

Design and Building Marketplace in Makassar State University

Muhammad Zulham Alfarizi Abinsair¹, Syamsu Alam¹, Valentino Aris^{1,*}

¹Digital Business Study Program, Faculty of Economics and Business, Makassar State University, Makassar, Indonesia

Abstract

Digital transformation in higher education creates opportunities to optimize campus resources and services through integrated web platforms. This study designs and develops a web-based marketplace for Universitas Negeri Makassar, called UNM Connect, to facilitate internal transactions and showcase non-academic services. Using a Research and Development approach with the Waterfall model, the project proceeds through needs analysis, system design, implementation, testing, and evaluation. Built with WordPress and the WooCommerce plugin, the system provides product management, online transactions, automated notifications, and integration with local payment gateways. Needs analysis found campus assets and business units were not centralized, while the interface design emphasized responsiveness and user-friendly navigation. Implementation delivered functional features aligned with user requirements. Black-box testing confirmed all functions performed as expected without significant issues. Evaluation with Google Analytics indicated active traffic, high page views, and consistent engagement. SEO testing using SERPROBOT showed strong search visibility, first-page keyword rankings, and a perfect optimization score. These findings confirm that UNM Connect effectively supports the digital transformation of campus services and offers a scalable, cost-effective model for universities seeking functional digital marketplaces. The project highlights modular architecture, security, and maintainability, and recommends ongoing training and support for campus units to sustain adoption and growth.

Keywords: higher education, marketplace, wordpress, woocommerce.

1. Introduction

Digital transformation has changed the way people live their lives, including in the business field. Technology has not only become a tool, but has also become a key driver in creating efficiency, accelerating processes, and giving rise to new models in transactions and communication[1], [2]. One form of using digital technology that is very beneficial is the use of marketplace platforms[3], [4]. The marketplace allows buying and selling activities to take place online without the need for physical meetings between sellers and buyers, thus greatly supporting high mobility and time and cost efficiency in transactions. The popularity of online shopping in Indonesia has shown a very rapid increase in recent years. Based on data, in 2022 the number of Indonesian e-commerce users has reached 178.94 million people, and is expected to continue to increase to 244.67 million users by 2027[5], [6]. This increase not only reflects increased access to technology, but also changes in consumer behaviour that is increasingly accustomed to online transactions[7], [8]. Factors such as ease of access, time flexibility, and product diversity are the main reasons why people are turning to digital platforms. Large companies such as Tokopedia and Shopee have leveraged technologies such as big data and cloud computing to improve the user experience and encourage service personalization. Similar technologies can now be deployed on a smaller but strategic scale, such as university environments, by leveraging open platforms such as WordPress and WooCommerce plugins[9].

Campuses as a dynamic environment have great potential to become a digital ecosystem that not only supports academic activities, but also healthy and sustainable economic activities. Students, lecturers, education staff, and business actors around the campus are communities that can be connected through an integrated digital system. At the State University of Makassar (UNM), for example, there are various assets such as laboratories, halls, student lodging, and food courts that have only been accessed conventionally. The use of these assets through digital-based marketplaces is expected to help campuses open new sources of income and improve the efficiency of resource management.

* Corresponding author:
E-mail address: valentino.aris@unm.ac.id



Several previous studies have also shown that the implementation of marketplaces in the educational environment has a positive impact on the campus economy and local business actors[10]. Research mentioning that the marketplace can be a means of marketing student entrepreneurial products more widely and effectively[10], [11]. It was also stated that the use of marketplaces for campus snacks makes it easier for traders to manage sales and facilitate the buying and selling process with students[12], [13]. The findings of these two studies are an important foundation that digital platforms on campus are not just tools but are able to create significant economic and social added value. UNM itself has formulated an institutional development strategy through a scheme to change the status to a Public Service Agency Higher Education (PTN-BLU). In the proposed. PPK-BLU planning document, it is stated that the optimal use of campus assets can have a significant impact on increasing the university's non-academic income. One of the main strategies in the document is to integrate various service units and physical assets of the university into a single marketplace system that can be accessed online by the wider community, cooperation partners, and the academic community.

In the development process, the digital platform used must have the characteristics of flexibility, efficiency, and easy to manage by non-technical users. WordPress is a logical choice because it is open-source and provides a user-friendly interface. By adding the WooCommerce plugin, this system can be transformed into a functional marketplace complete with product catalog features, payment methods, and transaction management. Another advantage is the availability of various additional plugins that allow the development of features as needed, such as integration with WhatsApp or local payment gateways such as Midtrans. Therefore, this technological approach is very suitable for campus environments that require fast and cheap digital solutions, but still reliable[14], [15], [16]

2. Method

This research uses the Research and Development (RnD) approach, which aims to produce products in the form of a web-based marketplace system that can be used directly by the State University of Makassar[17]. The development model used is Waterfall, which is one of the classic models in software engineering. This model focuses the development process on a structured and sequential workflow, starting from needs analysis, system design, implementation, testing, to maintenance[18]. Each stage is fully completed before moving on to the next, resulting in clear documentation and a systematic process in software development. The research was carried out within the State University of Makassar, which is the main location of the developed system. The selection of this location was adjusted to the main purpose of the research, which is to build an internal marketplace system that can be used by the entire UNM academic community. The research implementation time starts from January to June 2025. The time span covers all stages in the system development process, from collecting user needs to the final evaluation of the system that has been built.

The system development process follows a workflow in the Waterfall model which consists of five main stages, namely: analysis, design, implementation, testing, and maintenance. The analysis stage aims to identify the needs of the system, both from the user side and from the technical side. Information was collected through observation and study of internal campus documents. Furthermore, the design stage is used to design the system structure, user interface (UI), as well as database architecture. Once the design is approved, the implementation phase is done by building the system using WordPress and WooCommerce plugins. The fourth stage is testing, which focuses on checking the functionality of the system so that all features run as expected. Finally, the maintenance stage is carried out to fix the bugs found and improve system performance according to user feedback. The procedure for developing marketplaces in the campus environment begins with a deep understanding of the urgency of implementing digital technology in supporting economic activities and internal campus services. The following are the stages of the marketplace system development procedure within the State University of Makassar:

2.1. Preparation

The initial stage begins with identifying the problems and needs of the project. This process is carried out through the collection of primary data from the field using observation and interview methods with the academic community as well as observation of economic activities on campus. In addition, a literature study was also conducted to obtain relevant secondary data regarding marketplace trends, consumption patterns, and digital transaction habits in the higher education environment[19], [20]. After the problem is identified, the necessary tools and development materials are prepared. The focus at this stage is to make sure all the technical resources are ready to go, such as WordPress software, WooCommerce plugins, themes, and hosting services. This preparation also includes the preparation of system requirements documents, initial design, and the preparation of internal communication media for the project.

2.2. Planning

The planning stage begins with preparing an initial design of the marketplace system. The design includes the page structure, navigation, key features (such as product catalogs, transaction systems, and payment integrations), and system information architecture. The initial design also contains a mapping of the user interaction flow, so that it can provide a comprehensive overview of how the system to be built works. This planning becomes the basis of reference in the more technical development process in the next stage.

2.3. Development

At this stage, the user interface (UI) is designed using templates and plugins that are tailored to the needs of the system. The implementation of the system is done by building the main pages using WordPress and integrating WooCommerce as an e-commerce framework. Key features such as product pages, shopping carts, checkouts, notification systems, as well as additional plugins such as WhatsApp integration and local payment methods are starting to be implemented in the system. The interface design is designed to be responsive and easy to use by different types of users, especially college students and staff.

2.4. Testing and Evaluation

After the system is successfully implemented, functional testing is carried out using the black-box testing method, to ensure that all functions run as expected[21]. This test involves real-world scenarios of using the system, such as the product ordering process, account registration, and transaction simulation, without looking at the system's internal code[12]. The test results are recorded to analyze if there are any bugs or malfunctions. The evaluation was carried out based on the results of testing and responses from early users, such as students, lecturers, and campus business unit managers. This feedback is used to measure ease of use, system efficiency, access speed, and feature suitability to user needs. The final evaluation is the basis for the maintenance and further development process so that the system is more stable, optimal, and relevant to the needs of the campus in the future[22].

3. Results and Discussion

This research produces a web-based marketplace system specifically designed to support economic activities within the State University of Makassar (UNM). The system, named UNM Connect, was developed with an RnD approach using the Waterfall model and WordPress-based technologies as well as WooCommerce plugins. The development results are described in four stages, namely needs analysis, interface design, feature implementation, and system testing and evaluation.

3.1 Needs Analysis Results

The needs analysis stage is carried out through the collection of primary and secondary data to understand the needs of the end user and the context of using the system. From the results of observations, interviews, and literature studies, it was found that campus asset utilization services (such as halls, laboratories, and food and beverage business units) have not been integrated into one digital system. In addition, transactions are still carried out conventionally, causing limitations in access and efficiency of services. The results of this analysis underlie the design of key features such as product registration, online ordering, order notifications, and payment system integration.

3.2. User Interface (UI) Design

The system's interface is designed to support ease of navigation and accessibility by users from a variety of backgrounds, especially students and campus staff. The interface design uses responsive templates with a simple navigation structure. The main page features product categories, quick search, and shopping cart features. The use of colors, icons, and typography was adapted to the visual characteristics of UNM. Below is a screenshot of the main interface of the system:

a) Landing Pages

This landing page is designed to be informative and engaging and provides users with a brief overview of the services and resources available on UNM Connect.

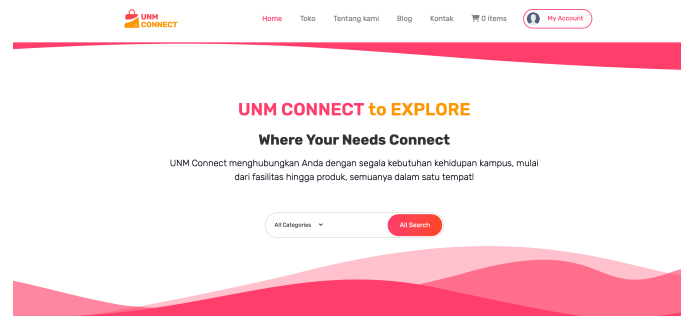


Fig. 1. Landing Pages

b) Store Page

The UNM Connect store page where users can purchase various products and services related to the State University of Makassar.

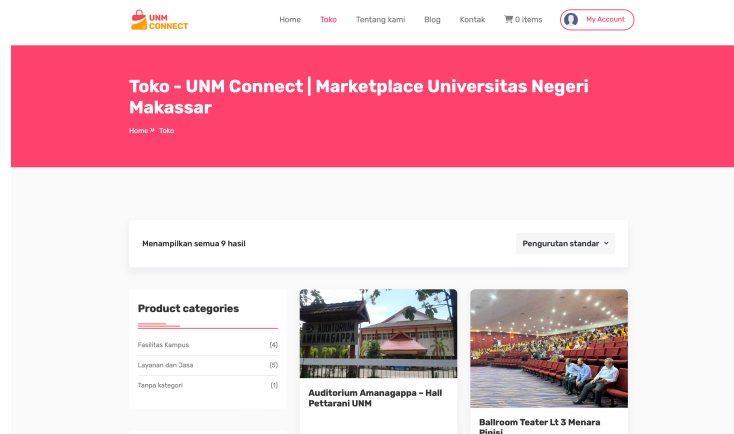


Fig. 2. Store Page

c) Product Page

The Product page consists of several sections that describe the attributes of the product, such as the main image and list of images, the price of the product, and its advantages.

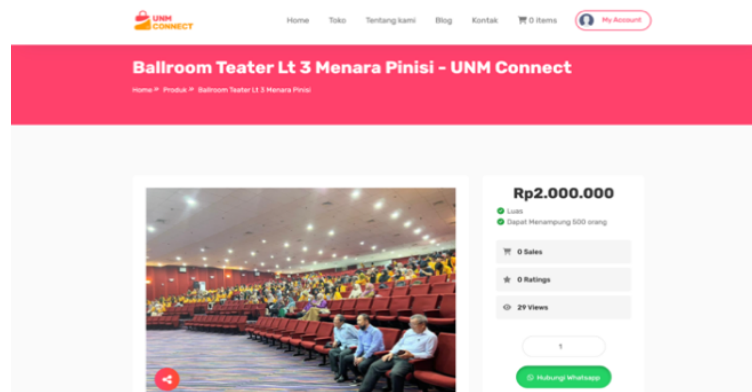


Fig. 3. Product Page

d) About Us Page

About us page on the UNM Connect navigation tab. This page contains information about this platform, including its features and how to use it.

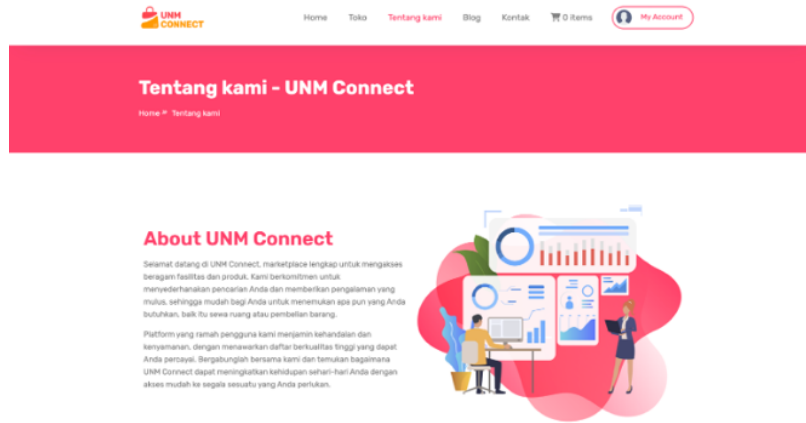


Fig. 4. About Us Page

e) Contact Page

Contact page on the UNM Connect navigation tab. This page contains contacts, locations and feedback forms that users can fill out.

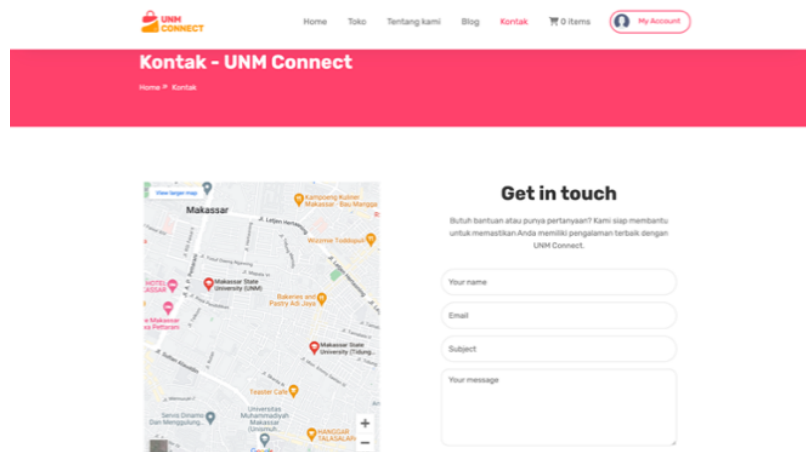


Fig. 5. Contact Page

3.3. Implementation of WooCommerce-Based Marketplace Features

The system is built using WordPress as the core *Content Management System* (CMS), with the WooCommerce plugin as the main module for managing transactions. Feature implementations include:

a) Login and Register Feature

Login and sign-up page. Login allows users to access their accounts by entering the correct credentials, such as usernames and passwords. Meanwhile, the account registration page allows new users to create an account by filling out a registration form that includes basic information such as name, email address, and password.

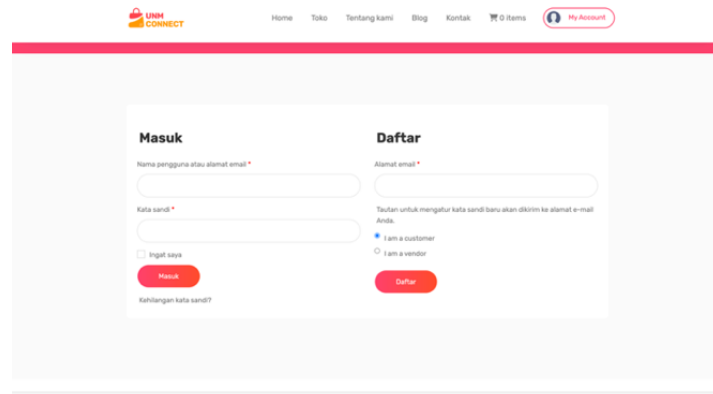


Fig. 6. UNM Connect Login and Registration Feature

b) Cart Features

These features were developed based on recommendations from the WooCommerce documentation and adapted to previous studies that stated that the success of campus marketplaces relies heavily on ease of interaction and an efficient online transaction system.

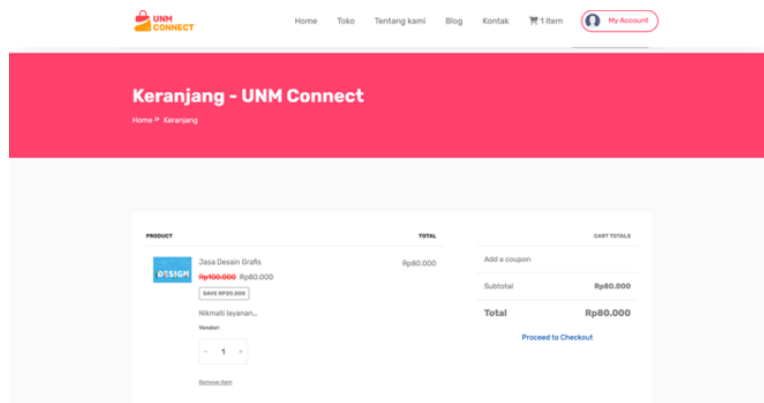


Fig. 7. Features of the UNM Connect Cart

The cart page is a place where users can view and manage the products they have added for purchase. Users can increase or decrease the number of products, remove unwanted items, and proceed to the checkout page to complete the purchase.

c) Checkout Features

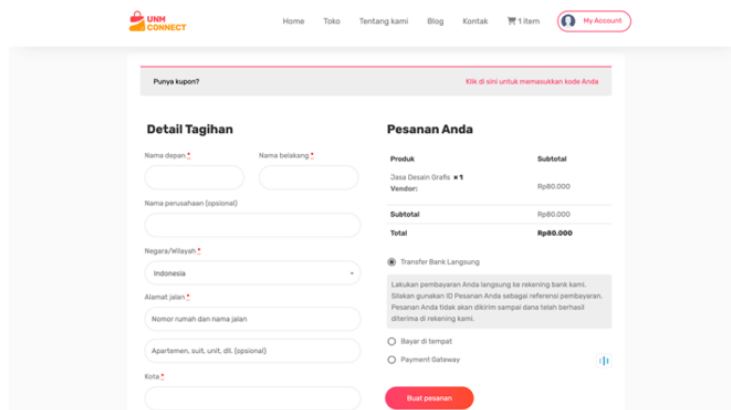


Fig. 8. UNM Connect Checkout Features

The checkout page when the user wants to see the items in the cart. Users will see a summary of their orders, including a list of purchased products, total prices, and shipping options

d) Features of Payment Gateway

Displays the Payment Gateway feature when the user selects the Payment Gateway payment option. Midtrans's payment gateway feature allows users to make online payments safely and efficiently. Users can choose their preferred payment method, such as credit cards, bank transfers, or digital wallets.

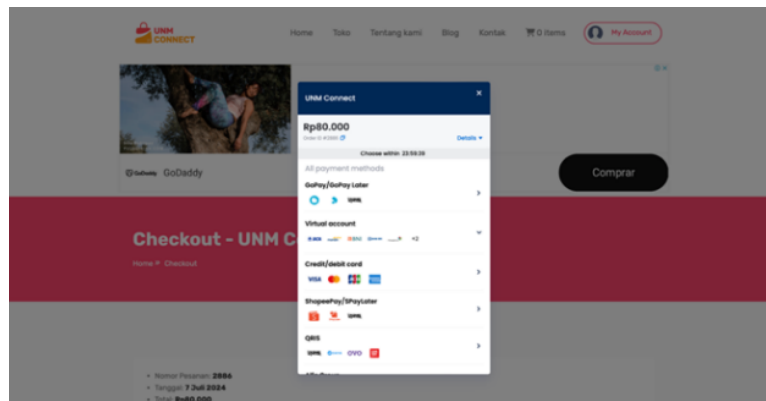


Fig. 9. Features of UNM Connect Payment Gateway

e) Product Add-on Features

Displays the add product feature when users log in to their dashboard. This feature helps users to add new products to the marketplace. Users can input product names, prices, categories, tags, photos, and short descriptions.

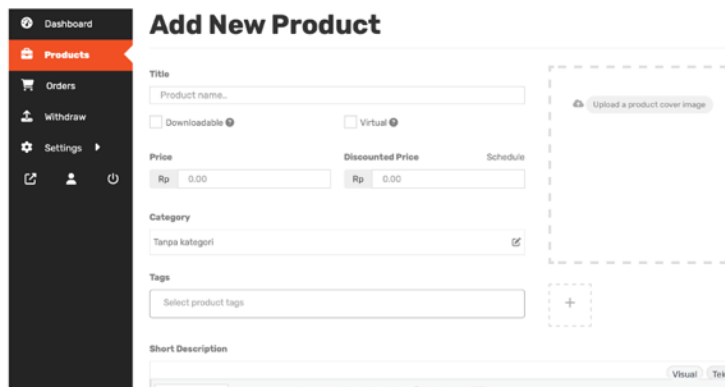


Fig. 10. UNM Connect Product Plus Features

3.4. System Testing

The test is carried out using the black box testing method to ensure that all system functions are running as intended. The test results show that all major features are working properly in the absence of significant failures or bugs[23]. The following table presents the test results of some of the key features.

The test results show that the system is functioning according to expectations in each process tested. For example, the login feature successfully opens a dashboard page with the correct credentials and displays an error message when the credentials are incorrect. In line with previous research which showed that woocommerce-based e-commerce applications were declared to have been successful because they could provide convenience to the relevant admins[24].

Table 1. Functionality Testing

No	Process	Input	Expected output	Result
1	Enter	Email and Password are correct	User dashboard page opens	Successfully Login and the dashboard page opens
2	Enter	Incorrect Email and Password	Display error messages	Failed to log in, error message appears
3	List	Fill in all the inputs requested	List Successful	Successfully register
4	List	Doesn't fill in all the inputs requested	Display error messages	Failed to register, error message appears
5	Basket	Pressing the add cart button	Add and redirect to cart pages	Successfully add and redirect to cart
6	Basket	Reducing Items and Deleting Items	Reduced or deleted items	Successfully reduce items and delete items
7	Checkout	Fill in the requested input and press the Checkout button	Redirect to the appropriate payment	Successful Redirect
8	Checkout	Not filling in the requested input	Display error messages	Error message appears
9	Payment Gateway	Making a Payment	Successful payout	Successful Redirect

3.5. Final Evaluation

The final evaluation will be carried out load and performance testing and will display traffic from Google Analytics and SEO to measure the platform's performance.

a) Traffic Google Analytics

Table 2. Events on the Website

Event name	Number of events	Total users
page_view	420	52
user_engagement	372	27
ad_impression	254	6
view_item_list	240	41
Scroll	122	15
session_start	93	52
view_item	63	17
first_visit	53	52
form_start	46	14
form_submit	31	14

The Google Analytics results in Table 2 show active platform usage with high page_view totaling 420, yet lower user_engagement with 372 events from 27 users indicates an opportunity to increase engagement in subsequent marketplace activities. This pattern aligns with GA4 literature that emphasizes event-based analysis and funnel exploration to identify drop-off points and link them to engagement metrics such as engaged sessions and average engagement time[25], [26]. In addition, web performance studies and case reports show that improvements to mobile UX and Core Web Vitals such as LCP, INP, and CLS correlate with higher engagement and conversion, reinforcing the need to optimize user experience to drive actions after page view.

Table 3. User Channels

First user primary channel group	New users
Straight	63
Organic Search	10

The main channel most used by new users is the Direct channel, with 63 new users, while the organic search channel (Organic Search) accounts for 10 new users. This indicates that most new users access the marketplace directly through the URL. Meanwhile, organic search channels, although their contribution is smaller, show that there are also users who find marketplaces through search results on search engines.

The conclusion of this data is that most new users access the marketplace through direct channels, while organic search accounts for a smaller contribution, demonstrating the need for a stronger strategy to increase visibility through search and there is potential to increase user engagement through mobile user experience optimization, as well as improved strategies to attract more mobile users[27], [28].

b) Performance and SEO

SEO performance and optimization need to understand that the technical performance of a platform and its visibility in search engines are crucial factors in influencing the user experience and overall business success. By improving these aspects, marketplaces can not only provide a better experience to users, but also increase the potential to reach a wider audience through search engines.

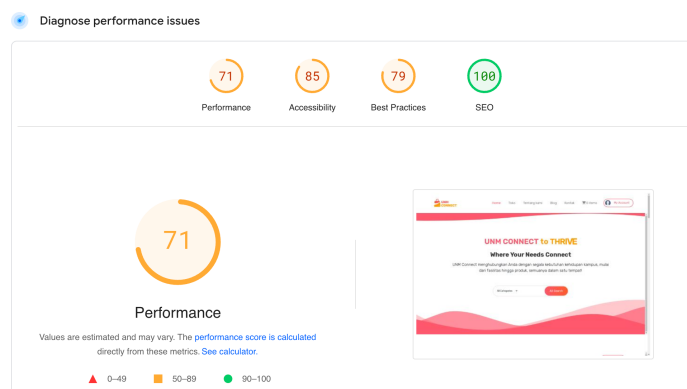


Fig. 11. Performance and SEO

A performance score of 71 indicates that this website has relatively good performance, which is a good value for a website built using WooCommerce, allowing it to load quickly and responsively. A score of 85 for accessibility indicates that the website is easily accessible to users, while a score of 79 for best practices indicates that the website follows most of the best practices in website development. Nonetheless, there are still some aspects that can be improved, such as implementing HTTPS thoroughly and ensuring the validity of the website's code[29], [30]. On the other hand, a perfect score of 100 for SEO signifies that the website has been well optimized for search engines, allowing it to be easily found by internet users looking for related information. In line with findings that suggest that effective SEO optimization and the use of responsive design to ensure a good display across multiple devices can significantly improve user engagement and platform visibility. SEO performance testing on one of the products, namely the UNM Teater Ballroom. Based on the results of checking the SEO performance of SERPROBOT on the UNM Theater Ballroom product, it can be concluded that this website managed to achieve a high ranking in Google search results for various related keywords, such as "UNM Teater Ballroom" and other variations. A consistent presence in the 2nd or 3rd rank indicates that the UNM Teater Ballroom, with strong visibility on the first page of Google search results

4. Conclusion

This research successfully designed and developed a web-based marketplace system called UNM Connect to support economic activities at Makassar State University. This system is built using the Research and Development (RnD) approach with the Waterfall model, through the stages of needs analysis, design, implementation, testing, and evaluation. The results of the study show that the main need of the academic community is the existence of a centralized platform that is able to integrate various campus assets and business units in one digital system. The responsive and simple interface is proven to improve the user experience, while the integration of WordPress and WooCommerce allows product management, online transactions, automated notifications, and local payment method support to run efficiently.

Functional testing with the black-box method ensures that all key features function as expected without any problems. SEO evaluations through Google Analytics and SERPROBOT also showed positive performance, with high user engagement rates, maximum optimization scores, and keyword rankings that occupied the first page of Google. These findings confirm that UNM Connect has strong digital visibility potential while being able to support the transformation of campus non-academic services. Overall, the integration of WordPress and WooCommerce has proven to be a strategic, affordable, and sustainable solution to build a university-based marketplace and can be used as a model for other educational institutions in Indonesia.

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