User Acceptance Testing and Evaluation of a Smart Student Rental Platform for Sustainable Campus Communities

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ABSTRACT

This paper presents the user acceptance testing (UAT) and evaluation of the Smart Student Rental Platform, a mobile application developed to promote sustainable resource sharing within university communities. The platform enables students to lend and rent academic or lifestyle items through a secure, centralized system that encourages affordability and reuse. User acceptance was evaluated using a structured questionnaire based on the Technology Acceptance Model (TAM), focusing on perceived ease of use, usefulness, capability, trust, and intention to use. Twenty-five university students participated in the testing after interacting with the functional prototype developed using Flutter and Firebase. The findings indicate a high level of user satisfaction, with respondents reporting that the application was easy to navigate, improved accessibility to essential items, and encouraged environmentally responsible behavior. Minor feedback highlighted the need for performance optimization. Overall, the results confirm that the system is both usable and beneficial for fostering sustainable consumption and community collaboration in campus environments.

Keywords: User Acceptance Testing (UAT), Smart Student Rental Platform, Sustainable Campus, Technology Acceptance Model (TAM), Usability Evaluation

INTRODUCTION

The growing concern about environmental sustainability, resource scarcity, and financial constraints among students has encouraged universities worldwide to explore sharing economies and peer-to-peer (P2P) models as alternatives to traditional ownership. Shared usage of items helps reduce waste, enhance affordability, and strengthen community bonds—especially in campus settings where many goods are used only temporarily.

However, informal sharing systems that rely on social media or noticeboards often face challenges such as low trust, lack of standardization, limited security, and inefficient matching between lenders and borrowers. To address these issues, digital platforms specifically designed for student rental and sharing have begun to emerge. One such platform is UniLend, developed in previous work to provide a structured, secure, and user-friendly environment where students can lend, borrow, and share items within their campus community [1].

While the design, feature set, and functional correctness of such platforms are essential—as shown in the earlier UniLend prototype [1]—user acceptance remains the key factor determining long-term adoption. The Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and their extensions are widely used to assess constructs such as perceived ease of use, usefulness, trust, social influence, and behavioral intention [2], [3]. For example, recent studies on ride-hailing and vehicle-sharing apps show that trust, satisfaction, and environmental concern strongly influence users' willingness to adopt such technologies [4], [5].

In the Malaysian context, studies have also shown that usability and a supportive environment are significant

factors shaping student engagement with mobile applications [6]. Similarly, research on green campus initiatives suggests that infrastructure alone does not ensure sustainable behavior; user perception, institutional support, and digital readiness also play critical roles [7], [8].

Building on this foundation, the present study conducts User Acceptance Testing (UAT) of the UniLend platform to evaluate five main factors: ease of use, usefulness, capability, trust/security, and intention to use. It also aims to identify design improvements and assess student readiness to adopt and recommend the platform. Through this evaluation, the study contributes to both the enhancement of UniLend and the broader understanding of what drives acceptance of smart rental and sharing platforms in sustainable campus communities.

METHODOLOGY

This section describes the research design, sampling, instruments, procedure, and analysis approach used to conduct the User Acceptance Testing (UAT) of the Smart Student Rental Platform (UniLend).

Research Design

This study employed a quantitative research design to evaluate the acceptance and usability of the Smart Student Rental Platform (UniLend) among university students. The purpose of this design was to collect numerical data reflecting users' perceptions of the platform's functionality, ease of use, usefulness, and overall satisfaction. Quantitative research enables objective analysis and supports statistical interpretation of user feedback, which is essential for validating system performance and measuring acceptance levels in real usage contexts.

The research followed a User Acceptance Testing (UAT) approach, in which participants interacted directly with the UniLend prototype and subsequently completed an online questionnaire. The testing aimed to assess whether the system met users' functional and non-functional expectations, focusing on usability, capability, trust, and intention to adopt. This approach is consistent with established studies that evaluate the adoption of mobile-based sharing applications using constructs from the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT2) [2], [3], [9].

The testing was conducted over three consecutive days, from 28 to 30 August 2025, within a controlled environment at Universiti Teknikal Malaysia Melaka (UTeM). Each participant was guided through the application's major features, including user registration, item listing, rental request, transaction confirmation, and review submission. After completing the session, participants were asked to respond to the UAT questionnaire distributed via Google Forms [10].

This design allowed for structured, consistent data collection and minimized external bias, ensuring that the observed responses accurately represented users' experiences. The quantitative data gathered through the Likert-scale responses were later analysed statistically to identify the mean scores for each construct and determine the overall level of user acceptance.

Participants and Sampling

A total of 25 participants were recruited to take part in the User Acceptance Testing (UAT) for the Smart Student Rental Platform (UniLend). The participants were primarily students from Universiti Teknikal Malaysia Melaka (UTeM), representing the core target users of the platform. The study adopted a purposive sampling method, which was appropriate for selecting individuals who met specific criteria relevant to the objectives of this research. Participants were required to be active members of the university community, familiar with the use of mobile applications, and willing to participate in the structured testing session. This sampling approach ensured that respondents possessed sufficient digital literacy and contextual experience to provide meaningful feedback on the usability, efficiency, and overall acceptance of the application.

Demographically, the participants consisted of both male and female users aged between 18 and 24 years old (Fig 1), reflecting the typical demographic of university students who are active users of mobile technology. Most of the respondents were undergraduate students, while a smaller portion comprised postgraduate students and administrative staff. Approximately 44% of participants had prior experience using rental or sharing

applications such as Carousell or Mudah.my, whereas 56% were first-time users of such systems (Fig 2). This balanced composition provided valuable insight from both experienced and novice users, ensuring that the feedback covered a wide range of perspectives regarding interface intuitiveness, functionality, and trustworthiness.

The recruitment process emphasized voluntary participation, and all participants provided informed consent before engaging in the study. Testing was conducted in a controlled environment to maintain consistency and reduce external bias. Each participant interacted with the UniLend prototype before completing the online questionnaire distributed via Google Forms. The inclusion of users with varied levels of technological proficiency and prior sharing-economy exposure strengthened the validity of the findings, as it reflected the diversity of potential adopters in real campus environments. Such sampling design follows the recommendations of prior user acceptance studies, which highlight the importance of including representative end-user groups to ensure reliable and generalizable results [9], [11].

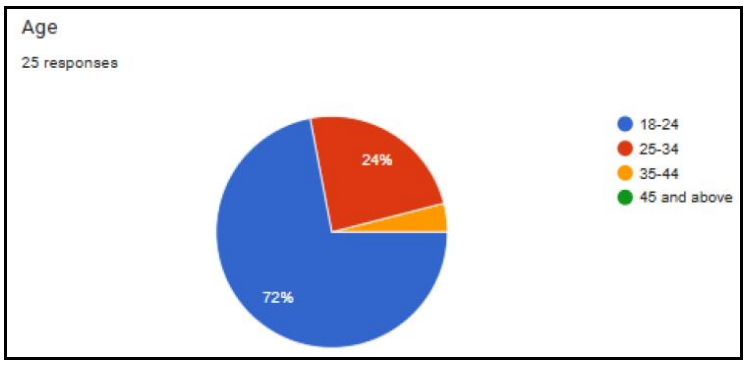

Fig. 1. Age of respondent pie chart

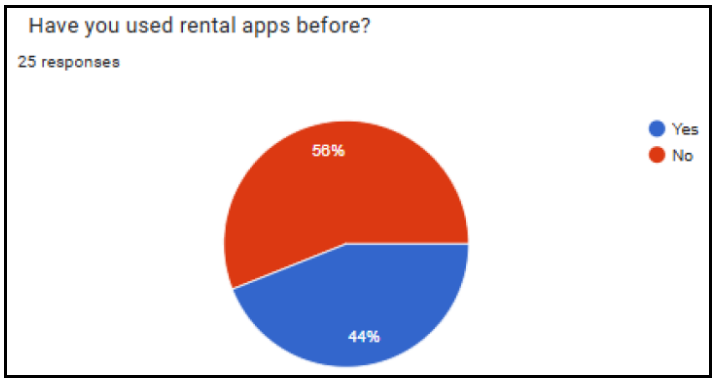

Fig. 2. Prior experience of respondent pie chart

Instruments / Measures

The User Acceptance Testing (UAT) of the Smart Student Rental Platform, known as UniLend, utilized a structured questionnaire distributed through Google Forms to measure users' acceptance and satisfaction with the system. The instrument consisted of 24 items, organized into six sections: Demographic Information, Perceived Ease of Use, Perceived Usefulness, System Capability, Security and Trustworthiness, and Attitude and Intention of Use (Table 1). These dimensions were adapted from established technology acceptance models such as the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) to ensure construct validity and comprehensive assessment of user experience.

The demographic section collected respondents' background information, including age, gender, occupation, and prior experience with rental or lending applications. This information was used to contextualize user perceptions and identify patterns among different user groups.

The Perceived Ease of Use section evaluated how intuitive and user-friendly the UniLend platform was, through items such as "The layout and navigation of UniLend are clear and intuitive" and "I find UniLend easy to use."

The Perceived Usefulness section measured the system's ability to enhance user efficiency and convenience, including statements like "UniLend saves me time compared to traditional buying or borrowing methods."

The System Capability section focused on the technical performance of the application, examining aspects such as responsiveness, reliability, and smooth operation ("UniLend runs smoothly without frequent lags"). The Security and Trustworthiness section assessed users' confidence in the safety and privacy of transactions ("I feel my account and personal information are secure in UniLend").

Finally, the Attitude and Intention to Use section evaluated users' overall satisfaction and willingness to continue using the platform ("I am likely to continue using UniLend in the future" and "I would recommend UniLend to my friends and peers").

All items, except demographic questions, were measured on a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree, enabling quantitative analysis of user perceptions. The instrument design allowed for systematic evaluation of both the functional and experiential aspects of UniLend, ensuring that user feedback could be meaningfully translated into system improvements.

This comprehensive measurement approach supported a holistic understanding of user acceptance, covering usability, trust, performance, and behavioural intention—key indicators for assessing the success and sustainability of digital platforms in campus communities.

Table1. Questionnaire overview

No.	Section	Questions
1	Demographic Information	Age
2		Gender
3		Occupation
4		Have you used rental apps before?
5		Have you ever bought an item and only used it a
6		Have you ever lent an item to a friend/classmate?
7	Perceived Ease of Use	The layout and navigation of UniLend are clear and intuitive.
8		I find UniLend easy to use.
9		I find it easy to get UniLend to do what I want to do.
10		It is easy to get used to using UniLend.
11	Perceived Usefulness	UniLend makes it easier to find items that I'm looking for.
12		UniLend reduces the cost of accessing items I only need temporarily.
13		UniLend makes it easier for me to lend out items I own and earn extra money.
14		UniLend saves me time compared to traditional buying or borrowing methods.
15		UniLend makes it easier to track my rental
16	Capability	UniLend runs smoothly without frequent lags.
17		UniLend responds quickly when I perform actions.
18		UniLend
19	Security/ Trustworthiness	I feel my account and personal information are
20		secure in UniLend.
21		I trust the app to handle rental transactions safely.
22	Attitude and Intention of Use	I feel positive about using UniLend for renting and
23		lending items.
24		I am likely to continue using UniLend in the future.

Procedure

The user acceptance testing (UAT) procedure for the UniLend Smart Student Rental Platform was conducted systematically to validate the system's usability, functionality, and user satisfaction. Before the testing began, participants were briefed on the objectives and procedures of the evaluation. They were given access to the fully

functional UniLend mobile application and instructed to explore all major features, including user authentication, item search, item rental catalogue, chat, rental notifications, item listing, rental history, review and rating, and payment modules. This ensured that participants experienced the complete rental workflow—from registration and item browsing to the final payment and review process

Throughout the testing session, users interacted with the application under real conditions while providing feedback through a structured questionnaire. Each item from the questionnaire was rated on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5), facilitating quantitative analysis of user satisfaction and acceptance levels

After the testing phase, all responses were collected automatically via Google Forms and exported for analysis. The data were then processed using descriptive statistical methods to identify trends and evaluate the performance of the system in terms of usability, perceived benefits, and user satisfaction. This structured approach ensured that the UAT provided reliable insights into how well the UniLend platform met user expectations and its readiness for deployment in a real-world university environment.

System Architecture and Backend Implementation

The UniLend Smart Student Rental Platform was developed using a three-tier architecture, comprising the client interface, application logic, and cloud-based backend services. This structure promotes scalability, maintainability, and efficient communication between system components.

The client interface was built using the Flutter framework, enabling a cross-platform solution compatible with both Android and iOS devices. This unified development approach ensures consistent performance and appearance across operating systems while reducing development time and maintenance costs. The frontend incorporates a responsive user interface designed to deliver smooth navigation, real-time notifications, and user-friendly item listing workflows.

The application logic layer manages core functionalities, including authentication, item transactions, chat communication, and review mechanisms. Business rules and user interactions are processed through Firebase Cloud Functions, providing serverless execution for lightweight operations such as transaction verification and notification delivery.

The backend layer utilizes Google Firebase, which offers real-time database synchronization, secure authentication, and encrypted cloud storage. Firebase Authentication ensures that only verified users can access the system, while Firestore provides a structured and scalable data management solution. The integration of Firebase Hosting and Cloud Storage further supports seamless file uploads and access to item images, ensuring a responsive user experience.

For performance monitoring and maintainability, the project adopted DevOps practices such as version control through GitHub and continuous integration using GitHub Actions. This automation facilitates regular testing, error detection, and streamlined deployment processes. Future development phases may incorporate containerized deployment using Docker and Kubernetes to enhance resource scalability and reliability in cloud environments.

This architecture not only supports UniLend’s operational efficiency and performance but also ensures flexibility for future integration of intelligent features such as AI-driven recommendations and real-time analytics dashboards, as discussed in the Future Works section.

RESULT AND ANALYSIS

This section presents the findings of the User Acceptance Testing (UAT) conducted on the Smart Student Rental Platform (UniLend). The data were collected from 25 participants through an online questionnaire, which evaluated five key constructs: Perceived Ease of Use, Perceived Usefulness, System Capability, Security and Trustworthiness, and Attitude and Intention to Use. The analysis provides insights into users’ demographic profiles, experiences, and overall acceptance of the platform within a campus context.

Perceived Ease of Use (PEOU)

The Perceived Ease of Use (PEOU) construct was assessed to determine how effectively users could interact with the UniLend Smart Student Rental Platform without prior training or technical guidance. The results illustrated in Fig 3 revealed that participants expressed a high level of agreement with the usability and simplicity of the application's interface. Most of the respondents either agreed or strongly agreed that the UniLend layout was clear, well-organized, and intuitive to navigate. Users found it easy to access features such as item listing, search, and rental confirmation, which demonstrates that the system's design successfully adhered to fundamental usability principles.

The responses indicated that most users were able to understand the functions and icons without requiring additional assistance, which is a critical factor in promoting user acceptance and adoption. Specifically, users noted that the menu structure, button placement, and feature grouping were logical and consistent throughout the app. This consistency minimized confusion and reduced cognitive load, allowing participants to complete transactions efficiently.

The findings further suggest that the learning curve for new users was minimal, as many reported being able to operate the system confidently within a few minutes of exploration. This observation is particularly significant given that more than half of the participants had no prior experience with rental or sharing applications. Their positive evaluation of UniLend's usability reinforces the system's capability to support both novice and experienced users effectively.

Overall, the high ratings across all PEOU items confirm that UniLend provides a user-friendly and accessible platform that facilitates quick adoption among its intended users. The combination of an intuitive design, logical interface flow, and ease of navigation contributed to strong positive perceptions of usability, which directly supports the first dimension of the Technology Acceptance Model (TAM). This finding validates that ease of use is a significant predictor of user satisfaction and continued intention to use UniLend within campus communities.

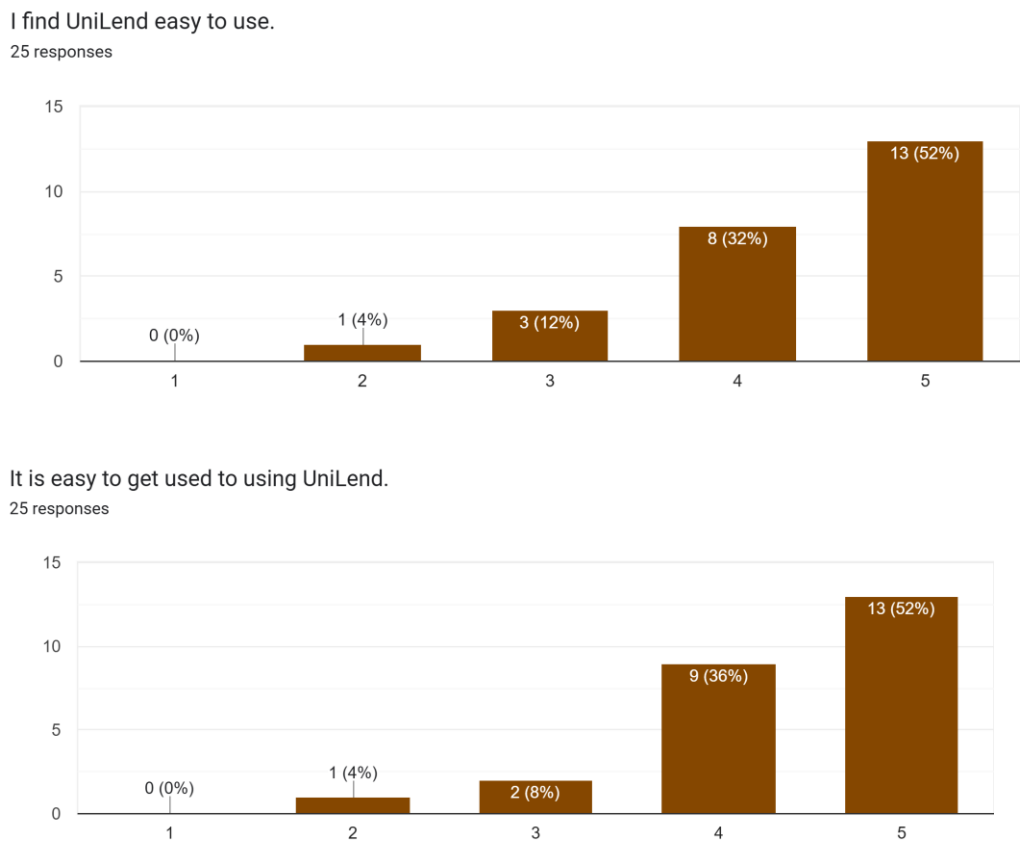

Fig. 3. Bar chart of questionnaire perceived ease of use section

Perceived Usefulness (PU)

The Perceived Usefulness (PU) construct was evaluated to determine how effectively the UniLend Smart Student Rental Platform supports users in achieving their objectives and improving their daily activities related to item renting and lending. As shown in Fig 4, participants demonstrated a strong level of agreement across all items in this construct, indicating that users found the system practical, beneficial, and capable of enhancing efficiency within a campus sharing environment.

A large proportion of respondents agreed that UniLend saves time and effort in locating and renting items compared to traditional methods such as in-person searches or social media postings. The centralized and organized listing feature was highlighted as a convenient way to discover available items without the need for direct communication or physical notice boards. Many participants also recognized that UniLend helps reduce financial costs associated with purchasing seldom-used items, making it particularly useful for students with limited budgets.

Beyond convenience, users also acknowledged that UniLend contributes to sustainable consumption practices within the university community. By encouraging the reuse and sharing of items, the platform promotes a more environmentally responsible lifestyle aligned with the principles of a sustainable campus. Respondents appreciated the app's potential to strengthen collaboration and mutual support among students through item lending and borrowing, rather than individual ownership.

Overall, the results confirmed that UniLend is perceived as a highly useful tool that not only improves accessibility and affordability but also advances the university's sustainability objectives. The positive responses across all items in this construct validate that users recognize tangible benefits in using the system. In accordance with the Technology Acceptance Model (TAM), these findings affirm that perceived usefulness strongly influences users' satisfaction and intention to continue using the platform, establishing UniLend as a valuable and functional solution for sustainable resource management in campus communities.

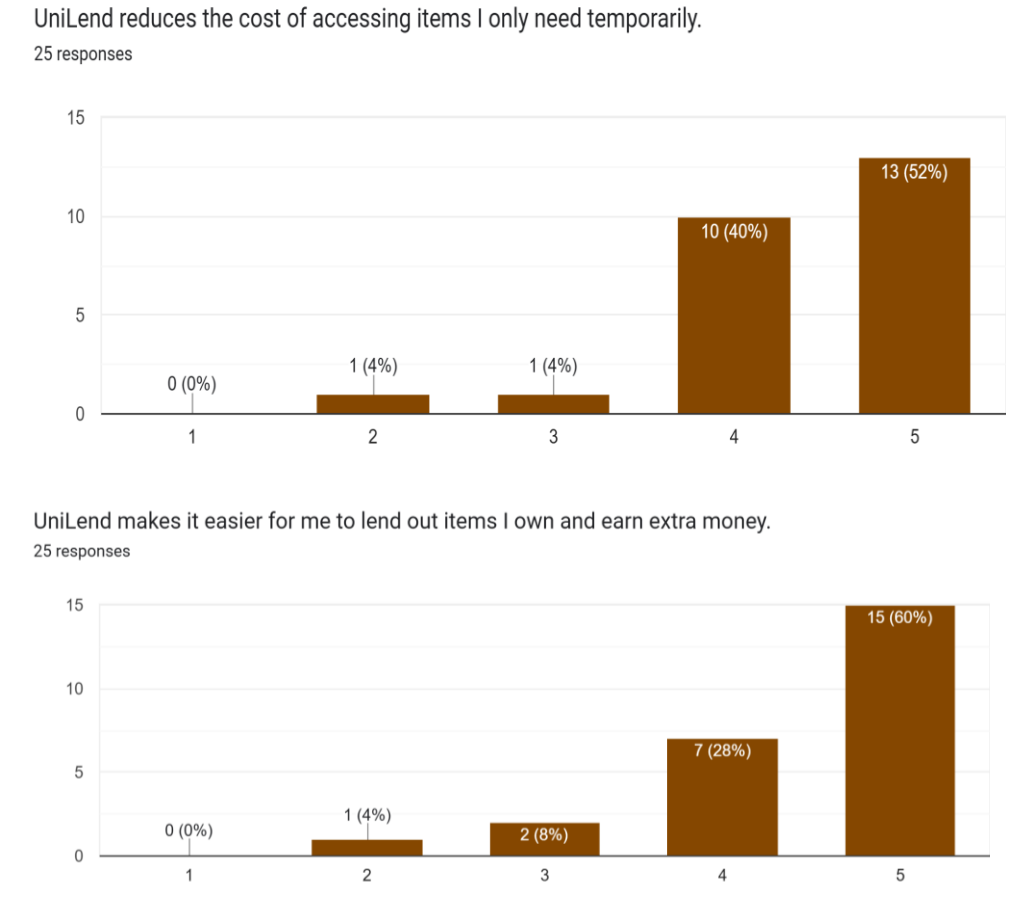

Fig. 4. Bar chart of questionnaire perceived usefulness section

System Capability (CAP)

The System Capability (CAP) construct was assessed to measure the overall performance, reliability, and responsiveness of the UniLend Smart Student Rental Platform during user interaction. According to the findings illustrated in Fig 5, the majority of participants agreed that the application operated smoothly and was capable of executing its intended functions effectively. Most respondents rated the platform positively in terms of responsiveness, stability, and functional consistency, indicating that the system was reliable in handling typical user tasks such as item listing, searching, and transaction processing.

However, a small portion of users noted that the application experienced occasional lag or slow response time during certain operations, particularly when navigating between menus or loading item images. These minor technical issues did not significantly affect the overall usability experience but suggest potential areas for optimization. The system's cloud-based backend, implemented using Firebase, performed adequately for a prototype stage; nonetheless, future iterations could benefit from improved data caching and optimized image-loading mechanisms to further enhance responsiveness.

Despite these minor limitations, the overall user perception of system capability remained highly positive. Participants agreed that UniLend's functions operated as intended and that the app maintained stable performance throughout testing. The smooth flow of features from registration to payment confirmation which contributed to a seamless experience that increased user trust and confidence in the platform's reliability.

In summary, the results of this construct indicate that the UniLend platform demonstrates strong technical performance and operational dependability, both critical for ensuring user satisfaction and sustained adoption. The few instances of delayed response times highlight areas for refinement but do not undermine the system's overall functionality. The consistently positive evaluations confirm that system capability plays a crucial supporting role in influencing perceived usefulness and user acceptance, as posited by extended models of the Technology Acceptance Model (TAM).

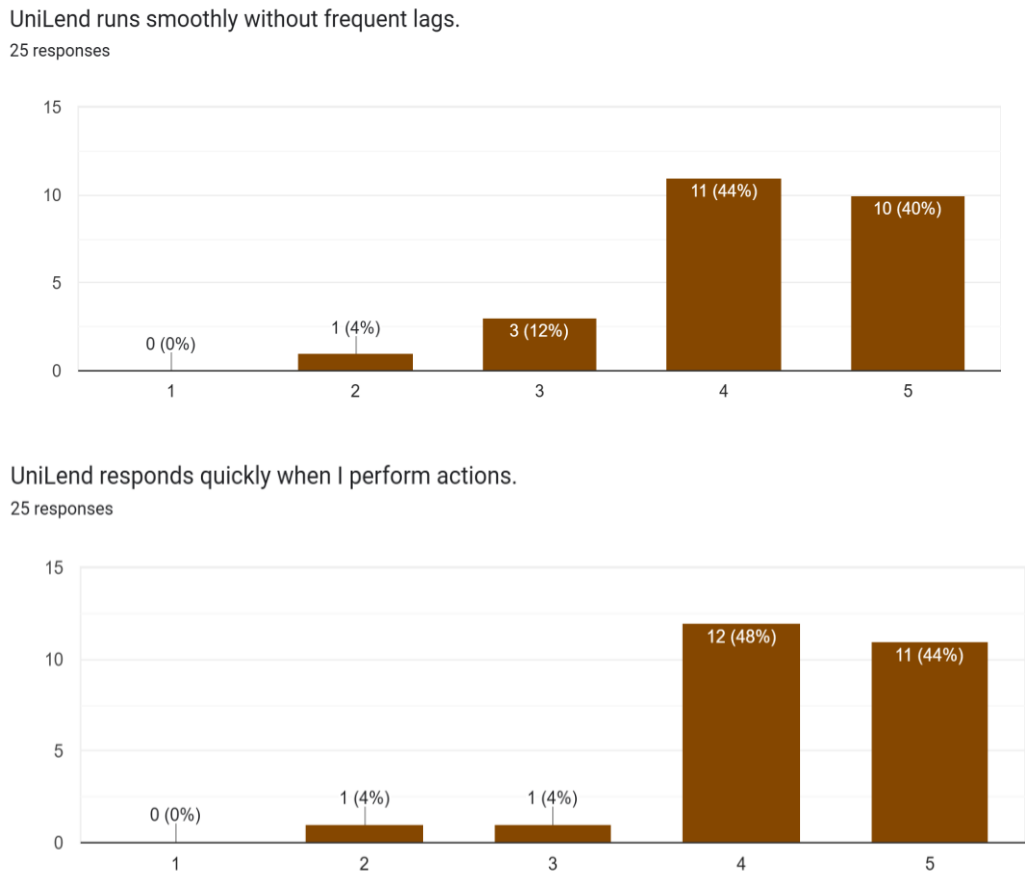

Fig. 5. Bar chart of questionnaire capability section

Security and Trustworthiness (SEC)

The Security and Trustworthiness (SEC) construct evaluated participants' perceptions of data safety, privacy, and system reliability within the UniLend Smart Student Rental Platform. The feedback obtained from the Google Form analytics revealed consistently positive results, reflecting strong user confidence in the application's ability to secure information and manage transactions safely.

For the statement "I feel my account and personal information are secure in UniLend," 44% of respondents selected Agree and 40% selected Strongly Agree, while only 4% disagreed and 12% were neutral. This indicates that 84% of participants believed the platform provides a secure environment for personal data management. Similarly, for the statement "I trust the app to handle rental transactions safely," 52% of users agreed and 36% strongly agreed, with only 8% remaining neutral and 4% expressing slight disagreement. These results show that a combined 88% of respondents expressed positive trust toward UniLend's transaction handling and data protection measures.

These findings affirm that users view UniLend as a secure and reliable platform. The high trust levels can be attributed to its structured authentication process, transparent rental workflow, and accessible transaction records that enhance accountability. Users valued the system's ability to protect personal data and ensure smooth, verifiable exchanges between lenders and borrowers.

However, a small fraction of participants suggested further strengthening security through additional authentication layers, such as two-factor verification or biometric login. These enhancements could further bolster user confidence and align UniLend's standards with advanced security practices used in modern mobile applications.

Overall, the results demonstrate that UniLend effectively establishes trust and reliability, both critical components influencing user acceptance according to the Technology Acceptance Model (TAM). When users perceive a system as secure, they are more likely to continue using it and recommend it to others. The overwhelmingly positive ratings across this construct confirm that UniLend's approach to system transparency, data safety, and secure design has successfully fostered confidence and trust within the university community.

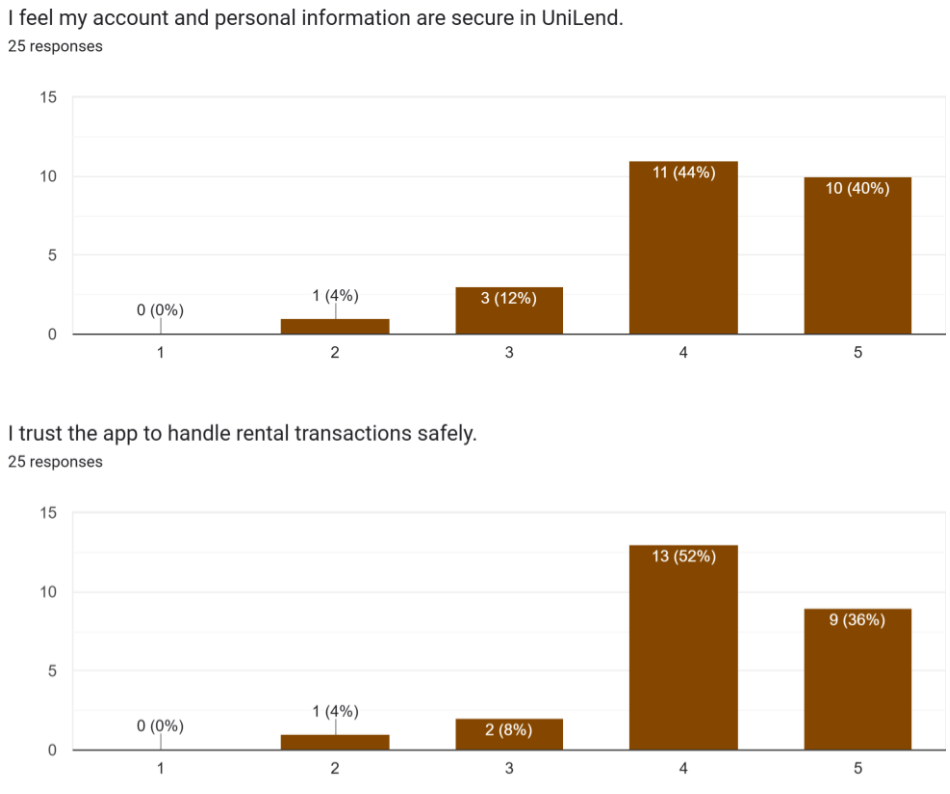

Fig. 6. Bar chart of questionnaire security and ttrustworthiness section

Attitude and Intention to Use (AIU)

The Attitude and Intention to Use (AIU) construct evaluated the participants' overall satisfaction with the UniLend Smart Student Rental Platform and their willingness to continue using it in the future. Based on Fig 7, the findings revealed an overwhelmingly positive response from participants, indicating a strong acceptance and favourable attitude toward the application.

A majority of respondents rated the items in this construct with either "Agree" or "Strongly Agree", demonstrating that users were satisfied with their overall experience using UniLend. Specifically, most participants agreed that they enjoyed using the platform and found it beneficial for managing item rentals efficiently. They also expressed confidence that UniLend is a useful and reliable system that simplifies the borrowing and lending process among students within the campus community.

Furthermore, respondents indicated a high level of intention to reuse the application in the future. The bar chart results showed that nearly all participants intended to continue using UniLend for future transactions and would recommend the platform to others. This indicates a strong likelihood of sustained adoption and positive word-of-mouth promotion within the university environment. The participants also acknowledged that the system contributes to promoting sustainable campus living, aligning with the broader objective of encouraging resource sharing and reducing waste through peer-to-peer exchange.

Overall, the results of this construct suggest that UniLend successfully fosters positive user attitudes and behavioural intentions, both of which are critical components of the Technology Acceptance Model (TAM). According to TAM, users who perceive a system as useful and easy to use are more likely to develop favourable attitudes that lead to continued use. The strong affirmative responses across all AIU items validate this relationship and indicate that UniLend has achieved a high level of user satisfaction and acceptance. These findings confirm that the platform not only meets users' functional needs but also aligns with their values of convenience, trust, and sustainability—factors essential for long-term success in campus-based digital ecosystems.

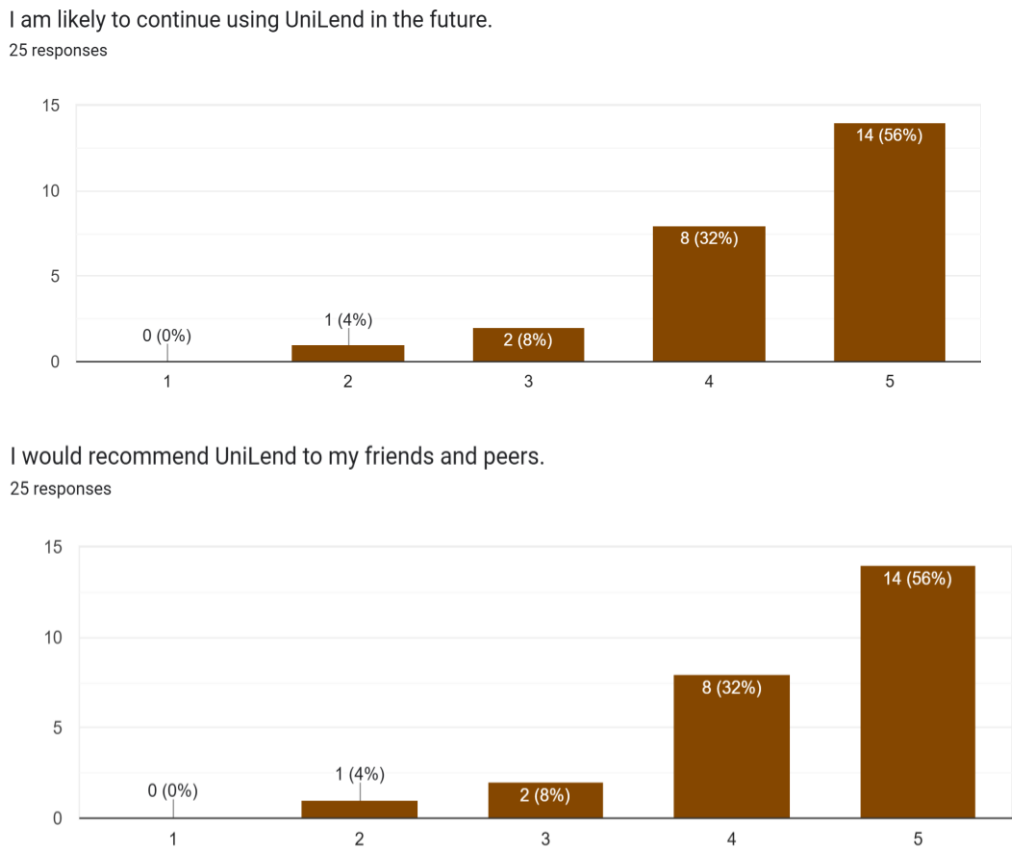

Fig. 7. Bar chart of questionnaire attitude and intention of use section

DISCUSSION

The User Acceptance Testing (UAT) results for UniLend demonstrate strong acceptance across all TAM constructs. This section interprets the findings, integrates them with recent literature, and discusses implications and limitations.

Reinforcing the Role of Ease of Use and Usefulness

The high ratings for Perceived Ease of Use (PEOU) confirm that the UniLend interface is user-friendly and intuitive, especially for both experienced and first-time users. These findings mirror studies showing that when digital platforms are easy to navigate, they significantly raise perceived usefulness and user satisfaction. For instance, a recent study of MSMEs in Malaysia found that PEOU and perceived usefulness (PU) both significantly influence the intention to adopt e-commerce tools. [12] The alignment suggests that in the sharing/rental domain, as with e-commerce, usability and interface clarity remain foundational.

Similarly, Perceived Usefulness (PU) in UniLend, especially regarding time savings, cost reduction, and enhancing sustainable sharing aligns with findings from studies of AI-powered training tools, which showed that when users perceive real benefits, their behavioural intention to use technology increases significantly. [13] Thus, UniLend's strong PU ratings provide essential validation for its value proposition, particularly in resource-constrained campus settings.

System Capability and Technical Performance as Enablers

While UniLend’s technical performance received overall positive feedback, some lag and occasional delays were noted. These minor issues, though not severely undermining usability, point toward areas needing optimization. This corresponds with findings in technology acceptance literature indicating that system responsiveness and reliability are critical for trust and continued use. [13]

These technical enablers are especially meaningful in a campus environment where connectivity and device heterogeneity can exacerbate performance impacts. Ensuring smooth performance, minimal loading times, and consistent behaviour across different devices will be important for scaling the platform.

Security, Trust, and Behavioural Intention

Trust and security were rated high in your testing, suggesting users felt confident in data privacy and transaction safety. In many TAM-based studies, trust functions as a mediator or moderator of PU and behavioural intention, especially in peer-based platforms and services involving financial or personal data exchange. For example, a recent study on consumers’ acceptance of AI in online shopping found that trust strongly influences attitude and intention to use, often even more so than ease of use. [14]

Your results show that the strength of security mechanisms in UniLend (authentication, clear transaction flows, transparency) has contributed significantly to high Attitude and Intention to Use (AIU) scores. This reinforces the idea that security is not just a background requirement but a visible feature that enhances acceptance.

Implications for Sustainable Campus Communities

One of the most interesting outcomes is how users see UniLend not just as a transactional platform, but as one contributing to sustainable campus lifestyles. The Attitude and Intention to Use (AIU) scores indicate users believe UniLend can promote sustainability. This aligns with recent work on TAM-based acceptance of metaverse and educational technologies in Malaysia, where PU, PEOU, and social influence were found to significantly shape user attitudes toward sustainability-oriented systems. [15]

Thus, UniLend has potential beyond convenience; it can serve as a tool for fostering behavioral change, promoting resource sharing, and reducing waste in campus ecosystems.

Positioning with Respect to Existing Applications

A comparative analysis of UniLend with similar rental and sharing applications such as Carousell, Mudah.my, and Facebook Marketplace was comprehensively discussed in our earlier work on the system's design and development [1]. That study highlighted UniLend's uniqueness as a campus-specific, sustainability-oriented platform that operates within a verified and trusted student network, unlike open-market alternatives.

In the present study, the focus shifts from system design to user acceptance and evaluation, validating how effectively UniLend's unique features—such as secure authentication, transparent transactions, and resource-sharing mechanisms—translate into actual usability and user satisfaction. The results reaffirm that these differentiating factors contribute to strong acceptance levels and position UniLend as a valuable digital tool for promoting sustainable behavior within campus communities.

CONCLUSION

This study presented the design, development, and evaluation of the UniLend Smart Student Rental Platform, a system designed to promote sustainable resource sharing within campus environments. Results from the User Acceptance Testing (UAT) revealed a high level of user satisfaction across all key constructs of the Technology Acceptance Model (TAM)—namely, Perceived Ease of Use (PEOU), Perceived Usefulness (PU), System Capability (CAP), Security and Trustworthiness (SEC), and Attitude and Intention to Use (AIU).

The findings confirm that UniLend is an intuitive, reliable, and beneficial platform that meets the needs of students and university staff for item rentals and sharing activities. Users found the platform easy to navigate, efficient in saving time, and helpful in facilitating access to shared items, which supports its practicality and acceptance within the campus context. The strong evaluation of security and trustworthiness also indicates that UniLend provides a safe and transparent environment for peer-to-peer transactions—an essential factor in technology adoption.

Beyond usability and functionality, the results highlight UniLend's contribution to sustainable campus development. By encouraging item reuse, minimizing unnecessary purchases, and fostering community collaboration, UniLend demonstrates how digital tools can drive behavioral change toward environmental responsibility.

Overall, this study successfully validated the feasibility and acceptance of UniLend as a sustainability-focused digital platform in higher education. The integration of usability, perceived usefulness, and trust within a student-centered ecosystem offers valuable insights for developing future sharing applications that support both digital transformation and sustainability goals in university communities.

Future Works

While the current version of UniLend has demonstrated strong acceptance, several future directions are proposed to enhance scalability, intelligence, and impact.

Future studies should expand the sample size to include students from multiple universities, covering diverse geographic and socio-economic backgrounds to validate the model's generalizability. Longitudinal studies are recommended to observe changes in user behavior, sustained engagement, and evolving trust levels over time.

From a technical standpoint, upcoming development phases will focus on integrating AI-driven recommendation systems to personalize item suggestions based on user profiles, search history, and transaction data. Additionally, real-time analytics dashboards will be developed to monitor platform usage, sustainability indicators (e.g., carbon savings through item reuse), and campus participation rates.

To strengthen backend resilience, future iterations may adopt containerized cloud deployment using tools such as Docker and Kubernetes, ensuring scalable resource allocation and high availability. Enhanced DevOps integration will also streamline continuous testing and secure updates.

Finally, extending UniLend to support inter-campus sharing networks would promote collaboration across higher education institutions, fostering a nationwide ecosystem of sustainable sharing and digital inclusivity..

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