

Design And Development Of A Laravel 13 Based E-Commerce Referral System For Seller Monitoring And Accountability

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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 contributes to software engineering, web development, and digital commerce paradigms by integrating a peer-accountability monitoring structure into referral-based e-commerce systems, thereby fostering a transparent, responsible, and sustainable digital marketplace environment. To realize this framework, the research utilized the Prototype development model. This methodology constructs an initial system iteration to model core operational requirements, which is subsequently evaluated, refined, and iteratively enhanced until the final software architecture aligns with user requirements. The prototype model was selected because it mitigates communication gaps between system architects and stakeholders early in the development lifecycle while accelerating iterative refinements when operational issues arise [13]. This iterative enhancement process is particularly suitable for this research, as embedding peer-monitoring mechanisms within a seller referral system represents a novel architecture that requires systematic, step-by-step refinements to its underlying business logic.

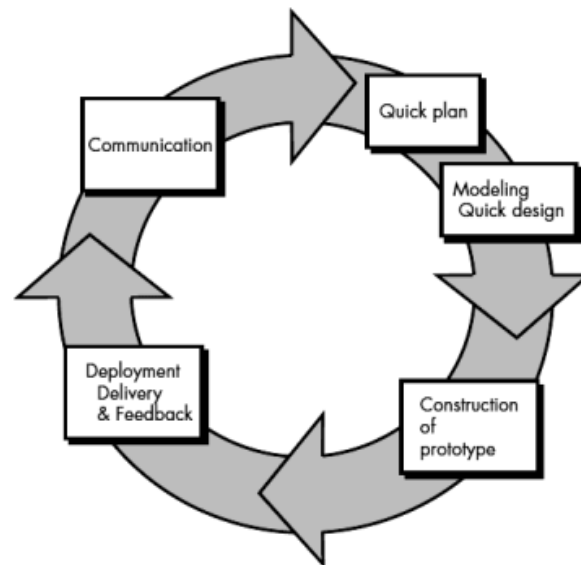


Figure 1. The Five Iterative Stages of the Prototype Development Model

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 functionalities integrated with peer-accountability mechanisms. The platform workflow is modeled using system flowcharts that delineate operational procedures, including seller eligibility verification, referral code generation, code validation during registration, database linkage between referring mentors and recruited sellers, and dashboard-based monitoring. If a subordinate seller fails to maintain operational standards, the referring mentor seller can enforce disciplinary actions, such as issuing warning alerts or executing temporary store access suspensions. User interactions are modeled through a Use Case diagram depicting two primary actor roles: referring mentor sellers and recruited subordinate sellers. Mentor sellers are authorized to generate and disseminate referral codes, track subordinate store performance, issue warning alerts, and suspend non-compliant store access. Recruited sellers can register via valid referral codes, configure store profiles and product listings, and fulfill platform operational requirements. Detailed execution flows are further illustrated using Activity Diagrams covering referral registration, mentor supervisory actions, and subordinate store management. These diagrams clearly demonstrate the processes for code verification, relationship mapping, and activity logging required for peer accountability. The relational database structure was implemented using MySQL, consisting of core interconnected entities structured according to relational database normalization principles to ensure data integrity [15], as summarized in Table 1.

Table 1. Core Database Entity Structure

Table Name	Primary Function
users	Stores user identities, authentication credentials, and merchant store metadata (e.g., store name, ratings, wallet balance) alongside role validation (is_seller) and account access state control (is_active).
referral_codes	Stores unique referral codes and links referring mentor sellers (user_id) with recruited subordinate sellers (referred_user_id).
referral_rewards	Logs generated referral commissions, incentive payouts, and financial metrics earned from subordinate seller activities.
products	Manages product listings published by each merchant seller (user_id).
categories	Classifies product categories.
orders	Records purchase transactions and order statuses between buyers and sellers.
order_items	Details individual products, quantities, and item prices associated with a specific order.
transactions	Logs payment gateway processing records and seller wallet withdrawal activities.
notifications	Logs system notifications regarding referral activities, orders, and store access changes.

To ensure database normalization and streamline identity management within the Laravel framework, store profile attributes and operational access controls are encapsulated directly within the users table rather than managed via a separate stores entity. Role differentiation and account access governance are handled using boolean control flags: is_seller explicitly distinguishes merchant accounts from regular buyers, while is_active regulates store access permissions, enabling mentor sellers or administrators to enforce disciplinary actions such as store suspension. In this architecture, the referral_codes table serves as the pivotal entity mapping relationships between referring mentor sellers (user_id) and recruited subordinate sellers (referred_user_id) with a standard one-to-many

(1:N) cardinality, as illustrated in the Entity Relationship Diagram in Figure 2. Leveraging Eloquent ORM in Laravel enables structured, consistent, and easily manageable relationship mapping [14], providing the data foundation for tracking subordinate store performance, ratings, and referral rewards (referral_rewards).

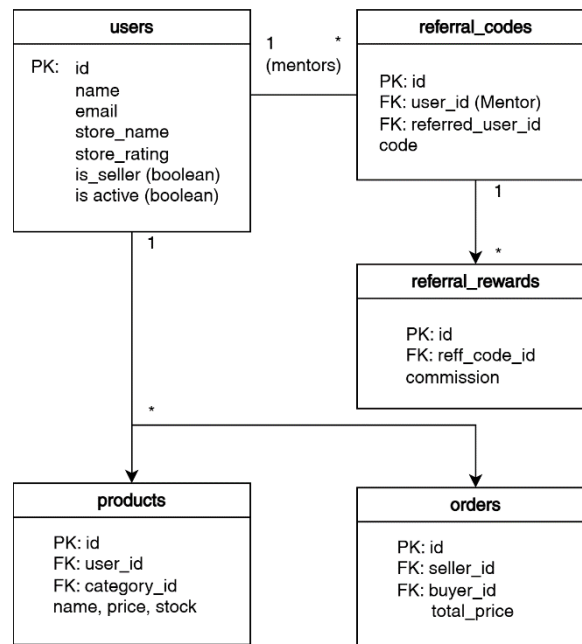


Figure 2. Entity Relationship Diagram (ERD) of Core System Entities

As illustrated in Figure 2, relational integrity across the platform is enforced through Primary Key (PK) and Foreign Key (FK) constraints. The users entity acts as the centralized store repository, encapsulating merchant metadata alongside role governance (is_seller) and store access flags (is_active). Inter-seller referral hierarchies are mapped in the referral_codes table using a one-to-many (1:N) cardinality connecting the mentor (user_id) and recruited subordinate seller (referred_user_id). Each referral relationship links to referral_rewards to log generated financial commissions. Furthermore, merchant catalog listings in products and transactional histories in orders maintain direct relational links to users via user_id and seller_id, enabling real-time performance tracking and instant product access suspension upon store deactivation. 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 accommodate local merchant cohorts and target domestic micro, small, and medium enterprises (MSMEs) in Indonesia, the functional prototype interface was implemented in Bahasa Indonesia.

To ensure reliable data storage and preserve 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 3.

Figure 3. Referral Based Seller Registration Interface (Localized in Bahasa Indonesia for Local MSMEs)

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 4, 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.

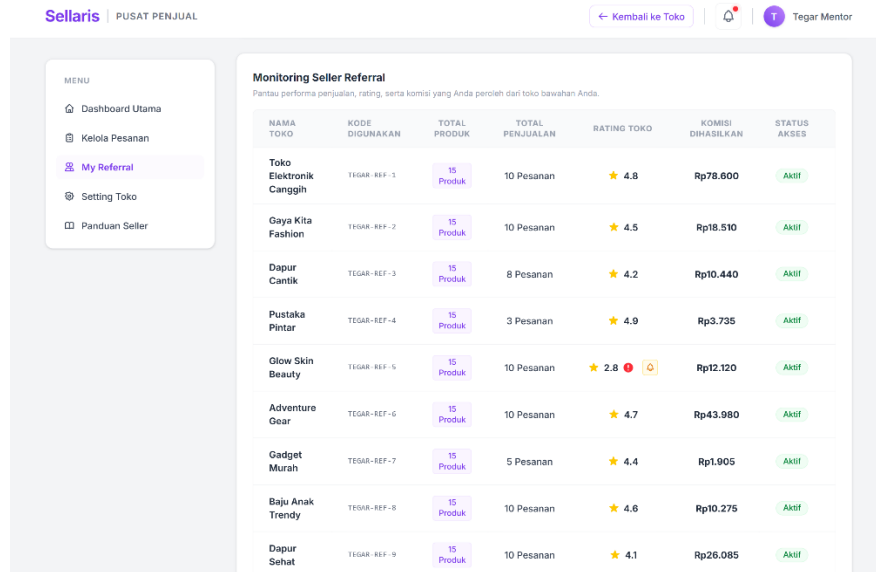


Figure 4. Subordinate Seller Referral Monitoring Control Panel Interface (Localized in Bahasa Indonesia for Local MSMEs)

Following successful authentication, sellers can also navigate to their central operational overview under the Dashboard Utama menu. As shown in Figure 5, 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.

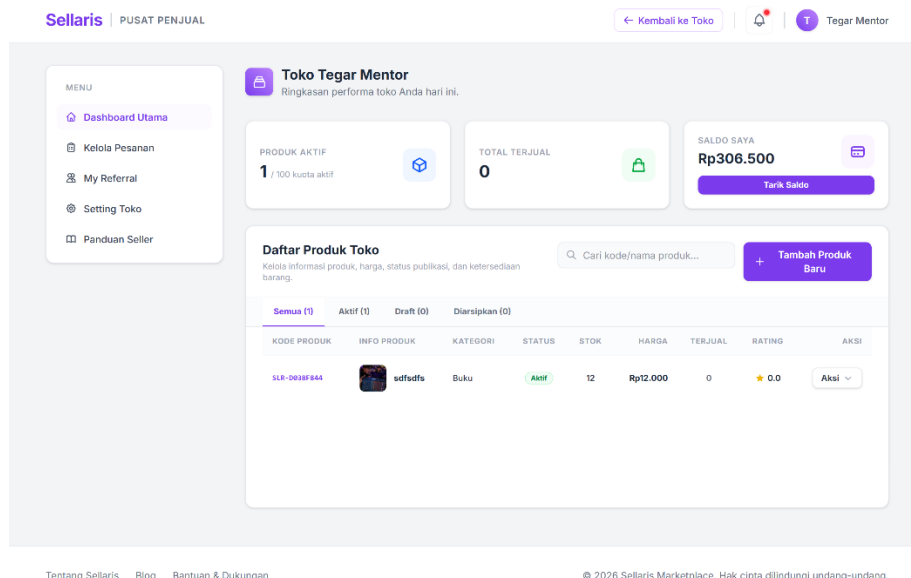


Figure 5. Main Seller Dashboard and Product Management Interface (Localized in Bahasa Indonesia for Local MSMEs)

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%
Store settings	5	5	100%
Total	33	33	100%

While Table 3 summarizes the overall pass rates across modules, Table 4 provides a representative sample of black-box test cases specifically designed to validate the core referral logic, dynamic warning alerts, and disciplinary store access suspension mechanisms.

Table 4. Representative Black-Box Test Cases for Core Referral and Monitoring Logic

Test Case ID	Test Scenario	Input Data	Expected Outcome	Status
TC-REG-01	Invalid referral registration	Code: EXPIRED123	System rejects registration and shows error message	Pass
TC-REF-01	Dynamic warning alert trigger	Rating drops < 3.0	Visual warning alert(!) renders on mentor panel	Pass
TC-REF-02	Disciplinary store suspension	Action: Deactivate	Target is <code>is_active</code> set to 0; status notification sent	Pass
TC-ACC-01	Suspended store access block	Access /dashboard	Middleware blocks access and redirects to notice page	Pass
TC-BUY-01	Catalog visibility restriction	Public store browse	Products with <code>is_active = 0</code> are hidden from buyers	Pass

To rigorously validate the functional performance of the platform's core novelties specifically mentor disciplinary controls and dynamic store monitoring, sample test cases encompassing negative and edge scenarios were executed, as detailed in Table 4. The testing verified that when a mentor seller initiates a store suspension action (TC-REF-02), the system executes a backend update that toggles the subordinate merchant's `is_active` flag in the users table from 1 to 0. This state change is instantly enforced across the application using Laravel route middleware (`CheckActiveStore`). Upon deactivation, suspended merchants are restricted from accessing operational dashboard routes (`/seller/dashboard`), and existing user sessions are invalidated (TC-ACC-01). Simultaneously, on the public marketplace interface, Eloquent database query builders automatically filter out product listings tied to inactive merchants (`WHERE users.is_active = 1`). Consequently, all product listings associated with the deactivated seller (`user_id`) are immediately hidden from public storefronts and checkout pipelines (TC-BUY-01). Furthermore, dynamic updates to store ratings automatically trigger visual warning alerts on the mentor panel (TC-REF-01), fulfilling the peer-accountability mechanisms envisioned in this research.

All test scenarios encompassing standard operational workflows and negative scenarios such as invalid referral codes, duplicate email registrations, and missing required fields yielded expected system responses, achieving a 100% pass rate across all modules as summarized in Table 3 and Table 4. These results indicate that application-level validation logic performed consistently, particularly

regarding referral code verification and store access restriction, which serve as core mechanisms for seller accountability in this research.

The test results demonstrate that all six main application modules operated in strict accordance with functional specifications. However, these functional achievements must be interpreted with careful academic nuance. Black-box testing primarily verifies input-output correctness at the interface level; it does not empirically prove that introducing a referral system fundamentally alters real-world seller behavior toward greater responsibility. Evaluating long-term behavioral transformation requires longitudinal field studies in live markets with expanded merchant cohorts, which falls beyond the scope of a prototype evaluation.

Nevertheless, this study introduces a novel paradigm shift in e-commerce referral architecture. Rather than functioning merely as user-acquisition tools, referral mechanisms are redesigned into peer-accountability frameworks that hold referring sellers responsible for the operational quality of their recruits. This aligns with findings by Chaniago et al., who emphasized that user satisfaction drives repurchase intentions in digital marketplaces [9]. By delegating initial quality supervision to experienced mentor sellers, the platform maintains steady service quality—a proactive approach superior to traditional volume-centric seller onboarding. This research directly extends prior Laravel-based e-commerce literature by Ratino et al. and Faqih et al., which focused on standard transaction modules without exploring inter-seller social dynamics [6], [5]. The current study bridges this gap by directly coupling relational referral data structures with peer-monitoring controls.

Despite these contributions, several limitations warrant critical examination. First, the prototype does not currently incorporate financial or non-financial incentive structures for mentors actively supervising their recruits, which may reduce long-term monitoring engagement due to uncompensated effort. Second, while backend code validation successfully blocks unauthorized registrations, it cannot fully prevent collusion where mentors and recruits satisfy registration rules without genuinely intending to execute supervisory duties. Addressing this requires multi-stage verification workflows in future iterations. Third, from an architectural perspective, the relational MySQL design is well-suited for prototype transactions but will necessitate advanced database indexing and caching mechanisms (e.g., Redis) as user concurrency scales.

In summary, functional testing confirmed that the prototype operates strictly as designed, fulfilling the research objective to construct a seller referral system integrated with peer-monitoring controls. The primary value of this platform lies in providing data structures and operational workflows that explicitly link referral connections with supervision responsibilities—an architecture rarely addressed in existing web development literature.

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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