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Al Niswah: Secure Online Trading for Women with Expert Support and Complaint Resolution

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ABSTRACT

Women's participation in online commerce is increasing; however, many women entrepreneurs in developing contexts continue to face substantial barriers to selling online. These barriers include limited access to customers, as well as serious concerns related to reliability, security, and fairness in online trading. This paper presents Al Niswah, a women-focused web marketplace designed to support home-based and small-scale women sellers through features that directly address these challenges. The platform enables direct communication between buyers and sellers, reducing dependence on intermediaries and potentially improving seller profitability. It also incorporates administrative supervision and a structured complaint-handling mechanism to enhance transparency, reduce misuse, and support accountability. In addition, Al Niswah provides guidance through expert support and includes a keyword-based help module that responds to user queries when expert assistance is unavailable. The system is designed to reflect common constraints faced by women sellers and to offer a practical solution for secure online trading and product promotion. To validate the platform at the functional level, black-box testing was conducted using representative test cases. The results confirm the correct operation of key workflows, including account registration and login, seller approval, product listing and browsing, complaint submission and handling, and advisory interactions through the support module. The paper also summarizes major implementation decisions and highlights system requirements related to safe and secure use. Finally, planned enhancements are outlined, including mobile text-message notifications for expert availability, an Android application, a more advanced advisory system, online payment support, and a user-rating feature. Future work will involve user-based evaluation to assess outcomes such as trust, usability, and adoption in real-world settings.

Keywords: *Women Empowerment, E-commerce, Digital Marketplace, Web Application, Rule-Based Advisory System, Developing Countries*

INTRODUCTION

Digital technologies are changing how people buy, sell, and promote products. Online trading can reduce

distance barriers, expand customer reach, and create new income opportunities, especially for small businesses. At the same time, many developing contexts still face gaps in access, skills, and support systems, so the benefits of digital commerce are not shared equally [1]. In Pakistan, the market conditions for online commerce have improved quickly in recent years because connectivity has expanded. National indicators reported from the telecom regulator show very large subscriber bases for mobile and broadband services, with wide population coverage for cellular and 3G and 4G signals [2]. This growth creates a strong technical basis for online marketplaces, even though access quality and digital readiness can still vary by region and user group.

Women's entrepreneurship is an important part of the economy, but women owned micro businesses often operate under constraints that reduce direct market participation. A national diagnostic summary based on labor force evidence estimates millions of women entrepreneurs in Pakistan and also high- lights common barriers such as mobility limits, information gaps, and low digital literacy in many cases [3]. These barriers reduce women's ability to access customers directly and can keep businesses small and informal. Home based business is also a common pathway for women, especially when mobility and social factors restrict participation in external markets. Research on Pakistan reports that home based women entrepreneurs often face limited market access, and they may rely on third parties to connect with buyers, which can reduce their earnings and limit growth [4]. These realities support the need for marketplace designs that reduce dependency on intermediaries and also improve confidence in transactions through clear rules and reporting channels.

Although general e commerce platforms provide online selling options, they are usually designed for broad users and do not focus on features that are important for women micro sellers, such as structured complaint handling, guided support, and role-based oversight. For example, Daraz provides a general marketplace model with seller onboarding and selling features, but it is not structured as a women focused trading space with built in empowerment-oriented workflows [5]. Similarly, Fiverr connects clients and freelancers, but it mainly targets digital services rather than product-based selling for home businesses [6]. To respond to these gaps, this work presents Al Niswah, a women focused web marketplace for home based and small-scale sellers. The system supports direct buyer seller communication to reduce reliance on middle agents. It also provides administrative supervision and a complaint handling process to strengthen accountability during trading. In addition, the plat- form offers advisory support through human experts when they are available, and it also includes an automated help feature that responds to users by matching their entered keywords with relevant guidance when experts are unavailable. The platform is developed using widely used web technologies, and it is validated at the functional level through black box test cases that cover key workflows.

The primary objectives of this research are to:

- Provide a secure and transparent digital marketplace for women sellers
- Reduce dependency on intermediaries and local agents
- Provide expert guidance and automated help for common queries
- Provide expert guidance and automated help for common queries

Contribution

To sum up, our contributions are as follows:

- We present Al Niswah, a women focused web market-place designed to support home based and small-scale women sellers by enabling direct buyer seller communication and reducing reliance

on middle agents.

- We design and implement a hybrid advisory layer that provides business guidance through human experts when available, and offers automated help by matching key terms in user queries with predefined responses when expert support is unavailable.
- We develop a structured complaint handling and administrative supervision workflow that allows users to submit complaints and enables administrators to review cases and respond through a clear and traceable process to support accountability.
- We implement a complete role-based system with separate functions for sellers, buyers, administrators, and experts using widely adopted web technologies and con- trolled access to ensure that each user type interacts with the platform through appropriate permissions.
- We conduct functional validation using black box test cases that cover major workflows such as registration and login, seller approval, product listing, complaint sub- mission and handling, and advisory support interactions, confirming the correctness of core platform functions.

RELATED WORK

Digital commerce is expanding quickly, but access and benefits are not shared equally. Global data still shows a gender gap in internet use, with men more likely to be online than women, and the gap is larger in less developed settings [7]. Mobile access matters because many users in low- and middle-income countries reach the internet mainly through phones. Recent evidence also reports a persistent gender gap in mobile internet use across low and middle-income countries, which is linked to barriers such as affordability, digital skills, and safety concerns [8]. These patterns matter for women led micro and home-based businesses because online channels can reduce distance barriers and widen customer reach, but only if the platforms are usable, trusted, and safe. Research on women's entrepreneurship in developing contexts emphasizes that women led firms often face constraints that limit growth, such as restricted mobility, weak market links, and limited control over business decisions. Large evidence reviews show that support tends to work best when it combines access to markets with skills, networks, and enabling conditions, rather than providing only one element in isolation [9]. In Pakistan, national level evidence highlights major gaps related to women's economic participation and access to formal financial services, which can limit scaling and can push many women toward informal, local trading channels [10].Recent Pakistan focused studies also report that women entrepreneurs face social and market barriers that affect business continuity and performance, which supports the need for systems that reduce dependency and improve access to buyers [11], [12].Related research in Pakistan also discusses the main challenges and motivations faced by women entrepreneurs, which helps explain why many businesses remain small and informal [13].

In addition, studies on women's entrepreneurial intention in Pakistan highlight factors that influence whether women choose to start or continue business activity, which is relevant when designing digital platforms for adoption and sustained use [14]. Existing online marketplaces and platform models partially address these challenges but are usually designed for broad audiences. Large ecommerce platforms offer listing and logistics support, and some provide buyer seller communication features and policy enforcement. For example, Daraz includes buyer seller interaction rules and platform monitoring of communications, which shows that mainstream marketplaces recognize communication risks and policy compliance needs, but these tools are not designed as empowerment focused features for women sellers [15].Meanwhile, service marketplaces such as Fiverr support direct messaging and transaction management for digital services, but their core model is not aimed at local product trading or home based selling needs [16].

Another stream of related work concerns trust building in online trading. Classic research on online communities and marketplaces explains that trust is often supported through reputation signals, feedback mechanisms, and rules that reduce cheating and low-quality transactions [17], [18]. Trust also depends on

what happens when a transaction goes wrong. UNCTAD highlights that cross border dispute resolution is still limited, and only 38 percent of countries have established systems for resolving cross border disputes, which can reduce consumer confidence in online markets [19]. This evidence supports the view that complaint handling and administrative oversight should be treated as core marketplace functions, especially in contexts where users already have strong concerns about reliability, fairness, and security. A further related area is guidance and capability support for new sellers. Many platforms offer learning resources, but they usually sit outside the transaction flow and do not provide help at the moment a user faces a problem. Broader evidence on women's entrepreneurship suggests that skills support and mentoring can help, although impacts vary and often depend on pairing training with other supports such as networks and market access [9].

For a practical marketplace system, advisory support can be implemented in two levels. The first level is human expert support, where approved experts respond to user questions. The second level is an automated help feature that responds immediately using a rule-based approach. In practice, keyword-based help usually means a small searchable guidance library where the user types a short query, the system matches key terms to a prepared set of topics, and it returns the most relevant predefined guidance. This design is closer to an in platform smart help or FAQ function than to a full artificial intelligence system. Similar rule based and pattern matching approaches have been widely used in conversational support systems, where responses are selected from predefined templates rather than generated freely [20], [21]. Retrieval based chatbot studies also describe this type of support as relying on known responses rather than open ended generation [22]. Overall, the literature suggests a clear gap: many platforms offer market access, some offer communication and policy enforcement, and many separate tools offer learning, but fewer systems combine market access, complaint-based accountability, and integrated guidance in a single workflow that is tailored for women engaged in home based or micro scale selling. This gap motivates women focused marketplace designs that place trust, accountability, and practical support at the center, while keeping the system simple enough to operate in real settings where users may have limited time, limited experience, and strong concerns about trading risks.

PROPOSED METHODOLOGY

The Al Niswah platform was developed using the waterfall software development model. This approach was selected because it follows a clear sequence of phases and supports strong documentation at each step, which is useful when system requirements and approval workflows must be defined clearly from the start. The development work was organized into requirements analysis, system design, implementation, and evaluation phases.

Requirement Analysis

Requirements were gathered by reviewing common issues in local trading practices, examining existing online selling models, and collecting input from potential users through informal interviews and discussions. The analysis focused on defining what each role needs from the system and what rules are required to support safe and accountable trading.

Stakeholders and Roles: The platform is organized around four main user roles: administrator, seller, buyer, and expert. Each role has its own access level and tasks. The administrator manages approvals, users, complaints, and system monitoring. Sellers create listings and respond to buyers. Buyers browse products and communicate with sellers. Experts respond to business related questions submitted by sellers.

Functional Requirements: The functional requirements were written in a structured form as part of the system requirements specification, covering the key workflows needed for trading and support. Core

functional requirements include user registration and login, role assignment, seller approval, product posting and browsing, query submission to experts, complaint submission, and administrative complaint handling.

Nonfunctional Requirements: The system also defines non-functional requirements to ensure stable operation and basic protection for users. These include availability, reliability, safety, performance, security, portability, and scalability. For example, security needs include controlled access by role, safe session handling, and protection of user accounts and stored records. Requirements documentation follows common software engineering practice for clarity and traceability.

System Design and Architecture

Al Niswah follows a client server architecture in which users access the system through a web browser, while the server handles application logic and persistent storage. Figure 1 presents the conceptual system architecture, showing the main user roles and the flow of requests and responses between the client layer, the application server, and the database server. The design separates user interfaces by role to reduce confusion and to ensure that each user can access only the functions required for their tasks. Role based access is defined so that sellers, buyers, administrators, and experts operate within clearly defined permissions. For example, sellers can manage product listings and respond to customer messages, administrators can verify seller detail and approve seller registrations and handle complaints, and experts can respond to submitted queries through the advisory module. At the server side, the system is organized into modular components that support the primary platform functions, including authentication, marketplace management, buyer seller messaging, complaint handling, administrative oversight, and advisory support. This modular structure keeps the main functions separated and supports future enhancement. The design stage is documented using standard software engineering artifacts. These include class level design to define entities and relationships, sequence diagrams for key workflows such as login and complaint submission, and activity diagrams that describe role specific operations. The database is designed to store all operational data required by the marketplace, including user profiles and roles, product information, communication records, complaints, and advisory queries. Table structures are planned using normalization to reduce redundancy and maintain consistency, while supporting reliable read and write operations across the main workflows.

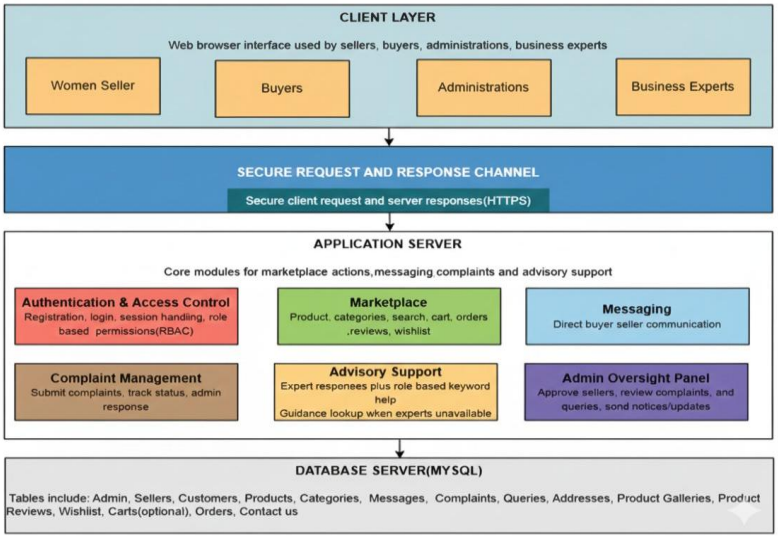

Fig. 1. Layered System Architecture of the Al Niswah Platform

Implementation Technologies

The system was implemented using standard web technologies. The server side uses PHP and the database uses MySQL. The client side uses HTML5, CSS3, and JavaScript, and Bootstrap is used to support a responsive interface. Figure 2 summarizes the implementation architecture and highlights the main modules, the supporting technologies, and the two-level advisory support design. Authentication and authorization were implemented using secure login flows, session handling, and role-based controls. Advisory support design. The support feature uses two levels. First, approved experts can respond to submitted questions through the platform interface. Second, the system provides an automated help feature that responds immediately using a rule-based method. In practical terms, keyword-based help means the user types a short query, the system identifies key words, matches them with a prepared guidance library, and returns the closest help topic. This is similar to a smart help or FAQ function rather than a full artificial intelligence system. This idea is supported by classic keyword triggered conversational and support systems, where responses are selected using key word matching rules.

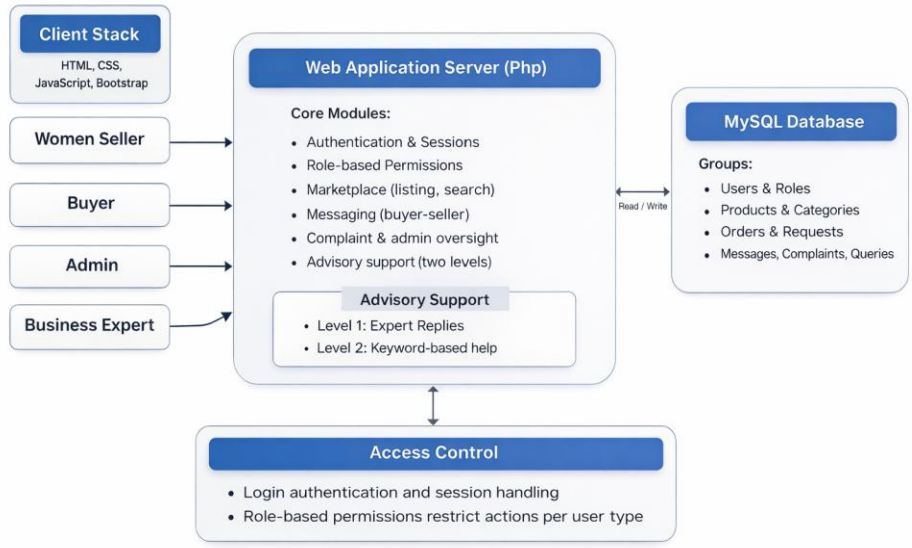

Fig. 2. Implementation architecture and technologies of Al Niswah, including the two-level advisory support module

Testing and Evaluation

Evaluation was conducted at the functional level using structured test cases. The testing documentation discusses unit testing, integration testing, and both white box and black box testing approaches. In this paper, the main focus is black box testing because it checks whether the visible system behavior matches expected results for real user workflows, without relying on internal code inspection. Figure 3 summarizes the functional testing workflow used in this study, from defining black box test cases to executing representative user scenarios and comparing observed outputs with expected results. Representative Black box test cases were prepared and executed for key workflows including login, seller approval, product listing and browsing, complaint submission and response, and query handling through expert support and the automated help feature. The goal of this evaluation is to confirm correctness of the main flows and ensure that the system requirements are implemented as intended, rather than claiming proven social or economic impact.

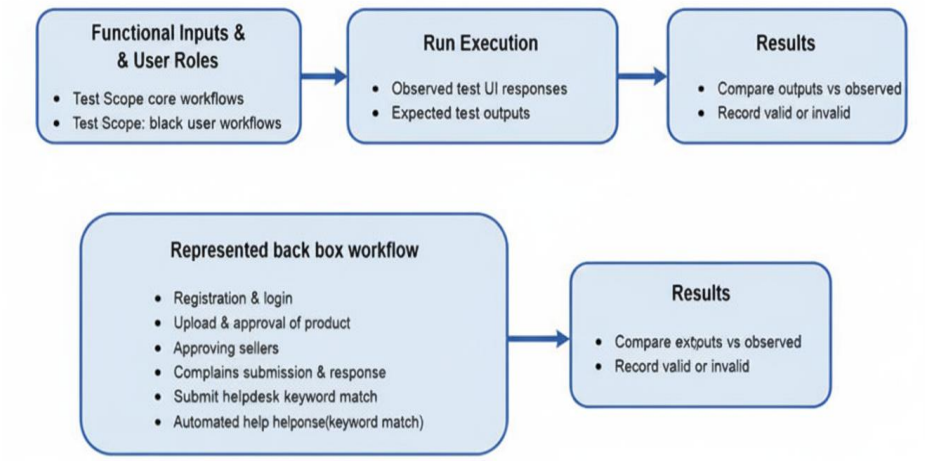

Fig. 3. Functional testing and evaluation workflow with a black box focus

EVALUATION AND RESULTS

Evaluation Setup

The evaluation was conducted using representative black box test cases that reflect common user scenarios across sellers, buyers, administrators, and experts. The goal was to confirm that the implemented features satisfy the defined functional requirements and that core workflows execute correctly under both valid and invalid inputs. This evaluation is focused on functional correctness and does not claim verified improvements in trust, satisfaction, or economic outcomes, which require user studies and deployment-based measurement.

Functional Results from Black Box Testing

The results show that the platform correctly supports authentication and access control at the user interface level. Valid login credentials allow the user to access the appropriate role panel, while invalid inputs produce warning behavior and block access. For marketplace operations, product upload and approval workflows behave as expected. Valid product submissions proceed through the administrative approval path and become visible for browsing after approval, while invalid cases do not proceed and remain unavailable on the platform. Administrative functions were also validated through seller approval and complaint handling workflows. Test cases confirm that administrators can approve or reject seller registrations based on provided information and that complaint records can be reviewed and answered through the administrative interface. Invalid complaint inputs can be discarded according to the defined checks. Advisory support was validated through query submission workflows. Valid queries are accepted and can be routed to expert users for response through the expert interface, while invalid or incomplete query submissions are discarded. In addition, the automated help feature provides an immediate response by matching user entered keywords to predefined guidance topics when expert replies are not avail- able. Overall, these results indicate that the system implements the intended role-based workflows and supports the main user facing functions required for online trading and oversight. Table 1 summarizes representative black-box test cases and confirms correct system behavior for login, product upload and approval, seller approval, query submission, and complaint handling under valid and invalid inputs.”

Table 1. Summary of Representative Black-Box Test Cases and Observed Outcomes for Al Niswah Workflows

Workflow	Input Type	Expected System Behavior	Observed Outcome
Login	Valid	User is redirected to dashboard	Valid
Login	Invalid	Warning message is shown	Invalid
Product upload	Valid	Admin approves; product becomes visible	Uploaded
Product upload	Invalid	Admin discards; product not visible	Not uploaded
Seller approval	Valid	Seller gets full panel access	Approved
Seller approval	Invalid	Seller access remains restricted	Not approved
Query submission	Valid	Query is approved and can be answered	Uploaded
Query submission	Invalid	Query is discarded; not shown to experts	Discarded
Complaint	Valid	Admin responds; user can view response	Answered
Complaint	Invalid	Complaint is discarded; no response shown	Discarded

Source: Authors Own Results

DISCUSSION

This work shows that a role based digital marketplace can be designed around the practical needs of women sellers who run home based or small-scale businesses. The system combines marketplace functions with administrative oversight and a structured complaint workflow, which helps formalize reporting and response compared to informal trading channels. The inclusion of advisory support also extends the platform beyond buying and selling by allowing users to submit questions and receive guidance through the expert interface, while an automated keyword-based help feature can provide immediate responses when experts are not available. The results from functional testing confirm that the main workflows operate correctly for key user roles. These workflows include login, seller approval, product uploading and visibility after approval, complaint submission and handling, and query submission for advisory support. This confirms that the platform requirements are implemented as intended at the system level. However, these results do not measure real world outcomes such as increased trust, improved income, or user satisfaction. Such outcomes require user studies and deployment-based evaluation. Several practical challenges remain. First, wider adoption depends on user awareness and digital literacy, which may vary across regions. Second, scaling to larger user bases will require stronger operational processes such as expert availability management, moderation policies, and platform administration. Third, if online payments are introduced in future versions, the system will require stronger security controls and clear transaction policies. These issues indicate that long term impact will depend not only on the software design, but also on partnerships and operational support.

CONCLUSION AND FUTURE WORK

This paper presented Al Niswah, a women focused web marketplace that supports home based and small-scale women sellers through a structured trading environment. The platform enables direct buyer seller communication and reduces reliance on middle agents by allowing sellers and buyers to connect within the system. It also introduces administrative supervision and complaint handling to support accountability during trading. In addition, the platform provides advisory support through expert responses and an automated help feature based on keyword matching, which ensures that users can access basic guidance even when experts are not available. Functional testing using black box test cases confirms correct behavior of the core workflows across the main user roles. Future work will focus on improvements that support wider access and stronger platform capabilities. Planned upgrades include an Android application to improve usability for mobile users, notification support such as text message alerts for expert availability and important updates, and enhancement of the current automated help feature into a more advanced

guidance module. Online payment support and a user rating and feedback feature can also be added to improve transaction convenience and transparency. Finally, collaboration with relevant institutions can be explored to support broader deployment and organized adoption in women empowerment initiatives.

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