

Title

**AI-DRIVEN JOB MATCHING PLATFORM WITH AN INTELLIGENT CHATBOT
ASSISTANT FOR MALAWI'S INFORMAL SECTOR**

Author

LEON MWALWANDA

Co-Author

Mr JOEL MULEPA

Issued 13/10/2026

ABSTRACT

The AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant For Malawi's informal sector is a web-based recruitment system built to solve the inefficiencies of Malawi's informal labour market, where hiring traditionally depends on word-of-mouth and personal networks rather than structured, accessible channels. The platform allows workers to create profiles highlighting their skills, experience, availability, and location, while employers can post jobs either manually or through a conversational chatbot that guides them through specifying worker requirements, location, budget, and urgency making the system accessible even to users with limited technical knowledge. At its core, an AI-powered recommendation engine matches job postings to suitable workers by evaluating skill compatibility, ratings, and availability, generating ranked candidate recommendations. Built using PHP, MySQL, HTML, CSS, Bootstrap, and JavaScript under the Agile Software Development Methodology, the platform demonstrates how AI and chatbot automation can streamline recruitment, improve worker visibility, reduce hiring costs and delays, and expand access to employment opportunities ultimately supporting digital transformation and

economic growth within Malawi's informal workforce.

Keywords: Artificial Intelligence (AI), Job Matching, Intelligent Chatbot, Informal Sector, Recruitment Automation, Recommendation System, Natural Language Processing (NLP), Vocational Skills, Worker Profiles, Web-Based Platform, Digital Recruitment, Malawi Labour Market.

INTRODUCTION

Background of Study

The informal sector plays a major role in Malawi's economy by providing employment opportunities for a large percentage of the population. Many Malawians depend on informal work such as carpentry, plumbing, bricklaying, electrical installation, gardening, welding, tailoring, and other vocational activities for daily income and survival. Despite the importance of this sector, recruitment and job matching processes remain largely manual, inefficient, and unstructured. Employers often rely on word-of-mouth communication, referrals from friends, social media posts, or physical searches to find workers. Similarly, skilled workers struggle to market themselves effectively

and access stable job opportunities. The lack of a centralized digital recruitment system specifically designed for Malawi's informal sector creates several challenges. Employers face difficulties in identifying trustworthy and skilled workers, while workers experience reduced visibility and limited access to employment opportunities. In many cases, employers hire unqualified workers due to insufficient information, resulting in poor-quality services, financial losses, and project delays. The advancement of Artificial Intelligence (AI) and web technologies provides an opportunity to modernize recruitment processes within the informal sector. AI-driven systems are capable of analyzing user data, matching skills with job requirements, and generating intelligent recommendations. In addition, intelligent chatbot assistants have transformed how users interact with digital systems by simplifying communication and automating repetitive tasks. This project focuses on the development of an **AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant for Malawi's Informal Sector**. The system aims to bridge the gap between employers and skilled workers by introducing intelligent recruitment automation. Employers can post jobs either manually or through a conversational chatbot interface, while the AI engine automatically

recommends suitable workers based on skills, ratings, availability, and job requirements.

The chatbot assistant simplifies job posting by guiding employers through conversational interactions. Instead of filling out complicated forms, users can communicate naturally with the chatbot, which extracts important details such as job type, location, urgency, and budget. The AI recommendation engine then processes this information and identifies the most suitable workers. The proposed system contributes towards digital transformation in Malawi's informal labour market by improving accessibility, efficiency, transparency, and worker visibility. It also demonstrates the practical application of Artificial Intelligence, Natural Language Processing (NLP), and recommendation systems within a localized African context.

OBJECTIVES

General Objective

To develop an AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant that improves recruitment and worker recommendation processes within Malawi's informal sector.

Specific Objectives

1. To develop a web-based recruitment platform for employers and informal workers.
2. To implement an intelligent chatbot assistant capable of conversational job posting.
3. To design an AI-driven recommendation engine that matches workers with jobs based on skills and qualifications.
4. To create secure user authentication and profile management functionalities.
5. To enable workers to register their vocational skills and availability online..

SYSTEM DESCRIPTION

The proposed system is a web-based intelligent recruitment platform designed specifically for Malawi's informal sector. The system enables employers and workers to interact digitally through a centralized platform powered by Artificial Intelligence and chatbot technologies.

The system consists of several integrated modules that work together to automate recruitment and job matching processes. These modules include user authentication, employer management, worker management, AI recommendation systems,

chatbot communication, and database management.

User Management Module

The User Management Module is responsible for handling user registration, authentication, and profile management. It allows both clients and workers to create accounts, log in securely, update their personal information, and manage their profiles. This module ensures that only authorized users can access the system while maintaining accurate records of user information.

Worker Profile Management Module

The Worker Profile Management Module enables informal sector workers to create and maintain detailed professional profiles. Workers can provide information such as their skills, experience, qualifications, location, availability, and contact details. This information forms the basis for the AI-driven matching process and helps clients identify suitable service providers.

Job Management Module

The Job Management Module allows clients to post job opportunities and specify the skills and requirements needed for a particular task. Clients can view job details, manage posted jobs, and monitor responses

from workers. This module serves as the primary interface through which employment opportunities are introduced into the system.

AI Job Matching Module

The AI Job Matching Module is the core intelligence component of the platform. It analyzes job requirements and compares them with worker profiles to identify the most suitable candidates. Using predefined matching criteria and recommendation algorithms, the module generates personalized worker recommendations, improving the efficiency and accuracy of the hiring process.

Intelligent Chatbot Assistant Module

The Intelligent Chatbot Assistant Module provides automated support and communication services to users. It responds to frequently asked questions, assists with navigation, guides users through registration and job posting processes, and provides recommendations based on user inquiries. The chatbot enhances accessibility and improves overall user engagement with the platform.

The Notification and Communication Module

The Notification and Communication Module facilitates interaction between clients and workers. It sends alerts regarding job postings, recommendations, applications, and important system updates. This module ensures timely communication and helps users stay informed about activities relevant to them.

Feedback and Rating Module

The Feedback and Rating Module allows clients and workers to evaluate each other after job completion. Users can submit ratings and reviews based on their experiences, promoting accountability, trust, and service quality within the platform. The collected feedback also helps future clients make informed hiring decisions.

Reporting and Administration Module

The Reporting and Administration Module provides administrators with tools to monitor and manage system operations. It enables the management of users, jobs, feedback, and chatbot activities while generating reports on platform usage, worker performance, and job placement statistics. This module supports effective system maintenance and decision-making.

LITERATURE REVIEW

Digital Platforms for Informal Sector Job Matching (2022-2023). Recent studies demonstrate that digital job-matching platforms can effectively address information frictions in developing countries' labor markets. *Lambon-Quayefio et al. (2023)* developed and piloted Text4Jobs Ghana, an AI-enabled system accessible via USSD code that automatically matches jobseekers to vacancies and notifies them via SMS. Within 10 weeks, the platform registered over 1,300 jobseekers and 249 employers, successfully matching 456 jobseekers to 251 vacancies and filling nearly 100 positions. The study demonstrated that digital technology can be harnessed to address matching inefficiencies without excluding potential workers who lack internet access or ICT literacy—a finding directly relevant to Malawi's informal sector, where low ICT literacy and limited internet access pose similar challenges.

Challenges and Limitations of Digital Matching Platforms (2022). However, digital platforms are not a panacea. *Jones and Sen (2022)*, in their randomized experiment in Mozambique, found that inviting vocational graduates to join digital platforms (Biscate for informal tasks and Emprego for formal jobs) produced zero average treatment effects on job outcomes, and impacts on life satisfaction were

negative. Notably, the informal jobs platform did lead to better outcomes for women with manual qualifications, whose earnings rose by over 50%. This mixed evidence underscores the need for context-specific design and highlights that digital solutions must be carefully tailored to local conditions—a gap the proposed system for Malawi aims to fill.

Emerging AI-Powered Platforms for African Talent (2024-2025). Recent African startups demonstrate the potential of AI-driven recruitment. *Growwr*, founded in early 2024, uses an AI crawler to verify talent portfolios, conducts AI behavioral interviews, and employs a matching engine that instantly shortlists qualified candidates. As of October 2025, the platform serves over 3,000 paying businesses across 13 countries and has vetted 19,000 candidates. Similarly, *Jobop*, founded in 2021 in Morocco, connects companies and workers via a smart platform using advanced algorithms for real-time matching and has achieved over 30% annual growth. These platforms validate the AI-driven approach while revealing a gap in solutions specifically addressing informal sector workers—the proposed system's niche.

Lessons from Platform Failures in the Informal Sector (2022). The Kormo platform, designed by Google's incubator in

2016 and piloted in Bangladesh's informal sector with BRAC, faced significant challenges that highlight the difficulties of integrating digital solutions in informal employment contexts. A conference paper (*Mahmud et al., 2022*) documented these challenges, and the project was subsequently redesigned with a different business model. This case underscores the need for careful attention to local context, business model viability, and user needs when deploying digital platforms in the informal sector—lessons directly applicable to the proposed Malawian platform.

Language Technology Gaps for African Languages (2022-2023). The development of NLP-based chatbots for African languages remains a critical challenge. Mondal et al. (2022) confirmed the "pitiful state of language technology" even for languages with large speaker bases such as Sinhala and Hausa, identifying significant gaps that require prioritization in research and investment. Adewumi et al. (2022) contributed AfriWOZ, the first high-quality dialogue datasets for six African languages, demonstrating that deep monolingual models can learn abstractions that generalize across languages. Keet and Khumalo (2023) further developed a matrix characterizing African languages on a spectrum from "Very LRL" (low-resourced

language) to "Very HRL," arguing that such contextualization is indispensable for project planning. These findings are particularly relevant for developing a Chichewa-capable chatbot for Malawi, where language resources remain limited.

Relevance to the Proposed System. These recent developments collectively support and inform the proposed "AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant for Malawi's Informal Sector." The demonstrated success of Text4Jobs Ghana (2023) validates the mobile-first, SMS-based approach for reaching users with limited internet access. The mixed results from Mozambique (2022) highlight the importance of context-specific design and the potential for targeted benefits to disadvantaged groups. Emerging African platforms (2024-2025) provide functional models for AI matching, while the Kormo case (2022) offers cautionary lessons. Most critically, the documented limitations of language technology for African languages (2022-2023) define the challenge of developing a Chichewa-capable chatbot—a gap the proposed system directly addresses

Summary Review

The literature review revealed that although several online recruitment systems and AI-driven recommendation platforms already

exist, most are designed for formal employment sectors and international freelancing markets. Existing systems do not adequately address the recruitment challenges faced within Malawi's informal sector.

Current informal recruitment methods are manual, inefficient, and unstructured, resulting in poor hiring decisions and reduced employment accessibility.

Research findings also indicate that AI recommendation systems and chatbot technologies significantly improve automation, communication, and user experience in recruitment systems.

Therefore, the proposed **AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant for Malawi's Informal Sector** aims to bridge this technological gap by providing a localized intelligent recruitment solution tailored specifically for informal workers and employers in Malawi.

SYSTEM ANALYSIS

System analysis is a process of studying and evaluating an existing system in order to identify problems, weaknesses, and possible improvements. It involves gathering requirements, understanding current operational procedures, and

determining how technology can be used to improve efficiency and performance. This chapter focuses on analyzing the recruitment challenges faced within Malawi's informal sector and identifying how the proposed AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant can provide a solution. The chapter examines the current recruitment methods, identifies their limitations, evaluates the feasibility of the proposed system, and explains the objectives and specifications of the new system. The analysis process was conducted through observation, online research, interviews, and evaluation of existing recruitment approaches used by employers and informal workers. The findings revealed that current recruitment methods are inefficient, unreliable, and poorly organized, resulting in delayed hiring, poor worker visibility, and reduced employment opportunities. The proposed system aims to solve these challenges through intelligent automation, chatbot-assisted communication, and AI-based worker recommendation technologies.

PROBLEM DEFINITION

Malawi's informal sector employs a large number of workers including carpenters, electricians, plumbers, builders, gardeners, welders, painters, and other vocational

workers. Despite the importance of this sector, there is currently no centralized intelligent recruitment platform specifically designed to connect employers with skilled informal workers.

Most recruitment activities within the informal sector are performed manually through: Word-of-mouth referrals, Social media communication, Physical searching, Informal networking, Phone calls and personal recommendations

These traditional methods create several major problems.

Lack of Worker Visibility

Skilled workers often struggle to advertise their services effectively. Employers may not know where to find qualified workers, resulting in missed employment opportunities.

Inefficient Recruitment Process

Employers spend excessive time searching for workers manually. The recruitment process becomes slow and inefficient, especially during urgent situations.

Poor Skill Verification

There is no structured system for verifying worker skills, ratings, or experience levels.

Employers may accidentally hire unqualified workers.

Lack of Intelligent Recommendations

Current methods do not provide automated worker recommendations based on job requirements, location, availability, or experience.

Communication Challenges

Most informal workers and employers rely on unstructured communication channels such as WhatsApp groups and verbal referrals, which lack organization and automation.

Limited Digital Transformation

The informal labour market in Malawi has limited technological integration compared to modern recruitment systems used in formal sectors. Because of these challenges, there is a need for a modern intelligent recruitment system capable of: Automating job matching, Improving worker visibility, Simplifying recruitment, Providing intelligent recommendations, Enhancing communication The proposed AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant was designed to address these problems.

EXISTING SYSTEM

The current recruitment system used in Malawi's informal sector is mostly manual and decentralized. Employers typically depend on: Friends and family referrals, Community recommendations, Social media advertisements, Physical visits to markets and workplaces and Informal communication networks. Although these methods are widely used, they have several limitations.

Existing Recruitment Methods

Word-of-Mouth Referrals

This is the most common recruitment method in the informal sector. Employers ask friends, relatives, or colleagues to recommend workers. However, this approach is unreliable and limited to small social circles.

Social Media Recruitment

Some employers use Facebook, WhatsApp groups, and other social media platforms to search for workers. While this increases reach, it still lacks proper worker verification and intelligent filtering.

Physical Searching

Employers sometimes physically visit trading centers, construction sites, or marketplaces to look for workers. This

process consumes time and transportation costs.

Limitations of the Existing System

- **Manual Operations**, most recruitment activities are performed manually without automation.
- **No Centralized Database**, There is no centralized database for storing worker profiles, skills, ratings, or job records.
- **No AI Recommendation System**, Current methods cannot intelligently match workers to jobs.
- **Poor Organization**, Job information is scattered across different communication platforms.
- **Security and Trust Issues**, Employers may hire unknown or unverified workers.
- **Lack of Conversational Assistance**, There are no chatbot systems to simplify recruitment communication.

These limitations motivated the development of the proposed AI-driven platform.

Executive Summary

The feasibility analysis showed that the proposed system is highly feasible and suitable for implementation within Malawi's informal labour sector. The project utilizes widely available

technologies such as PHP, MySQL, Bootstrap, JavaScript, and XAMPP, which provide a stable and efficient environment for developing a web-based application. These technologies are affordable, accessible, and supported by extensive documentation and developer communities.

The system is economically viable because it requires minimal investment in software acquisition and infrastructure. The use of open-source technologies significantly reduces costs, while low-cost hosting solutions make deployment affordable. Furthermore, the platform is designed to operate efficiently without requiring expensive hardware or specialized equipment.

From an operational perspective, the system is easy to use and can be adopted by both employers and informal workers with limited technical knowledge. The inclusion of an intelligent chatbot assistant simplifies navigation and provides immediate support, increasing user satisfaction and reducing the learning curve associated with new technology.

The implementation of the proposed system is expected to improve recruitment efficiency by quickly matching clients with suitable workers. It will reduce hiring delays through automated recommendations, increase worker

visibility by providing an online platform for showcasing skills, improve communication between employers and workers, and modernize recruitment processes within Malawi's informal sector through the adoption of digital technologies.

The feasibility study concluded that the project is practical, achievable, and beneficial to Malawi's informal sector.

Findings and Recommendations

Findings

The study revealed that recruitment within Malawi's informal sector is largely unstructured, with most hiring activities relying on word-of-mouth referrals and personal networks. This makes it difficult for employers to consistently identify skilled and reliable workers when opportunities arise.

It was also found that many employers experience challenges in locating qualified workers whose skills match specific job requirements. The absence of a centralized recruitment platform often results in time-consuming searches and unsuccessful hiring outcomes.

The research further showed that informal workers struggle to market their skills and services effectively. Many skilled individuals have limited opportunities to

showcase their expertise to potential employers, reducing their chances of securing employment.

Existing recruitment methods were found to be slow and unreliable, as they depend heavily on manual communication and personal recommendations. This often leads to delays in filling vacancies and inefficiencies in the recruitment process.

The study also established that employers require faster and more reliable worker recommendations. They need systems capable of identifying suitable candidates quickly without extensive manual searching.

Finally, the research demonstrated that intelligent automation technologies such as artificial intelligence and chatbots have the potential to significantly improve recruitment efficiency, communication, and accessibility within the informal sector.

Recommendations

Based on the findings, it is recommended that a centralized digital recruitment platform be developed to connect employers and workers in a single online environment. Such a platform would simplify the recruitment process and improve access to employment opportunities.

To improve user interaction and support, chatbot-assisted communication should be integrated into the platform. The chatbot can guide users through registration, job posting, and other system activities while providing instant responses to common queries. Worker profile management should also be improved by allowing individuals to create detailed profiles that highlight their skills, qualifications, experience, and availability. This would increase their visibility to potential employers.

The digitization of informal labour recruitment processes is highly recommended to reduce dependence on manual methods and improve overall efficiency. Digital platforms can streamline operations while enhancing record management and accessibility.

The system should also incorporate worker rating and availability features to help employers make informed hiring decisions and identify active service providers more easily.

Finally, stakeholders should encourage digital transformation within Malawi's informal sector by promoting the adoption of innovative technologies that support employment creation, workforce development, and economic growth.

PROPOSED SYSTEM

The proposed system is an AI-Driven Job Matching Platform with an Intelligent Chatbot Assistant designed specifically to address recruitment challenges within Malawi's informal sector. The platform leverages artificial intelligence, recommendation systems, chatbot technology, and web-based management tools to create a more efficient and reliable recruitment environment for both employers and workers.

The system enables employers to post job opportunities, view AI-generated worker recommendations, manage applications, and interact with the chatbot assistant for guidance and support. Through these features, employers can quickly identify suitable candidates and reduce the time required to fill vacancies.

Workers can create accounts, develop professional profiles, add vocational skills, update their availability, and receive job opportunities that match their qualifications. This allows workers to increase their visibility and improve their chances of securing employment.

A key feature of the proposed system is the intelligent chatbot assistant, which supports conversational job posting. Instead of completing lengthy forms, employers can interact naturally with the chatbot, which

gathers job requirements and assists in creating job postings efficiently.

The AI recommendation engine analyzes worker skills, ratings, availability, and job requirements to identify the most suitable candidates for each opportunity. By automating the matching process, the system improves recruitment accuracy and helps employers make informed hiring decisions.

Overall, the proposed platform enhances recruitment efficiency, increases worker visibility, improves communication between users, organizes recruitment data effectively, and promotes greater employment accessibility within Malawi's informal labour market.

SYSTEM OBJECTIVE

The main objective of the proposed system is to develop an intelligent web-based recruitment platform that improves job matching processes within Malawi's informal sector through the use of artificial intelligence and chatbot technologies.

Specific Objectives

1. The first objective is to automate worker recommendations using AI technologies. This enables the system to analyze job requirements and worker profiles in order to

- generate accurate and relevant recommendations.
2. The second objective is to simplify the job posting process through the use of an intelligent chatbot assistant. The chatbot provides an interactive and user-friendly method for creating job opportunities and accessing system services.
 3. Another objective is to establish a centralized database that stores worker profiles, job postings, applications, and other recruitment-related information. This improves data management and accessibility.
 4. The system also aims to improve recruitment efficiency and reduce hiring delays by streamlining the process of identifying and selecting suitable workers for available jobs.
 5. Additionally, the platform seeks to enhance worker visibility and accessibility by providing a digital space where workers can showcase their skills and connect with potential employers.
 6. The project further aims to modernize recruitment practices within Malawi's informal labour market by introducing innovative technologies that replace traditional manual methods.
 7. Another objective is to provide employers with reliable worker recommendations based on skills, ratings, experience, and availability, thereby improving hiring decisions.
 8. Finally, the system seeks to strengthen communication between employers and workers through integrated messaging, notifications, and chatbot-assisted interactions.

SYSTEM SPECIFICATIONS

System specification defines the hardware and software requirements necessary for the successful development, deployment, and operation of the proposed AI-Driven Job Matching Platform. These requirements ensure that the system functions efficiently, provides reliable performance, and supports all intended features.

Hardware Requirements

The hardware requirements for the system include a computer with an Intel Core i3 processor or higher to ensure smooth execution of development tools and system operations. The computer should have a minimum of 4 GB RAM to support multitasking and efficient processing of application components. A minimum storage capacity of 500 GB is required to accommodate the operating system, development tools, databases, and project files. The monitor should support a minimum resolution of 1366×768 pixels to provide a clear and comfortable user interface during

system development and testing. A keyboard and mouse are also required to enable effective user interaction with the system. Additionally, a stable internet connection is necessary for accessing web resources, downloading software updates, and carrying out online deployment activities.

Software Requirements

The software requirements for the system include the Windows operating system, which provides the primary development environment and supports the execution of the required software tools. XAMPP is used as the local server environment, enabling the execution of Apache, PHP, and MySQL services during development and testing. PHP serves as the backend programming language, implementing the system's business logic, processing user requests, and managing communication with the database. MySQL is used as the database management system to store information related to users, jobs, skills, applications, ratings, and chatbot interactions. Bootstrap is employed as the frontend framework to create responsive and visually appealing user interfaces that adapt to different devices and screen sizes. JavaScript enhances interactivity by enabling dynamic content updates and improving the overall user experience. HTML is used to structure the application's web pages, while CSS is responsible for styling the pages to ensure a professional and user-friendly interface. Visual Studio Code serves as the source code editor,

providing tools for writing code, debugging, and managing project files. Finally, Google Chrome is used as the web browser for system testing and validation to ensure that the application functions correctly in a modern browsing environment.

REFERENCES

1. Abubakar, A. M., Behraves, E., Rezapouraghdam, H., & Yildiz, S. B. (2019). Applying artificial intelligence technique to predict knowledge hiding behavior. *International Journal of Information Management*, 49, 45–57.
<https://doi.org/10.1016/j.ijinfomgt.2019.02.006>
2. Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, 2, 100006.
<https://doi.org/10.1016/j.mlwa.2020.100006>
3. Alshater, M. M. (2022). Exploring the role of artificial intelligence in enhancing academic performance: A case study of ChatGPT. *SSRN Electronic Journal*.

<https://doi.org/10.2139/ssrn.431235>

[8](#)

4. Bayne, S. (2015). Teacherbot: Interventions in automated teaching. *Teaching in Higher Education*, 20(4), 455–467.
<https://doi.org/10.1080/13562517.2015.1020783>
5. Bharadiya, J. P. (2023). Machine learning and AI in business intelligence: Trends and opportunities. *International Journal of Computer (IJC)*, 48(1), 123–134.
6. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
7. Cappelli, P. (2019). Your approach to hiring is all wrong. *Harvard Business Review*, 97(3), 48–58.