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Design and Development of a Laravel 13 Based E-Commerce Referral System for Seller Monitoring and Accountability

Primaadi Airlangga^{1*}, Tegar Puji Bachtiar²,

^{1,2} Informatics, University KH. A. Wahab Hasbullah
¹ primaadi.airlangga@unwaha.ac.id, ² tgarbach29@gmail.com

ABSTRACT

The rapid growth of electronic transactions necessitates systems capable of monitoring seller quality and reputation across marketplace platforms. This study aims to design and implement a seller referral system on a Laravel 13 based e-commerce platform integrated with performance monitoring and seller accountability mechanisms. Built using the Prototype model encompassing communication, planning, modeling, prototyping, and deployment phases the system utilizes MySQL for database management. Registered sellers can distribute unique referral codes to prospective sellers, with the system automatically recording these relationships to enable structured tracking of activities, product counts, store ratings, and access status of referred sellers. Functional testing conducted via a black-box approach demonstrated that the authentication, referral registration, dashboard, monitoring, order management, and store settings modules operated strictly according to specifications, achieving a 100% test case pass rate. The primary contribution of this research lies in shifting the referral paradigm from simple user acquisition to a peer-accountability framework that holds referring sellers responsible for the performance of their recruits, thereby mitigating the presence of unreliable sellers and fostering greater trust in the online shopping environment.

Keyword : E-commerce, Laravel 13, Referral System, Seller Monitoring, Seller Accountability.

INTRODUCTION

Digital transformation has fundamentally reshaped the economic and commercial landscape, primarily driven by a shift in consumer purchasing behavior from conventional channels to online platforms. As internet penetration expands, consumer habits evolve accordingly. This trend enables business operators to broaden market reach and maintain competitiveness in an increasingly crowded marketplace [1]. Governments actively support the acceleration of digital transformation within micro, small, and medium enterprises (MSMEs) due to their pivotal role in the national economy, positioning e-commerce as a strategic mechanism to sustain business operations in competitive digital environments [2].

Despite these vast opportunities, small business operators frequently encounter structural hurdles in adopting digital systems, ranging from limited technological literacy to rapidly changing shopping preferences [3]. This issue is further exacerbated by the proliferation of unverified sellers operating across marketplace platforms. The absence of rigorous screening mechanisms opens avenues for fraudulent activities, business identity theft, and non-compliant product listings, which ultimately erode consumer trust and harm legitimate MSMEs [4]. A viable solution involves deploying technology-based systems capable of enhancing seller verification and monitoring, thereby providing platform administrators with assurance that all active sellers comply with established standards [5]. From a technical perspective, modern web frameworks like Laravel facilitate the construction of complex, well-structured e-commerce platforms by providing integrated mechanisms for

authentication, database management, and third-party service integration [6]–[8]. However, these technical capabilities are rarely matched by academic studies investigating inter-seller relational dynamics. Most Laravel-based e-commerce literature remains focused on routine tasks such as catalog management, payment processing, and user authentication, omitting how peer-to-peer seller relationships can be designed to sustain high service quality [6]. Fundamentally, e-commerce platforms are not merely transaction engines but interactive ecosystems connecting platform operators, sellers, and consumers. The sustainability of these platforms relies heavily on trust and service quality empirical studies demonstrate that user satisfaction significantly drives marketplace repurchase intentions [9].

Previous studies reveal a distinct research gap concerning this issue. Widyasari and Ramadhan [10] developed an MSME marketplace information system that expanded market access but did not incorporate referral mechanisms or inter-seller accountability. Rachmawati [11] investigated MSME e-commerce adoption to adapt to shifting consumer behavior, yet omitted social dynamics among platform sellers. Yuliana and Arwin [12] analyzed e-commerce adoption determinants using the Technology-Organization-Environment framework, emphasizing organizational and technological readiness while ignoring the role of existing sellers in guiding new entrants. On the technical front, Ratino et al. [6] highlighted Laravel's efficiency for e-commerce development, though their scope was restricted to standard product and transaction management. Similarly, Faqih et al. [5] proposed a web-based e-commerce system to foster digital transformation for culinary MSMEs without integrating referral mechanisms with seller accountability. These studies demonstrate a consistent pattern: research attention remains concentrated on general adoption factors or technical development, while mechanisms explicitly tying seller referrals to peer social accountability remain largely unexplored.

To bridge this gap, this study designs and implements a seller referral system on a Laravel 13-based e-commerce platform that deliberately incorporates monitoring and seller responsibility mechanisms into the referral process itself. Unlike conventional referral schemes oriented solely toward user acquisition, the proposed system holds referring sellers accountable for the behavior and performance of their recruits through feature sets tracking activities, product counts, store ratings, and access status. The objective of this research is to design, build, and evaluate the functionality of this system to curb irresponsible sellers, strengthen supervision over new store onboarding, and foster a safer, more transparent, and sustainable digital commerce ecosystem for MSMEs in Indonesia.

METHODOLOGY

Research Type and Stages

This study is very important for software engineering, web development, and digital commerce because it adds a peer-monitoring system to a seller referral program, which helps create a fair, responsible, and long-lasting e-commerce environment. To achieve this framework, the research used the Prototype development model. This method creates a first version of the model that shows the main needs of the system. Then, it is tested, checked, and improved step by step until the finished software matches what the users want. The prototype model was selected because it helps reduce the difference in understanding between developers and stakeholders from the beginning, and it speeds up the process of making improvements when issues are found [13]. This process of gradually improving things works well for this research because setting up seller responsibility in a referral system is a new way of doing things that needs careful step-by-step improvements to the business logic.

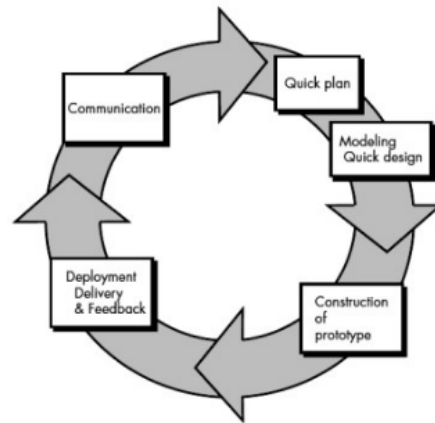


Figure 1. The Five Iterative Stages of the Prototype Development Model

The overall development process traversed five main phases, as illustrated in Figure 1. First, the communication phase identified system requirements by observing existing seller onboarding workflows and reviewing relevant literature. Second, the quick plan phase established the technology stack (Laravel 13 and MySQL), business logic, and feature partitioning focused on referral registration and peer-relationship tracking. Third, the modeling quick design phase produced flowcharts, use case diagrams, activity diagrams, database schemas, and user interface mockups. Fourth, the construction of prototype phase involved coding the system based on the architectural design, encompassing authentication, seller management, referral processing, and peer-monitoring controls. Fifth, the deployment delivery & feedback phase subjected the prototype to comprehensive functional testing to ensure all modules operated as intended prior to evaluation.

Data Collection Methods and Types

Data collection was executed through two primary techniques: direct observation and a comprehensive literature review. Direct observation was conducted on existing seller management workflows within the e-commerce platform. This observation prioritized analyzing seller onboarding channels, peer-recruitment mechanisms, relational linkages between referring and referred sellers, and peer-monitoring controls. The empirical observation unveiled critical operational drawbacks, specifically the lack of structured seller recruitment channels, untracked inter-seller relationships, and absent supervisory mechanisms for referred seller activities. These findings directly informed the functional requirements and feature specifications of the proposed system.

Complementarily, a literature review was performed by retrieving and evaluating academic textbooks, peer-reviewed journal articles, and technical documentation. The review encompassed core domain topics, including e-commerce architectures, seller referral systems, seller management paradigms, peer accountability frameworks, Laravel 13, MySQL, and Prototype development methodologies. This synthesized literature established the theoretical backbone of the study, justified the selection of the development model, and guided architectural implementation.

The empirical analysis utilized both primary and secondary data streams. Primary data was gathered directly through operational workflow observations and rigorous functional software testing. This dataset comprised parameters related to referral code generation and validation, seller relationship logging, store activity tracking, and peer-monitoring actions. Primary data served to validate whether the implemented application successfully fulfilled system requirements and resolved operational gaps. Conversely, secondary data was acquired indirectly via academic literature and official technical documentation, providing theoretical benchmarks for system design, database modeling, and framework deployment.

System Design

The system was designed to support seller referral features that are connected with peer accountability. The system workflow is shown using flowcharts that explain each step, starting with checking if a seller is approved, creating a special code for referrals, using that code to verify a new seller's sign-up, linking the new seller to the referring seller in the database, and then tracking all referred sellers through a dashboard. If the seller who was referred doesn't follow the platform rules, the seller who referred them can take action by giving warnings or stopping the referred seller's store from being used. Interactions between the people involved are shown through a use case diagram that includes two main roles: the sellers who refer others and the sellers who are referred by others. Sellers who refer others can see and send out referral codes, keep track of the stores they've referred to and how their referrals are doing, send out warnings, and block access to certain stores if needed. Sellers who are referred can sign up using a referral code, set up their store profile and product listings, and handle their responsibilities as required by the platform's rules. Specific steps in each activity are shown using activity diagrams for referral registration, actions taken by the referring seller, and managing the referred seller. These diagrams clearly show how referrals are checked, how relationships are kept track of, and how store activities are recorded, which helps in checking accountability. The database structure was built using MySQL and included six main connected parts, following rules for relational databases to keep data accurate in web apps [15], as shown in Table 1.

Table 1. Core Database Entity Structure

Table Name	Primary Function
users	Stores identities and authentication credentials for all users (buyers and sellers).
Referral_codes	Stores unique referral codes and links referring sellers with referred sellers.
products	Manages product listings published by each seller.
categories	Classifies product categories.
orders	Records purchase transactions and order statuses between buyers and sellers.
notifications	Logs system notifications regarding referral activities, orders, and store access changes.

The referral_codes table serves as the pivotal entity mapping relationships between referring and referred sellers. Leveraging Eloquent ORM in Laravel enables structured, consistent, and easily manageable relationship mapping [14], providing the data foundation for all seller monitoring features during implementation. Hardware and software requirements used during design and development are detailed in Table 2.

Table 2. Hardware and Software Specifications

Category	Component	Function
Hardware	PC	System design, development, and testing environment.
Hardware	Development server	Application deployment, database hosting, and access management.
Software	Laravel 13	Primary MVC-based web application framework.
Software	MySQL	Relational Database Management System (RDBMS).
Software	Visual studio code	Integrated Source Code Editor.
Software	laragon	Local development environment (PHP, Apache, MySQL).

RESULTS AND DISCUSSION

System Implementation

The architectural plan for the proposed e-commerce system was completely developed using the Laravel 13 web framework, following the Model-View-Controller (MVC) design pattern closely, with MySQL acting as the relational database management system. The software implementation resulted in four key functional modules: authentication and referral-based seller onboarding, automated validation of referral codes, monitoring of subordinate sellers, and analytical dashboards that show metrics for individual stores as well as activities within the referral network. To ensure reliable data storage and preserve the structure during various web activities, the database was implemented in accordance with the relational entity schema presented in Table 1. In this architecture, the `referral_codes` database table served as the main relational link between referring sellers and referred sellers. By using Laravel's Eloquent Object-Relational Mapping (ORM), these peer-to-peer relationships were automatically set up and organized when accounts were created, providing a clear record that allows for automatic tracking of seller networks without the need for manual database searches. The authentication module on the client-facing application interface offers secure access control through email and password, with standardized input validation in the backend. During the seller onboarding process on the Sellaris platform, the system requires sellers to follow a strict registration policy. This involves completing essential profile information such as full name, store name, email address, phone number, and password. Additionally, a valid referral code is mandatory as part of the registration process. Before adding new account information to the MySQL database, the backend validation service checks whether the given referral code is real and currently active. This automated verification process ensures that each new merchant is properly connected to an existing sponsor store before they are given access rights, as shown in Figure 2.

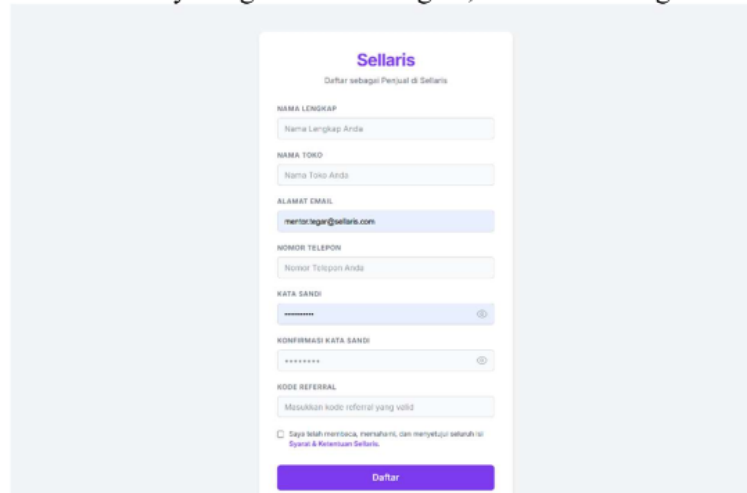


Figure 2. Referral Based Seller Registration Interface

Crucially, to fulfill the core research objective of embedding peer accountability into the referral mechanism, the platform features a dedicated referral management and monitoring interface under the My Referral menu. As depicted in Figure 3, this control panel presents a structured table displaying the mentor seller's subordinate stores alongside critical performance metrics. For each referred seller, the system dynamically tracks and renders the assigned referral code, total published products, total completed orders, store rating averages, earned commission metrics, and account access statuses. Furthermore, the interface incorporates visual compliance indicators and action controls such as warning alerts triggered for low-rated stores (e.g., rating below threshold) enabling mentor sellers to actively supervise and maintain quality standards across their recruited network.

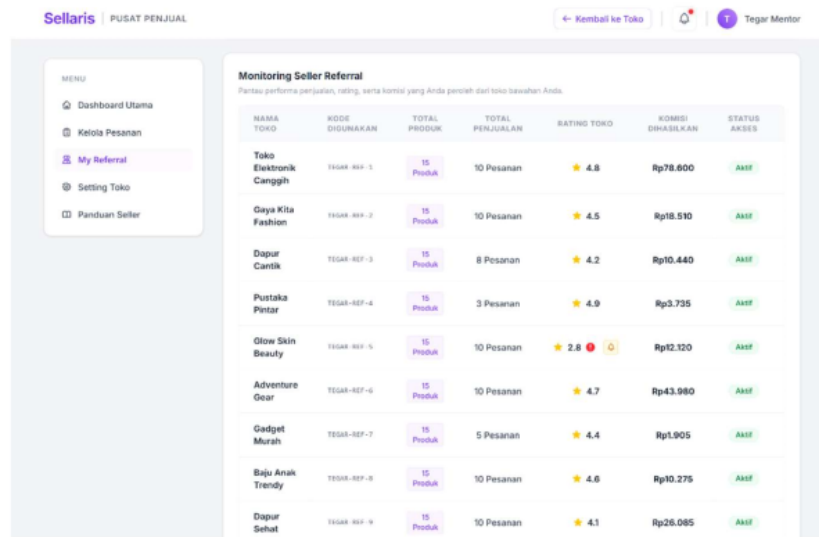


Figure 3. Subordinate Seller Referral Monitoring Control Panel

Following successful authentication, sellers can also navigate to their central operational overview under the Dashboard Utama menu. As shown in Figure 4, this main dashboard aggregates real-time store metrics such as active product quota counters, total units sold, and current withdrawable wallet balances into consolidated statistical cards. Furthermore, the interface incorporates a product catalog management panel that allows sellers to publish new items, search product listings, and monitor stock levels, pricing, category classifications, and individual product sales performance.

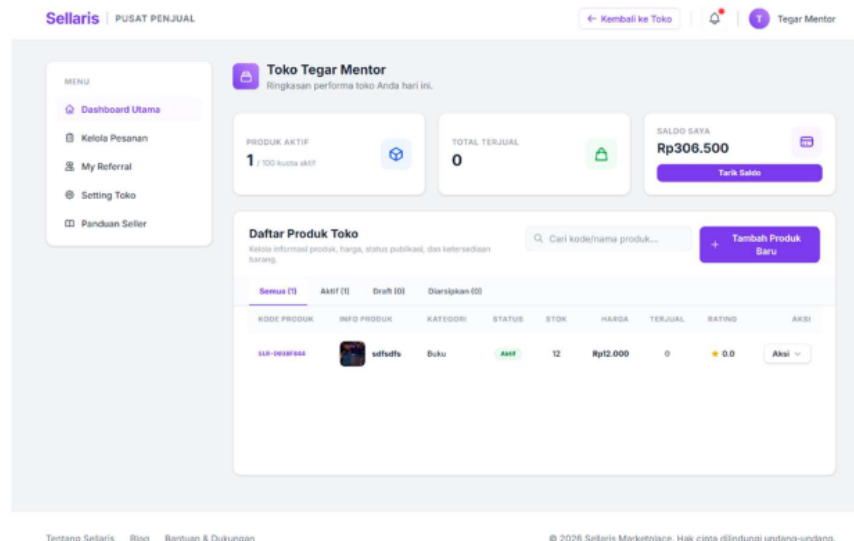


Figure 4. Main Seller Dashboard and Product Management Interface

Functional System Testing

Testing was done by looking only at the results the software gave, checking if they were correct based on the inputs used, without looking at how the software worked inside. This approach was chosen to check if each part met the tasks it was supposed to do during the planning stage. The testing included six modules: login, seller registration, seller dashboard, referral system, order management, and store settings. It covered 33 test scenarios, which included both normal and special cases of input. Here is a summary of the testing results, as shown in Table 3.

Table 3. Summary of Black-Box Testing Results

Test module	Total scenarios	Passed	Success rate
Login	5	5	100%
Seller registration	6	6	100%
Seller dashboard	7	7	100%
Referral system	5	5	100%
Order management	5	5	100%
Storage setting	5	5	100%
Total	33	33	100%

All test scenarios including negative cases such as invalid referral codes, duplicate email registrations, and missing required fields yielded expected system responses, achieving a 100% pass rate across all modules. These results indicate that application-level validation logic performed consistently, particularly regarding referral code verification, which serves as the core mechanism for seller accountability in this research.

The test results show that all six main application modules worked as they were supposed to according to the system's requirements. However, these functional achievements should be understood with careful academic consideration. Black-box testing mainly checks if the inputs and outputs work correctly at the interface level it doesn't actually show that adding referral systems changes how real-world sellers behave in a more responsible way. To understand how behavior changes, you need long-term studies in real markets with a bigger group of sellers, which isn't possible with just testing a prototype. This study brings a new idea by changing how seller referral systems work. Instead of just being ways to get more sellers, they become systems that hold referring sellers responsible for how well their new sellers perform. This matches what Chaniago and others found, showing that when users are happy, they are more likely to buy again from the marketplace [9] by giving quality control to experienced sellers, the platform can keep service quality steady, which is better than older methods that focus only on the number of sales. This study builds on the work of Ratino et al. and Faqih et al., who created e-commerce systems using Laravel but did not consider how sellers relate to each other [5], [6]. The current research addresses this by connecting referral data structures directly to monitoring features. Nevertheless, several limitations warrant critical examination. The system does not offer any financial or non-financial rewards for sellers who actively watch over their recruits, which could lead to lower involvement in the future because the effort to monitor others isn't being rewarded. Second, even though the code validation at the application level stops registration without a valid code, it doesn't fully stop situations where referring and referred sellers follow the registration rules but don't really intend to do proper supervision. To fix this, more verification steps will need to be added in future work. Third, from an architectural point of view, the relational MySQL setup works well for small-scale transactions in a prototype, but when the number of users grows, it will need better database indexing and caching systems to keep the speed of queries from slowing down. These points show that although passing functional tests is important, it by itself isn't enough to make sure something works well over a long time. In short, the results show that the system worked as intended, meeting the research goals by providing a seller referral system that includes peer monitoring features. The real benefit of this platform comes from offering data structures and workflows that clearly link referral connections with supervision responsibilities an area that has been rarely addressed in previous studies on Laravel e-commerce.

CONCLUSION

This study created, developed, and tested a seller referral system on an e-commerce platform built with Laravel 13, which includes features to monitor and hold sellers accountable. The system was built step by step using the Prototype model. It began with understanding the requirements, then moved on to designing the workflow through tools like flowcharts, use case diagrams, activity diagrams, and database schemas. After that, the six main features were developed: user authentication,

seller registration through referrals, a dashboard, a referral system, order management, and store settings. Testing the system in 33 different situations showed that all parts worked perfectly every time. This proves that checking referral codes, keeping track of relationships between sellers, and displaying monitoring data all work well throughout the whole app.

The main point of this study is changing the way referral systems are understood in online shopping platforms moving from just trying to grow the number of users to a system where the sellers who refer others are responsible for how well their recommended sellers perform. This method could help cut down on bad sellers and make users feel more confident in online platforms. More research is needed to check how it behaves in real situations, because this study only tested how it works. For future improvements, it's recommended to add reward or commission programs for sellers who refer others, include detailed analytics and reporting tools, set up instant notification alerts, create a mobile app version, improve security with two-factor authentication, and establish clearer ways to measure seller responsibility, like tracking buyer feedback and store activity, to better manage and control the system in future work.

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