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Design of the 'Abdimas' Marketplace System: A Digital Platform for PKM Collaboration (Version 0.0)

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Abstract

Community Service (Pengabdian kepada Masyarakat or PkM) is one of the three core responsibilities (Tridharma) of higher education in Indonesia, alongside education and research. However, many lecturers especially those new to academia face difficulties in identifying suitable community partners. This study addresses that issue through the design of a digital platform called "Abdimas", intended to function as a marketplace system for matching lecturers with PkM partners. Applying the Design Thinking methodology, focusing on the conceptual and architectural design of the "Abdimas" platform, this study implemented a user-centered design approach. Data from interviews with lecturers, partners, and university administrators were analyzed using thematic analysis to identify core requirements. Based on these findings, the system was designed to support lecturer registration, partner discovery, and need-based matching. Senior lecturers are also supported in exploring new, underserved areas, while partners can publicly express their needs to attract suitable academic collaborators. University administrators can monitor the distribution of PkM activities over time to ensure equity and effectiveness. Unlike existing administrative platforms that often function as one-way reporting tools, the "Abdimas" marketplace introduces a bidirectional matching mechanism that allows partners to actively broadcast their specific community needs, bridging the information gap for lecturers. The system design includes use case diagrams, UI/UX prototypes, an Entity Relationship Diagram (ERD), and blackbox test scenarios to validate functionality. Although still in the design phase (Version 0.0), "Abdimas" has the potential to scale beyond academic users by supporting Corporate Social Responsibility (CSR) initiatives and facilitating student-level community services. This research contributes a structured and scalable system design to improve collaboration and outreach in community service programs within higher education.

Keywords: community service, digital platform design, higher education collaboration, system development, UI/UX.

1 Introduction

Technological advancements, particularly web systems, have had a tremendous impact on different sectors [1], including education, through Community Service initiatives. Community service (PkM) is one of the three major pillars of Indonesia's Tri Dharma of Higher Education [2]. The Community Service Program (PKM) is predicted to have a major impact on the local community, improving knowledge, skills, and quality of life [3], [4], not just a voluntary activity, but one that is based on clear and measurable research [5], [6], as well as a directed methodology that follows the specific needs of the local community [2], [6], [7]. These activities include observation, preparation, and distribution stages, showing a systematic method to conducting Community Service Programs [8]. Overall, Community Service Programs (PKM) in Indonesia are not only mandatory, but also serve to raise social consciousness and empower communities [4], [9]. For example, entrepreneurship training for students not only increases knowledge but also gives the community instruments to create jobs and promote welfare [9], [10].

The Indonesian Ministry of Education and Culture's implementation of the SISTER system is a critical step towards improving the quality of community service provided by lecturers, resulting in a faster and more flexible reporting process that promotes transparency and accountability in lecturer performance evaluation [11]. For example, health cadre training activities in Karangayu Village [12]

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and entrepreneurship training in relevant villages [13] show how lecturers can work with communities to address a wide range of issues, including public health and local business development. Pre- and post-tests are commonly used to assess the success of these activities, as they quantify changes in knowledge and abilities as a result of the service [14].

However, implementing community service in the field is not without challenges. One major challenge is that professors rely heavily on their personal networks to identify community service partners. This often leads to repetition of activities in the same areas year after year, limiting the effectiveness of these programs. Innovative ways to connect academics with stakeholders in the broader community are needed [15]. Furthermore, limited networks might cause discrepancies in the distribution of community service rewards between areas. According to research, faculty members' expectations for promotion and tenure are linked to their activity outside of campus, highlighting the need of supporting the development of these networks [16]. For young professors who are just starting their academic careers, this problem is especially serious.. Academics and community members must work together on collaborative community service activities [17]. They frequently have trouble creating the networks required to find community service partners with comparable backgrounds and passions. This restriction restricts their potential contributions to community development in addition to making it more difficult to carry out community service successfully. These young professors frequently have to look for community service partners on their own, which can be time-consuming and ineffective.

On the other hand, potential partners face major obstacles; they frequently struggle to articulate their demands to possible faculty members. An effective communication platform is critical to ensuring that the ensuing collaboration is relevant and meaningful, suited to the requirements of the communities served. [18] research illustrates the urgent need for a successful collaborative approach to tackling public concerns through community-focused innovations. Furthermore, [19] found that active member participation can boost resource utilisation in a collaborative setting. According [20], social media can be a very successful instrument for communication. In this setting, venues that encourage communication and collaboration between academics and community partners are required to expedite innovation and social impact. As [21] pointed out, disagreement in the communication process can impede good collaboration, while bad communication can lead to mistrust among team members. As a result, it is critical to create platforms that not only facilitate communication, but also encourage trust and a thorough grasp of the context of community needs.

To solve these issues, the idea of a digital marketplace has been offered as an innovative alternative. This marketplace acts as a bridge between individuals in need and those who can supply solutions. [22] also stated that partnerships between educational institutions and community partners are critical for improving community service initiatives. Lecturers can use digital marketplaces to promote community service and transformative cooperation [23]. A further in-depth examination reveals that digital platforms promote business continuity in the face of adversities, such as the bad economic position created by the pandemic [24]. Furthermore, by implementing digital marketing methods, lecturers can better share information about their community service initiatives to potential partners and capture stakeholders' interest [25]. In terms of community service, this digital marketplace is projected to connect professors with relevant community service partners, minimising dependency on personal networks and allowing for more widespread and effective collaboration.

This study is to analyse system requirements and create several critical components of the "Abdimas" market system, such as use case diagrams, UI/UX prototypes, Entity Relationship Diagrams (ERD) designs, and blackbox testing designs. This strategy is intended to give a more systematic and well-documented alternative to allow community service in higher education while also ensuring that available resources, including grant funds, are properly utilised.

2 Literature Review

The use of digital technology to enhance higher education activities has become a prominent emphasis in a number of research projects, notably in strengthening the Tri Dharma of Higher Education. One major focus is on digitising Community Service (PkM) activities in response to the demand for efficiency, accessibility, and multi-stakeholder participation. [26] created an Android-based PKM Centre Mobile Learning application to let students access information, upload proposals,

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and prepare for PKM activities. The program performed well in terms of functionality, look, and simplicity of use, as evidenced by numerous levels of user testing.

However, the approach utilised by [26] is one-way, allowing students to acquire information from educational institutions. Its focus overlooks essential concerns in the dynamics of collaboration between lecturers and community partners, notably cooperative initiatives in planning and implementing PkM programs. On the other hand, the literature on higher education digitalisation emphasises the necessity of systems that can bridge the gap between academic and community actors using an open, collaborative, and needs-oriented model.

To date, no research has particularly built a marketplace-based system that allows community partners to directly submit their real-world challenges, while lecturers select partners based on their relevant knowledge. This study fills this gap by building the "Abdimas" system as a digital platform that unites instructors, partners, and university administration in a collaborative ecosystem based on real-world requirements. Aside from giving information, "Abdimas" is intended to promote an efficient and transparent matching process in Community Service Program (PkM) activities. This essentially distinguishes this study from the creation of PkM systems that are either administrative or student-focused. As a result, the fundamental contribution of this research is the creation of a marketplace-based system that enables the strengthening of multi-stakeholder collaboration in PkM in a more participative and documented manner.

3 Research Method

This study adopts the Design Thinking methodology, focusing on the conceptual and architectural design of the “Abdimas” platform. This approach ensures the design is rooted in actual user needs through five stages: Empathize, Define, Ideate, Prototype, and Test design.

To enhance the clarity of the research process, each stage illustrated in Figure 1 is designed with specific objectives and targets: User Needs Study (Empathize & Define): Targeted to produce a requirements specification document based on thematic analysis of stakeholder interviews. Use Case & UI/UX Design (Ideate): Targeted to define the functional scope and create high-fidelity interactive mockups. ERD Design (Prototype Design): Targeted to establish a structured database scheme as a blueprint for the system’s data management. Blackbox Test Design (Test Planning): Targeted to develop functional test scenarios to validate the logic of the system’s features before full development.

The first stage of this research is a user requirements analysis, which is carried out through in-depth interviews and surveys with many key groups, including lecturers, prospective community service partners, and university management. The interviews are intended to help lecturers understand the difficulties they have in locating community service partners, as well as the needs and expectations of possible partners who would participate in community service activities. The data gathered from these interviews and surveys is then qualitatively analysed to discover common user demands and issues. The qualitative data obtained from these interviews and surveys were analyzed using thematic analysis. This technique allowed the identification of recurring patterns and code community service obstacles, which were then translated into the system’s function requirements.

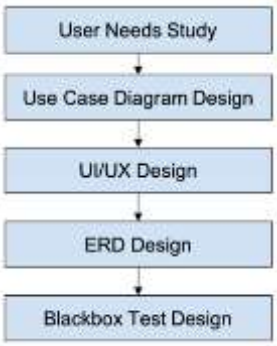


Figure 1 Research stages

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After identifying user needs, the next stage is system design. At this stage, a use case diagram is created to visualize the interactions between users and the system, identifying main workflows such as partner discovery and activity monitoring. The UI/UX design follows by creating wireframes and mockups to ensure the platform is intuitive. Additionally, an Entity Relationship Diagram (ERD) is designed to model the data structure for efficient information management.

Based on these designs, an initial prototype of the "Abdimas" platform was developed as a high-fidelity mockup. The purpose is to ilustrate the feasibility of the system's features and workflows before the actual development phase. The next stage involves design validation using the blackbox testing method. This focuses on evaluating the system's proposed functionality through a series of test scenarios designed to explore various user interactions and ensure each feature operates according to requirements.

The final stage of this research is iteration and refinement. Based on the results of the scenario evaluations, the development team refines the design and integrates feedback from early users to enhance the system's relevance and usability. This iterative process ensures the platform reaches a stable design level, ready for future implementation on a larger scale.

4 Results and Analysis

Table 1 User needs study

User	Expectations
Community Service Partners	They want to communicate their needs so that the grants received by lecturers can be channeled to support these needs.
Lecturers	They should be able to see a list of possible locations for community service, along with the specific needs of each location.
	They should be able to choose where they will perform the service, and if the partner agrees, the agreement is formalized with a "Partner Statement Letter" (Surat Pernyataan Mitra).
Director of DPPM (Directorate of Research and Community Service)	They want to monitor the distribution of community service partners' locations, ensuring that lecturers can spread out their community service activities evenly within a 200 km radius from the campus.

The results from interviews with several users identified key needs that must be addressed by the "Abdimas" marketplace system. Table 1 summarizes the needs of the primary users, including community service partners, lecturers, and university management.

Table 1 illustrates that community service partners require the ability to communicate their specific needs to receive appropriate support from lecturers, particularly concerning the utilization of grant funds they receive. They want to ensure that their needs are clearly communicated and that the available funds are used efficiently and effectively.

Meanwhile, lecturers need access to a list of potential locations for community service, along with the specific needs of each location. They also desire flexibility in choosing service locations that align with their expertise, as well as the ability to formalize agreements with community service partners through documents such as a "Partner Statement Letter".

The Director of DPPM (Directorate of Research and Community Service) requires a feature to monitor the distribution of community service locations by lecturers. They hope to see how services

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are distributed within a certain radius from the campus, ensuring that community service efforts are not concentrated in just one area but are spread out to achieve broader impact.

From the needs analysis, several key features have been identified to be included in the system. In addition to the three main roles mentioned (community service partners, lecturers, and university management), it was also identified that an additional role, admin, is necessary. The admin will be responsible for verifying lecturer accounts and ensuring the integrity of the data within the system. The functions and interactions of these four roles are then visualized through a use case diagram, which can be seen in Figure 2.

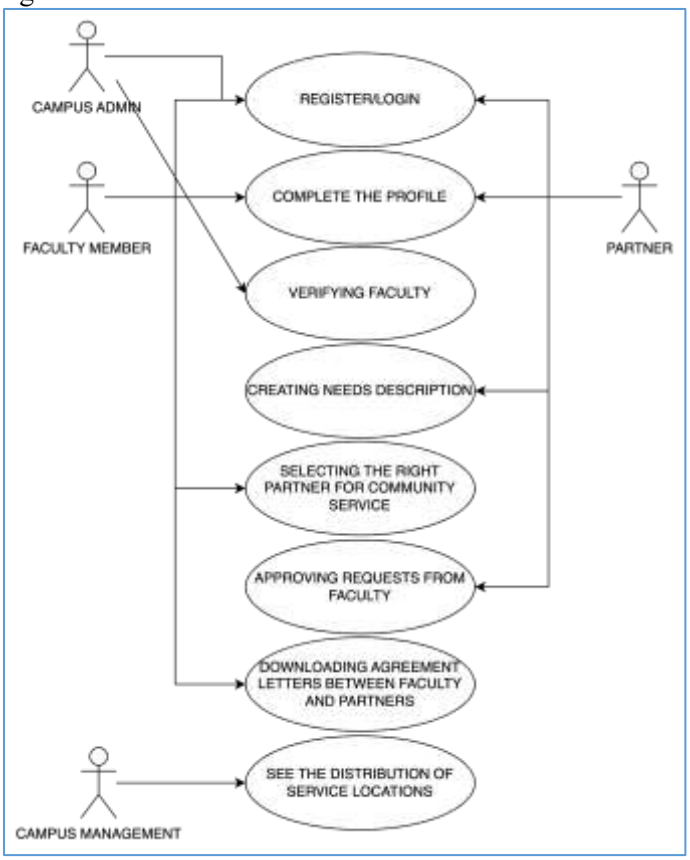


Figure 2 Use Case diagram design

Based on the use case that has been designed, the next stage is to develop the system's UI/UX design. This design is crafted with consideration for ease of access and navigation for users with varying levels of digital literacy. The UI/UX accommodates four types of accounts: lecturer, partner, campus management, and campus admin. Each account type has access to different features according to their needs and roles within the system. The UI/UX design can be seen in Figure 3 and Figure 4.



Figure 3 UI/UX design(home page)

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Figure 4 UI/UX design (input design)

Next, the Entity Relationship Diagram (ERD) was developed to model the data structure that will be used in the system. This ERD encompasses eight main entities, each with clearly defined and structured relationships with the others. The ERD design helps ensure that data can be accessed and managed efficiently, supporting the core functionalities of the system. The ERD can be seen in Figure 5.



Figure 5 ERD design

Blackbox testing is designed to ensure that each feature in the system functions according to the specifications. Several test scenarios have been developed, including tests for the functionality of the login page, user profile management, and the search and selection features for community service partners. Each scenario is expected to identify potential issues or discrepancies with the specifications so that they can be addressed before the system is fully implemented.

Table 2 presents the blackbox testing scenarios and the expected outcomes for each component tested. For example, the login page testing includes scenarios where users enter correct and incorrect credentials to ensure that the system responds appropriately in both situations. Similarly, profile page testing ensures that users cannot proceed without completing the required information and that only users verified by the admin can access certain features.

Table 2 Black box testing scenarios

No	Test Component	Test Scenario	Expected Result
1	Login Page	Entering correct username and password	Successfully logs into the Home Page
2	Login Page	Entering incorrect username and/or password	Displays an error message indicating that login was unsuccessful
3	Profile Page	Completing Profile	Partner: Can add needs Lecturer: Can be verified by

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			Campus Admin
4	Profile Page	Not completing Profile	Partner: Cannot add needs Lecturer: Cannot be verified by Campus Admin
5	Add Needs Modal	Completing all required fields	Submit button becomes clickable
6	Add Needs Modal	Not completing all required fields	Submit button remains unclickable
7	Add Needs Modal	Having more than 3 active needs (Status: OPEN)	Add button remains unclickable because partners are limited to submitting a maximum of 3 requests
8	Partner List Page	Selecting a partner with status Open	Can view partner's detailed needs and choose a partner
9	Partner List Page	Selecting a partner with status Closed	Can only view the partner's detailed needs and see which user is partnered with them
10	Needs Submission List: Viewing users who have applied	Selecting a user who has applied	Allows the selected user to download the partner agreement file
11	Partner Agreement File Download Page	Clicking the file link	Successfully downloads the correct file
12	Community Service Distribution Page	Selecting distribution by semester: entering desired semester	Can view the locations of community service distribution for the selected semester
13	Community Service Distribution Page	Selecting distribution by year: entering desired year	Can view the locations of community service distribution for the selected year
14	Community Service Distribution Page	Selecting overall distribution	Can view the locations of community service distribution across all semesters

Overall, these results demonstrate that the "Abdimas" marketplace system has been designed with careful consideration of the specific needs of various user types. The intuitive UI/UX design, solid data structure as represented by the ERD, and comprehensive testing scenarios all contribute to the development of a system that can be successfully implemented to support community service activities in higher education institutions. Despite its potential, this research has limitation, the “Abdimas” system is currently in the design and prototype phase (Version 0.0), meaning its practical effectiveness in a live environment has not yet been measured.

5 Conclusion

This research achieved its primary objective of addressing the communication gap between lecturers and community partners through the design of the “Abdimas” marketplace system. By utilizing a Design Thinking approach, the study identified that the difficulty in locating PkM partners, especially for junior lecturers, stems from a lack of centralized information regarding community needs. The resulting system design provides a structured mechanism for bidirectional matching,

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allowing partners to explicitly state their requirements and lecturers to align their expertise with real-world problems. The evaluation of the design through blackbox testing scenarios confirms that the proposed features, such as needs-based filtering and automated agreement letter generation, are logically capable of streamlining the partner-matching process.

Despite these outcomes, this study has several limitations. First, the research is currently confined to the architectural design and high-fidelity prototype phase (Version 0.0), meaning the system's actual impact on PkM distribution has not yet been empirically measured in a live environment. Second, the validation process was limited to functional logic via test scenarios, without addressing non-functional requirements such as data security, server scalability, or long-term user retention. Furthermore, the user needs analysis was based on a specific institutional context, which may necessitate further adjustments for implementation in other universities with different administrative policies.

For future implementation, it is recommended that the system be fully developed and subjected to pilot testing to evaluate its effectiveness in reducing the time required to establish community collaborations. In conclusion, the "Abdimas" design offers a systematic framework to improve the transparency and efficiency of community service programs, supporting more effective engagement between higher education institutions and their stakeholders.

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