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A Cost-Effective Digital Solution for Community Libraries: A TAM Evaluation of a CMS-Based Book Circulation System

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Abstract

The digital transformation of community-based libraries in developing regions requires careful consideration of user acceptance factors for successful implementation, particularly when managing physical book collections through online systems. This study evaluates user acceptance of a CMS-based online book circulation system implemented in "Ramah Baca," a community library in East Kalimantan, Indonesia. The system utilizes WordPress CMS with a modified WooCommerce plugin specifically adapted for physical book lending operations. Using the Technology Acceptance Model (TAM), this research examines how Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Behavioral Intention to Use (BI), and Actual Use (AU) influence users' Attitudes Toward Using (ATU) the CMS-based book circulation system. A quantitative survey of 40 active users revealed that Perceived Usefulness ($\beta = 0.511$, $p = 0.002$) and Behavioral Intention to Use ($\beta = 0.456$, $p = 0.017$) significantly positively affected Attitude Toward Using, while Perceived Ease of Use ($p = 0.831$) and Actual Use ($p = 0.701$) showed no significant partial effects. Collectively, all variables significantly influenced Attitude Toward Using (F-value = 24.959, $p < 0.001$). The findings suggest that for community library physical book circulation systems in developing regions, enhancing perceived usefulness and fostering long-term engagement are more critical than focusing primarily on ease of use. The successful adaptation of WordPress and WooCommerce demonstrates the viability of using modified e-commerce platforms for physical book management in resource-constrained environments.

Keywords: *Content Management System, Library System, Technology Acceptance Model.*

1. Introduction

Community-based libraries play a vital role in promoting literacy and knowledge access in developing regions, particularly in tropical areas where educational resources may be limited [1]. The past study found that a significant majority of community members (79.6%) believe it would be helpful if their local libraries provide social services, indicating a strong public trust in libraries as institutions capable of addressing community needs. There is strong connections between library missions and social services, particularly in the areas of serving underserved populations and creating inclusive and accessible spaces, reinforcing the library's role as a community cornerstone [2]. In Indonesia, where community libraries serve as crucial knowledge hubs in both urban and rural areas [3][4] [5][6]implementing effective digital circulation systems for physical materials presents both opportunities and challenges. The digital transformation of these libraries has become increasingly important, with online book circulation systems emerging as essential tools for improving service accessibility and operational efficiency, especially for managing physical book collections. A key innovation in this digital transformation is the development of online Circulation System built on Content Management Systems (CMS), which facilitate centralized management and remote access to physical book collections [7].

Content Management Systems (CMS) have gained popularity as cost-effective solutions for developing data management in resource-constrained environments. The use of CMS has become commonplace for managing libraries [8][9]. The adaptation of WordPress with WooCommerce plugins for physical book lending represents an innovative approach that leverages existing e-commerce functionality for library operations, especially for libraries that have an online book lending process (books are sent by post or courier) [7]. This approach is particularly relevant for managing physical book collections, as it provides robust inventory management, reservation systems, and user authentication capabilities that can be customized for library-specific. In addition, the use of Wordpress as the chosen CMS makes it easier for library managers to add educational information content as a strategy to increase library users [10].

However, the successful implementation of these systems depends significantly on user acceptance, particularly in the attitude toward using on digital libraries. The Technology Acceptance Model (TAM) provides a robust framework for understanding the factors that influence

users' adoption of such systems, though its application in community library contexts in developing regions remains underexplored [11], especially for systems managing physical collections through modified e-commerce platforms.
The TAM method has been commonly used in previous studies aimed at evaluating library systems [12][13][14][15]. Recent studies on library technology acceptance have primarily focused on academic or institutional libraries, with limited attention to community-based settings [16][17]. This gap is particularly significant given the unique characteristics of community library users, who often include diverse age groups and educational backgrounds. Understanding the specific factors that drive technology acceptance in these contexts is essential [18] for designing systems that effectively serve community needs while ensuring sustainable implementation, particularly when the system manages physical rather than digital materials.
The "Ramah Baca" community library in Samarinda, East Kalimantan, represents an important case study of digital transformation in tropical regions. The implementation of a WordPress CMS with modified WooCommerce plugin for physical book circulation provides valuable insights into user acceptance dynamics in community library settings. This system specifically manages the library's physical book collection, allowing users to check real-time availability, reserve books online, and manage borrowing schedules. This study aims to examine how TAM constructs influence user attitudes toward the physical book circulation system, with particular focus on the relative importance of usefulness versus ease of use in this specific context.

2. Methods

2.1. Research Context and System Implementation

This study was conducted at the "Ramah Baca" community library in Samarinda, East Kalimantan, which serves approximately 250 registered members (offline and online) from diverse socioeconomic backgrounds and maintains a collection of more than 2,400 physical books. The library implemented a customized online circulation system in 2022 using WordPress CMS with a modified WooCommerce plugin.

Fig 1. The Homepage of Ramah Baca Book Circulation System (Indonesian)

Fig 1, Fig 2 and Fig 3 show the user interface of the Book Circulation System that has been built and used for the last 3 years.
The modification involved adapting e-commerce functionality for physical book lending operations, including:

a. Inventory management for physical book tracking
b. Reservation system replacing shopping cart functionality
c. Loan period management instead of purchase transactions
d. Physical pickup/delivery coordination replacing shipping modules

The system enables users to search for physical book collections, check real-time availability, reserve books online, and manage borrowing schedules for physical items. Books are delivered by a private courier who delivers books weekly in the Samarinda and Kutai Kartanegara areas. Then books are returned by courier, postal service, or in person. Users who return books late or do not return books at all will not be fined but will be marked and will not be able to borrow books before returning or replacing the lost books. The system stores all user contacts and their Instagram accounts and will be reached if there is a problem with delivery or return.

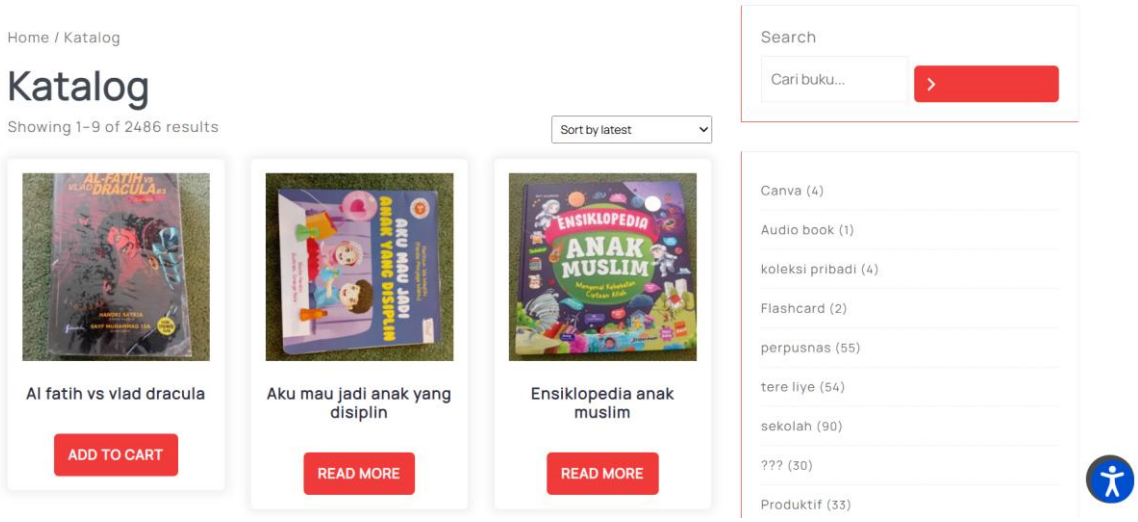

Fig 2. The Catalog Page of Ramah Baca Book Circulation System

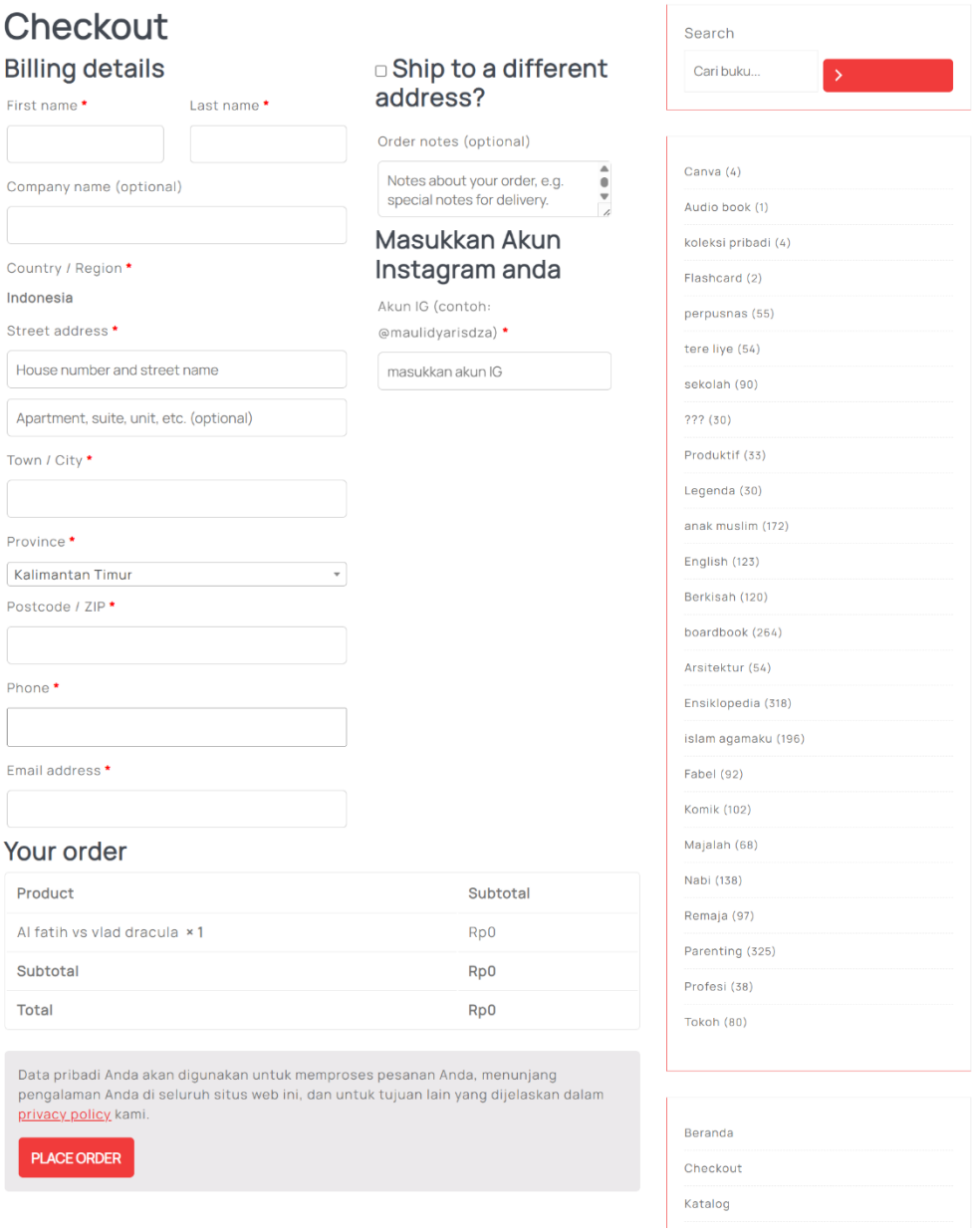

Fig 3. The Checkout Page of Ramah Baca Book Circulation System

2.2. Sampling and Participant Characteristics

Using purposive sampling, we recruited 40 active library users who had utilized the online physical book circulation system at least twice during the three-month study period (January-March). The sample included both regular library visitors (65%) and occasional users (35%), representing the system's actual user base. Participants comprised 95% female and 5% male users, with age distribution of 5% students (under 20), 65% young adults (20-35), and 30% adults (over 35).

2.3. Instrument Development and Data Collection

The research instrument was adapted from established TAM scales [19] [20] and customized for the physical book circulation context. The questionnaire measured five constructs using a 5-point Likert scale with specific focus on physical book management:

a. Perceived Ease of Use (5 items focusing on system navigation and physical book reservation processes)
b. Perceived Usefulness (5 items emphasizing time savings and physical book access convenience)
c. Behavioral Intention to Use (4 items measuring continued usage plans for physical book reservations)
d. Attitude Toward Using (4 items assessing overall satisfaction with physical book lending service)
e. Actual Use (3 items documenting usage frequency for physical book borrowing)

Data collection employed both online surveys and assisted paper-based questionnaires to accommodate varying levels of digital accessibility among community users, with particular attention to users' experiences with physical book management through the digital system.

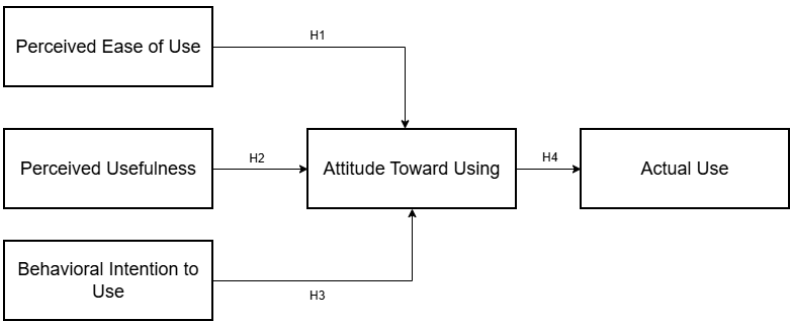

Fig 4. Conceptual Framework Model

2.3. Data Analysis

Data analysis followed a systematic approach using IBM SPSS Statistics 26. Initial descriptive analysis characterized the sample demographics and physical book usage patterns. Reliability analysis confirmed internal consistency with Cronbach's alpha values exceeding 0.75 for all constructs. Classical assumption tests included normality assessment (Kolmogorov-Smirnov test), multicollinearity detection (Variance Inflation Factor), and heteroscedasticity evaluation (scatterplot analysis). Hypothesis testing employed multiple regression analysis with a significance level of $\alpha = 0.05$, using t-tests for partial effects and F-tests for simultaneous influences.

3. Result and Discussion

3.1. User Characteristics and Physical Book Usage Patterns

The sample comprised 40 users with diverse demographic characteristics, all engaged in physical book borrowing through the digital system. Usage frequency data showed that 65% used the system monthly, 35% weekly, primarily for physical book reservations (70%) and availability checks (30%). The most frequently borrowed physical materials included educational textbooks (15%), fiction (20%), and children's books (65%), demonstrating the system's effectiveness in managing diverse physical collections. The diversity in user profiles reflects the typical community library context, where digital systems must serve users with varying technological familiarity while managing physical assets. Tests confirmed that the data were normally distributed (Kolmogorov-Smirnov p-value = 0.059), free from multicollinearity (all VIF values < 10), and showed no signs of heteroscedasticity.

3.2. Hypothesis Testing Results

The regression analysis produced the following results for the hypothesized relationships:

Table 1. Hypothesis Testing Results for Ramah Baca Book Circulation System

Hypothesis	Path	t-value	Sig.	Decision
H1	PEOU → ATU	0.215	0.831	Not Supported
H2	PU → ATU	3.280	0.002	**Supported**
H3	BI → ATU	2.498	0.017	**Supported**

Hypothesis	Path	t-value	Sig.	Decision
H4	ATU → AU	-0.387	0.701	Not Supported
Hypothesis	Path	F	.Sig	
H5	PEOU, PU, BI → ATU	24.959	0.000	**Supported**

The hypothesis testing results reveal several important patterns in user acceptance of the physical book circulation system. For H1, the non-significant relationship between Perceived Ease of Use and Attitude Toward Using ($\beta = 0.033$, $p = 0.831$) suggests that users' attitudes toward the system are not substantially influenced by how easy they find the system to use. This finding contradicts traditional TAM expectations but aligns with the specific context of physical book management where functional necessity may override usability concerns. The extremely low t-value of 0.215 further confirms the weak predictive power of PEOU in this context, indicating that users are willing to navigate some complexity if the system delivers substantial benefits for accessing physical books.

The strong support for H2 ($\beta = 0.511$, $p = 0.002$) indicates that Perceived Usefulness is the most powerful predictor of positive attitudes toward the system. Users who recognize the practical benefits of being able to check physical book availability, make reservations remotely, and save time visiting the library develop more favorable attitudes toward using the system. The coefficient value of 0.511 demonstrates that for every unit increase in perceived usefulness, attitude toward using increases by more than half a unit, highlighting the critical importance of functional value in this context. The high t-value of 3.280, which substantially exceeds the critical threshold of 1.96, provides strong statistical evidence for the significance of this relationship, reinforcing that practical utility is paramount for user acceptance in community library settings.

H3 also received strong support ($\beta = 0.456$, $p = 0.017$), revealing that Behavioral Intention to Use significantly influences current attitudes. This suggests a reciprocal relationship where users' plans for future system use positively affect their present evaluation of the system. The substantial coefficient indicates that fostering long-term usage commitment can enhance immediate user satisfaction with the physical book circulation service. The t-value of 2.498, while slightly lower than for PU, still demonstrates clear statistical significance, suggesting that users' forward-looking commitment to the system plays a complementary role alongside immediate usefulness perceptions.

The rejection of H4 ($\beta = -0.065$, $p = 0.701$) reveals that a positive Attitude Toward Using does not directly translate to frequency of actual use. This counterintuitive finding suggests that mere system usage, without positive attitude, does not guarantee the actual use toward the physical book management system. The negative coefficient, though not statistically significant, hints at the possibility that compulsory or positive attitude without corresponding satisfaction might even does not make users use the system more. The t-value of -0.387, falling well below the significance threshold, confirms that usage positive attitude alone is an unreliable indicator of user satisfaction, emphasizing the need to distinguish between system utilization and genuine user acceptance.

Finally, the strong support for H5 (F-value = 24.959, $p < 0.001$) confirms that the integrated TAM model provides a comprehensive framework for understanding user acceptance of the physical book circulation system. The highly significant F-value demonstrates that the combined effect of all independent variables provides substantial explanatory power for understanding variations in user attitudes, validating the overall model's applicability in this specific context of physical book management through digital platforms. The exceptionally low p-value (< 0.001) provides robust evidence that the model as a whole effectively captures the key determinants of user acceptance, despite the non-significance of individual paths for PEOU.

The R-squared value of 0.65 indicates that the model explains 65% of the variance in Attitude Toward Using, which represents a substantial explanatory power in social science research, particularly in the context of technology acceptance studies. This high explanatory power reinforces the relevance of the selected TAM constructs in understanding user acceptance dynamics for physical book circulation systems in community library settings. The remaining 35% unexplained variance suggests the potential influence of external factors not captured in the current model, such as social influences, facilitating conditions, or specific demographic characteristics that may moderate acceptance patterns in community library contexts.

3.3. Discussion

3.3.1. WordPress-WooCommerce Implementation for Physical Books

The successful adaptation of WordPress with WooCommerce plugin for physical book management demonstrates the viability of using modified e-commerce platforms for library operations. The system effectively transformed conventional e-commerce features: shopping cart became reservation list, purchase process became loan request, and shipping management became pickup coordination. This innovative approach provided a cost-effective solution for physical book management while maintaining familiar e-commerce interaction patterns for users.

3.3.2. Perceived Ease of Use on Attitude Toward Using

The non-significant relationship between PEOU and ATU (H1) contrasts with conventional TAM findings but there is a reason for this. In community library settings managing physical collections, where the online circulation system provides tangible benefits like time savings and remote access to physical books, users appear to prioritize these functional advantages over absolute ease of use. This finding suggests that for community libraries with limited resources, investing in core functionality for physical book management may yield better acceptance outcomes than perfecting interface design.

3.3.3. Perceived Usefulness on Attitude Toward Using

The strong significance of PU on ATU (H2) underscores the importance of demonstrable benefits in technology acceptance for physical book management systems. Users particularly valued features that addressed specific physical book management needs, such as the ability to check real-time physical availability before visiting the library and the convenience of remote reservations for physical items. These

practical benefits for physical book access appear to outweigh initial usability challenges, supporting recent findings that perceived usefulness drives sustained usage in resource-constrained environments [21].

3.3.4. Behavioral Intention on Attitude Toward Using

The significant influence of BI on ATU (H3) reveals an important dynamic for physical book circulation systems. Users' intentions to continue using the system for physical book reservations positively influenced their current attitudes, suggesting that commitment mechanisms and long-term engagement strategies could enhance overall acceptance.

3.3.5. Attitude Toward Using on Actual Use

The non-significant relationship between ATU and AU (H4) indicates that positive attitude alone does not guarantee usage frequency in physical book borrowing in the system. After conducting interviews with users, most of them do use it regularly every week or every month, without being influenced by how positive their attitude towards the system is, but rather because they follow the schedule of the library's personal courier who has a special schedule, unlike deliveries via post which can be done at any time. This is because deliveries via post can sometimes be slow and complicated because they have to open the packaging.

4. Conclusion

This study provides evidence that for CMS-based online physical book circulation systems in community libraries, perceived usefulness and behavioral intention are primary drivers of positive user attitudes, while ease of use show limited direct influence. The successful implementation using WordPress CMS with modified WooCommerce plugin demonstrates the practical viability of adapting e-commerce platforms for physical book management in resource-constrained environments.

The findings have important implications for community libraries in tropical developing regions, suggesting that resource allocation should prioritize functionality that delivers clear benefits to users while implementing strategies to foster long-term engagement. Specific recommendations for physical book management systems include:

a. System Development: Focus on features that provide immediate value for physical book access, such as real-time availability updates, mobile-friendly interfaces for on-the-go reservations, and simplified reservation processes for physical items.
b. WooCommerce Customization: Further develop plugin modifications to better serve physical book lending needs, including enhanced loan period management, automatic reminder systems for returns, and integration with physical inventory tracking.
c. User Education: Implement programs that highlight system benefits specifically for physical book access and develop engagement strategies that encourage continued usage, such as reading challenges or personalized physical book recommendations.

This study's limitations include its single-case design and relatively small sample size, though these are offset by the rich contextual insights from an actual implementation set managing physical collections. Future research should expand to multiple community libraries across different tropical regions in Indonesia, incorporate longitudinal designs to track acceptance evolution for physical book systems, and examine the role of moderating factors such as digital literacy levels and social influence. Comparative studies between different CMS platforms for physical book management could also provide valuable insights for resource-constrained libraries seeking optimal digital solutions.

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