☐	☐	☐	tidak memotivasi	18
memenuhi ekspektasi	☐	☐	☐	☐	☐	☐	☐	tidak memenuhi ekspektasi	19
tidak efisien	☐	☐	☐	☐	☐	☐	☐	efisien	20
jelas	☐	☐	☐	☐	☐	☐	☐	membingungkan	21
tidak praktis	☐	☐	☐	☐	☐	☐	☐	praktis	22
terorganisasi	☐	☐	☐	☐	☐	☐	☐	berantakan	23
atraktif	☐	☐	☐	☐	☐	☐	☐	tidak atraktif	24
ramah pengguna	☐	☐	☐	☐	☐	☐	☐	tidak ramah pengguna	25
konservatif	☐	☐	☐	☐	☐	☐	☐	inovatif	26

Figure 6 User Experience Questionnaire (UEQ)

Figure 6 illustrates the UEQ questionnaire format used as an instrument to evaluate user experience with the SIMOKA prototype. The UEQ is structured using pairs of opposite adjectives to measure six user experience dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Respondents were asked to provide ratings based on their experience while using the SIMOKA dashboard. Through the use of UEQ, the evaluation process can be conducted efficiently and systematically, enabling the results to clearly reflect the visual quality and ease of use of the system.

Table 5
UEQ Results

Dimensi UEQ	Rata-rata	Varian
Daya Tarik (*Attractiveness*)	2,000	0,07
Kejelasan (*Perspicuity*)	1,750	0,29
Efisiensi (*Efficiency*)	2,125	0,06
Ketepatan (*Dependability*)	1,875	0,06
Stimulasi (*Stimulation*)	1,875	0,10

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Kebaruan (*Novelty*)	1,125	0,56

Table 5 presents the results of the user experience evaluation of the SIMOKA prototype based on the six UEQ dimensions. The attractiveness dimension achieved a mean score of 2.00 with a variance of 0.07, indicating that the SIMOKA dashboard interface is perceived as visually appealing and generates a positive impression. The perspicuity dimension obtained a mean score of 1.75 with a variance of 0.29, suggesting that the system is relatively easy to understand and learn. The efficiency dimension recorded the highest mean score of 2.125 with a variance of 0.06, indicating that the system is considered highly efficient and supports users in completing tasks quickly with minimal effort. The dependability dimension achieved a mean score of 1.88 with a variance of 0.06, reflecting that the system meets user needs and is perceived as reliable. Furthermore, the stimulation dimension obtained a mean score of 1.875 with a variance of 0.10, showing that the system is sufficiently engaging and encourages user interaction. Meanwhile, the novelty dimension recorded the lowest mean score of 1.13 with a variance of 0.56. Although still within the positive range, this result indicates that not all users equally perceived the system as innovative or unique, suggesting that the novelty aspect could be further enhanced.

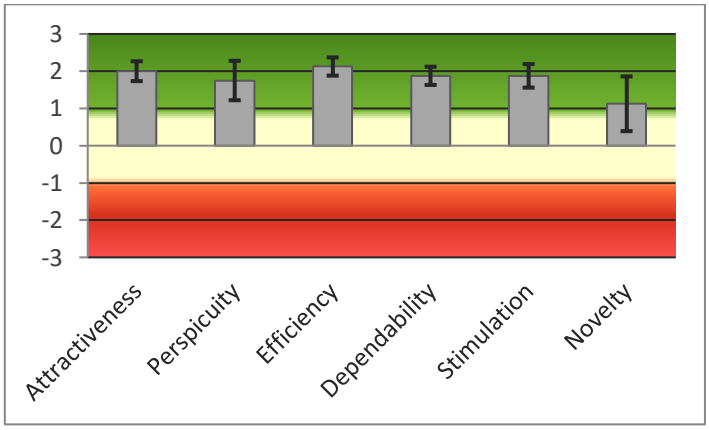

Figure 7 UEQ Dimensions

Figure 7 presents a bar chart illustrating the mean scores for each UEQ dimension, including attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Based on the visualization, most dimensions fall within the green area, indicating that user evaluations range from good to very good. Relatively high scores in attractiveness, efficiency, dependability, and stimulation demonstrate that the SIMOKA dashboard effectively supports user needs in terms of interface design, ease of use, and functional consistency. The perspicuity dimension also falls within the positive category, indicating that the system interface is easy to understand and learn. In contrast, the novelty dimension shows a relatively lower score compared to other dimensions, suggesting that the level of design innovation could still be improved.
Overall, the results indicate that the SIMOKA dashboard provides a positive user experience, particularly in pragmatic dimensions such as efficiency, dependability, and attractiveness. High scores in these dimensions suggest that users perceive the system as reliable, efficient, and visually acceptable. This is particularly important for financial monitoring systems that support decision-making processes. From an Information Systems perspective, these findings reinforce the view that system acceptance in critical applications is more strongly influenced by functional performance and system reliability than by interface novelty alone.

The findings of this study are also consistent with international research that positions dashboards as strategic instruments in decision support systems. Arnott and Pervan (2021) emphasize that dashboards integrating real-time data visualization play a crucial role in improving decision quality. This study reinforces these findings by demonstrating that direct visibility of cash flow enables users in higher education institutions to monitor and evaluate financial conditions more effectively.

The efficiency dimension achieved the highest mean score, indicating that the SIMOKA dashboard effectively supports users in completing financial monitoring tasks quickly and with minimal effort. This finding aligns with previous studies in the Information Systems field, which emphasize efficiency as a key factor in shaping perceived usefulness in decision support and administrative systems. In addition, the high score in the dependability dimension reflects user trust in system stability and data accuracy, both of which are crucial aspects in financial

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data management and reporting. Overall, these results support the IS Success Model perspective, which highlights the role of system quality in forming positive user perceptions and encouraging continued system use.

Although the perspicuity dimension remains within the positive category, it shows relatively higher variance compared to other pragmatic dimensions. This indicates differences in user perceptions regarding system learnability and understanding, which may be influenced by varying levels of user experience or familiarity with financial dashboards. These findings suggest opportunities for improvement, particularly in information structure, labeling, and the provision of supporting features such as user guides or onboarding mechanisms to enhance consistency in user understanding.

Interestingly, the novelty dimension recorded the lowest mean score and the highest variance among all dimensions. This result does not necessarily indicate a design weakness but rather reflects a deliberate trade-off in system development. The SIMOKA dashboard prioritizes familiarity, standardization, and cognitive simplicity over the use of highly innovative or unconventional interface elements. In the context of financial monitoring systems, this approach may reduce cognitive load and minimize the risk of user errors. This finding is consistent with HCI literature, which suggests that novelty is not always a desired attribute in systems that require high levels of accuracy, predictability, and trust. Therefore, the relatively low novelty score can be interpreted as an indicator of functional maturity rather than a limitation in usability.

When compared with previous studies that applied the UEQ and generally focused on consumer-oriented applications such as e-commerce or mobile apps where hedonic qualities like novelty and stimulation tend to be more dominant this study demonstrates that pragmatic qualities play a more decisive role in shaping user experience perceptions in institutional financial systems. This contextual difference represents a contribution of the study in enriching Information Systems research, particularly in the evaluation of user experience in financial monitoring systems within higher education institutions in Indonesia, which remains relatively underexplored. The contribution of this study is also relevant to research on digital transformation in higher education, which emphasizes the need for financial information systems that are not only technically accurate but also easy to use by non-technical decision-makers. Accordingly, this study extends prior findings in the higher education context by integrating real-time cash flow monitoring, a design thinking approach, and standardized UX evaluation.

From a user experience perspective, the design principles derived from this study support arguments in core UX literature that highlight the importance of visual simplicity and information clarity in analytical systems. Studies by Bargas-Avila and Hornbæk (2021) as well as Thüring and Mahlke (2021) indicate that good user experience contributes to reduced cognitive load and improved system effectiveness. The findings of this study confirm that a design thinking approach can produce more intuitive financial dashboard designs that are better aligned with user needs, particularly in professional contexts that demand high levels of efficiency and dependability.

From a practical perspective, the findings suggest that further development of the SIMOKA dashboard should prioritize enhancing analytical capabilities and data visualization rather than focusing solely on increasing interface novelty. Innovation efforts may be directed toward providing deeper financial insights, automating reporting processes, or integrating predictive features, while maintaining a familiar and reliable interface structure for users.

Nevertheless, this study has several limitations. First, the user experience evaluation was based on subjective perceptions measured through UEQ and was not complemented by objective performance metrics such as task completion time or error rates. Second, the evaluation was conducted at the prototype stage, meaning that user experience with a fully implemented system may differ. Third, the study did not include comparisons with other financial monitoring systems, which limits the generalizability of the findings.

Future research may address these limitations by combining UEQ with other evaluation methods, such as task-based usability testing or longitudinal studies to observe changes in user experience over time. In addition, comparative studies across institutional financial monitoring systems could provide deeper insights into best practices in dashboard design. Further research may also explore strategies to enhance perceptions of novelty through advanced analytical features without compromising system usability and reliability.

6. CONCLUSION

This study evaluated the user experience of the SIMOKA dashboard prototype as a financial monitoring system

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in higher education institutions using the User Experience Questionnaire (UEQ). The results indicate that user experience is dominated by pragmatic qualities, particularly efficiency and dependability, which play a crucial role in supporting financial monitoring activities and decision-making processes. These findings confirm that in institutional financial systems, functional aspects and ease of use have a stronger influence on user perceptions than hedonic qualities such as interface novelty.

From an Information Systems perspective, this study extends the application of UEQ to mission-critical decision support systems by highlighting the trade-off between novelty and usability. Practically, the findings suggest that the development of financial dashboards in higher education should prioritize efficiency, clarity of information, and system reliability, while innovation should focus on enhancing analytical capabilities and delivering meaningful financial insights. Nevertheless, this study is limited to perceptual evaluation of a prototype and does not include objective performance measurements or comparisons with similar systems. Therefore, future research is recommended to combine usability evaluation methods, conduct comparative studies, and explore the development of advanced analytical features without compromising system usability and reliability.

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