IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

A Real-Time Platform for Government Scheme Navigator

M.Maheshwari,[1], M.Roshini [2], S.Sharu Dharshini [3]

Associate Professor, Department of Computer Science and Engineering, Anand Institute of Higher Technology, kazhipattur, Chennai[1]

Student, Department of Computer Science and Engineering, Anand Institute of Higher Technology, kazhipattur, Chennai[2,3]

Abstract: Machine Learning (ML) plays a vital role in building intelligent systems that automate eligibility assessment, pattern recognition, and personalized service delivery. In public welfare, ML offers scalable solutions to address challenges such as limited awareness, complex eligibility rules, bureaucratic delays, and low digital literacy—particularly in rural and marginalized communities. This paper introduces Scheme Navigator, a progressive web application designed to simplify access to over 150 central and state welfare schemes in India. The system combines rule-based logic with ML algorithms to dynamically match user profiles with relevant schemes, conduct real-time eligibility checks, and provide geolocation-based guidance using GIS tools. Built using Flask, PostgreSQL, Leaflet.js, Flask-Mail, and Twilio, the platform ensures secure authentication, multilingual accessibility, and timely notifications. A mixed-methods evaluation—incorporating surveys, interviews, and system testing—demonstrates enhanced eligibility awareness, usability, and engagement among users. The study highlights the potential of ML-driven platforms to deliver inclusive, efficient, and transparent welfare services.

Keywords: Machine Learning, Welfare Schemes, Eligibility Prediction, Rule-Based Systems, Progressive Web Application, Geolocation Services, Flask, Government Services, Public Welfare, Digital Inclusion, Multilingual Interface, User Engagement

I. INTRODUCTION

Government welfare schemes are crucial for addressing poverty, social inequality, and providing opportunities for marginalized communities. These schemes are intended to ensure access to essential services such as healthcare, employment, housing, and education, especially for vulnerable populations in rural and underserved areas. However, despite the widespread presence of these initiatives, their actual utilization and accessibility remain limited, often due to bureaucratic inefficiencies, lack of awareness, and digital divides in rural regions. Recent technological advancements, especially in Machine Learning (ML), hold significant potential to address these challenges and enhance the effectiveness of welfare scheme delivery.

While technology has been applied in various sectors to streamline service delivery, there remains limited research on how it can improve accessibility to welfare schemes, particularly through the use of data-driven platforms, rule-based systems, and machine learning (ML). Most existing studies focus on isolated applications like eligibility prediction or fraud detection but do not provide a consolidated view on how these technologies impact overall accessibility and delivery. Moreover, as the digitalization of welfare schemes grows, understanding how ML and data analytics can be leveraged effectively to improve targeting, scheme matching, and real-time notifications is crucial for scaling these solutions.

The lack of awareness about the schemes remains a significant issue, as shown by statistics where 87% of citizens are aware of agricultural welfare schemes but only 44.8% use them. These gaps highlight the need for technology-driven solutions to enhance both engagement and accessibility for marginalized populations. This study aims to explore how machine learning (ML) and digital tools can enhance the accessibility and delivery of government welfare schemes in

DOI: 10.17148/IJARCCE.2025.14518

India. It seeks to evaluate the public's awareness and utilization of these schemes, examine how digital platforms and ML can improve targeting and eligibility assessments, and identify barriers to their adoption.

The study focuses on Indian government welfare schemes across sectors like employment, housing, healthcare, and financial inclusion. It examines the use of rule-based systems and ML algorithms for real-time scheme matching, automated eligibility checks, and notifications. The scope also includes challenges related to digital illiteracy and the adoption of digital technologies, with a focus on improving welfare accessibility for both urban and rural populations.

II. RELATED WORKS

A. Rural Development and Government Schemes

Building a successful rural development framework requires a comprehensive understanding of socio-economic conditions, government policies, and technological advancements. Rural India, which houses nearly 65% of the country's population, faces challenges such as unemployment, inadequate housing, and limited access to healthcare and infrastructure. In response, the Government of India has implemented numerous welfare schemes targeting these areas.

Notable initiatives include the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), which offers guaranteed employment to rural households [1]. Pradhan Mantri Awas Yojana (PMAY) supports affordable housing [2], while DAY-NRLM promotes women empowerment through self-help groups [3]. Infrastructure-focused programs such as the Pradhan Mantri Gram Sadak Yojana (PMGSY) enhance connectivity [4], and Ayushman Bharat improves healthcare access through financial coverage for rural citizens [5]. These schemes collectively address key pillars of rural development—employment, housing, health, and infrastructure—contributing to inclusive and sustainable growth.

B. Digital Transformation in Rural Governance

The Digital India initiative, launched in 2015, has transformed public service delivery by introducing digital infrastructure and promoting e-governance [6]. One of its most impactful frameworks is the JAM Trinity (Jan Dhan-Aadhaar-Mobile), which supports Direct Benefit Transfers (DBT) to reduce leakages and enhance transparency [7]. Technologies such as Geographic Information System (GIS) mapping and data analytics have further optimized scheme implementation and resource allocation. GIS-based platforms help visualize infrastructural gaps and prioritize development zones, while predictive analytics aids in evaluating program effectiveness and identifying underserved regions [8].

C. Literature Review on Welfare Scheme Platforms

While policy frameworks have evolved significantly, the digital accessibility of schemes remains a major challenge. Studies highlight that existing platforms often lack personalization and usability, leading to low adoption rates among citizens [9]. For example, MyScheme is a government initiative that provides a searchable database of central and state schemes; however, it requires users to manually filter through numerous programs, lacking automation or personalization [10]. Similarly, Schemeshaathi—a mobile app that helps users browse scheme information—offers limited eligibility-based suggestions and lacks real-time updates or multilingual support [11]. The UMANG platform, though integrated with multiple government services, presents a steep learning curve for first-time or rural users [12]. The existing research on government welfare schemes reveals both innovations and limitations across various platforms. The table below summarizes key innovations and disadvantages identified in prior studies:

Table I Compare Several Welfare Schemes And Platform

Study	Innovation	Disadvantages
MyScheme	Searchable government scheme database.	No personalization, no real-time updates, manual filtering.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

Schemeshaathi App	Mobile app for browsing schemes.	Limited eligibility suggestions, no real-time updates, limited language support.
UMANG Platform	Integrates multiple government services.	Complex interface, difficult for first-time users.
MGNREGA	Guaranteed rural employment.	Implementation delays, low awareness in rural areas.
PMAY (Pradhan Mantri Awas Yojana)	Affordable housing for rural and urban areas.	Eligibility issues, construction delays.
DAY-NRLM	Empowers women through self-help groups.	Limited reach, dependent on local infrastructure.
Ayushman Bharat	Healthcare access and financial protection for rural citizens.	Limited awareness, shortage of local healthcare facilities.
PMGSY (Pradhan Mantri Gram Sadak Yojana)	Improves rural road infrastructure.	Delayed implementation, poor construction quality.
Digital India (JAM Trinity)	Financial inclusion via Aadhaar, mobile, and bank accounts.	Security risks, digital divide in rural areas.

III. PROPOSED SYSTEM

The proposed system addresses major shortcomings in current government welfare portals, including the lack of real-time notifications, user-specific recommendations, and language or location-based accessibility. While existing platforms such as MyScheme and Schemeshaathi offer generalized scheme information, they fall short in providing automated and tailored recommendations, and platforms like UMANG have user interfaces that are not rural-friendly [9], [12].

To overcome these challenges, the system begins with secure multi-step authentication using email and mobile OTP verification. Once authenticated, users input their demographic and socio-economic data, which is processed using a hybrid of rule-based filtering and machine learning algorithms to suggest the most relevant government schemes. Unlike platforms that require users to manually search and filter, this system ensures recommendations are personalized and automatic. One of the key enhancements is multilingual support, enabling access to the platform in several Indian languages using Flask-Babel. This goes beyond MyScheme, which supports only English and Hindi [10]. Additionally, the system's frontend is fully mobile-responsive using Bootstrap 5, ensuring smooth performance on all devices.

The platform provides real-time updates via SMS and email notifications, addressing the absence of such features in Schemeshaathi [11]. Notifications include scheme launches, application deadlines, and status changes. Furthermore, the integration of Google Maps API and Leaflet.js offers a geospatial feature that helps users locate government offices and explore region-specific schemes. This is especially helpful for rural users who lack easy access to information hubs.

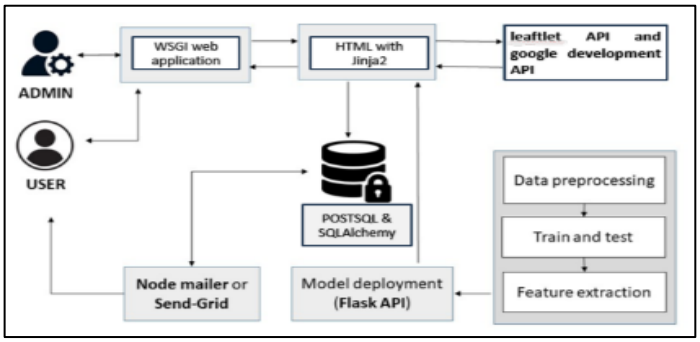

Figure 1 Architecture diagram

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

The architecture of the system, as depicted in Fig 1: System Architecture, demonstrates how various modules interact seamlessly. Users and admins interact through a WSGI-based web application. The frontend is built with HTML templates rendered by Jinja2, which communicates with the backend using Flask APIs. The PostgreSQL database, managed through SQLAlchemy, securely stores user information and scheme data. Real-time notification services are handled via NodeMailer or SendGrid, enabling the system to push alerts directly to users.

The scheme matching engine involves a backend model deployment using Flask APIs, which processes user inputs through modules like feature extraction, data preprocessing, and training/testing components. These machine learning modules ensure the engine learns from user data to improve future recommendations. Geolocation-based services are handled using the Leaflet and Google Development APIs to provide map views and location-specific data. The overall architecture ensures that user inputs are validated, processed, and responded to in real time, with enhanced personalization, accessibility, and scalability.

Table III Functional Requirements Of Proposed System

Functionality	Description	Implementation
Secure Registration	Multi-step verification with email and mobile	Flask-Mail, Twilio OTP, Flask-Login
User Authentication	Login and session management	Flask-Login, secure password hashing
Scheme Matching Engine	Recommends schemes based on user data	Rule-based logic + ML model
Profile Management	Users can view/edit personal info, reset password	Flask-WTforms, validation, PostgreSQL
Multilingual Interface	Interface in regional Indian languages	Flask-Babel for translation/localization
Notifications System	Real-time updates on new/expiring schemes, status changes	Automated alerts via email/SMS
GPS & GIS System	Users can find nearby government offices as per their Scheme Type	Leaflet, Google Maps API integration

The proposed system significantly improves on the existing systems by offering real-time personalized recommendations, a multilingual interface, and geospatial mapping for greater accessibility. This not only simplifies access to government schemes but also enhances transparency and inclusivity in public service delivery.

IV. IMPLEMENTATION

The proposed system is built on a modular architecture that ensures scalability, data security, real-time responsiveness, and user accessibility. At its core, the platform is designed to connect citizens with relevant government welfare schemes based on personal eligibility, while offering real-time notifications, multilingual support, and secure user interactions. The implementation involves multiple stages, from system initialization to user engagement, scheme matching, and personalized communication.

A. System Initialization and Configuration

The system is initialized by configuring the core framework using Flask, a lightweight and modular web framework suitable for building scalable applications. During initialization, critical components such as URL routing, user session handling, and HTML rendering are set up. Key third-party extensions including Flask-Mail for email communication, Twilio for SMS services, Flask-Babel for multilingual support, and SQLAlchemy for ORM-based database interactions are also loaded. A PostgreSQL database serves as the central data repository for user records and scheme metadata. Security layers are activated, including password hashing with secure cryptographic algorithms and token-based email verification, which collectively ensure robust user authentication and data privacy. This modular initialization ensures the system is both extensible and secure from the start.

B. User Registration and Verification

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

User registration is the first interaction point and is designed to be both intuitive and secure. During this phase, users provide basic information such as name, email, and phone number through a structured registration form. After submission, the system initiates an email-based verification by sending a secure token link generated using Flask-Mail. Upon clicking the link, the user's email is marked as verified. To further enhance security and identity validation, a One-Time Password (OTP) is sent via Twilio to the registered mobile number. Only after both steps are completed is the user's account fully activated. This **t**wo-step verification process helps reduce fake registrations and ensures the authenticity of users accessing the platform.

C. Profile Management and Data Collection

Once authenticated, users proceed to complete their personal profile by submitting detailed demographic and socio-economic information, including age, gender, caste category, marital status, educational qualification, occupation, income level, and disability status. This information is stored securely in PostgreSQL and forms the basis of the eligibility analysis engine. Users are also provided with the ability to update their profile, change account details, or initiate a secure password reset process via email. These features ensure that user data remains current and protected against unauthorized access, allowing for accurate, real-time eligibility assessments.

D. Scheme Matching and Real-Time Notification System

The eligibility engine plays a central role in mapping user profiles with relevant government schemes. Each scheme has predefined eligibility parameters such as income thresholds, age range, caste category, disability status, region, and more. The engine filters schemes based on these parameters and categorizes them into three groups: "Eligible"**,** "May be eligible", and "Not eligible." These categories are displayed on the user dashboard along with key details, documentation requirements, and application links. The platform incorporates a real-time notification system that uses Flask-Mail and Twilio to alert users about new matches, scheme deadlines, application reminders, and document updates. This ensures users are consistently informed and can act promptly.

E. Accessibility, Geolocation, and Security Enhancements

The platform is designed to be inclusive, user-friendly, and scalable. Multilingual support is provided using Flask-Babel, enabling real-time switching between various Indian languages, making it accessible to rural and non-English-speaking users. The frontend, developed using Bootstrap**,** ensures mobile responsiveness and intuitive navigation. For regional targeting, Leaflet.js is integrated to offer map-based visualizations of nearby government offices and location-specific schemes. From a security standpoint, all form inputs are validated to prevent injection attacks, APIs are protected with token-based access, and user credentials are encrypted. The backend is optimized with query optimization techniques and pagination, ensuring efficient performance under heavy traffic and concurrent users.

V. RESULT AND DISCUSSION

The Government Scheme Navigator system demonstrates its comprehensive functionality by seamlessly integrating multiple components to provide personalized welfare scheme recommendations based on socio-economic parameters. Upon user input through the User Details Form Fig 2.2, which collects demographic data such as age, income, marital status, and occupation, the system processes the information to match users with relevant government schemes.

These schemes are then displayed in the system's dashboard Fig 2.1, where they are categorized as "Eligible," "May be Eligible," or "Not Eligible," accompanied by brief descriptions and eligibility criteria Fig 2.3, ensuring users have full transparency regarding the recommendations. Additionally, the system incorporates an interactive map interface powered by Leaflet.js Fig 2.4, which enables users to identify nearby government offices and services. This spatial representation enhances the user's ability to access physical services. A GPS view Fig 2.5 further improves the user experience by providing a geographical visualization of the user's current position relative to available schemes and service centers, facilitating easy navigation to nearby assistance. On the administrative side, the system includes a secure admin panel Fig 2.6 that allows administrators to manage scheme details, monitor user registrations, handle grievances, and track real-time system metrics. The platform also ensures continuous user engagement through real-time notifications via push

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

alerts, email (via Flask-Mail), and SMS (via Twilio), keeping users informed about new schemes, application deadlines, and status updates.

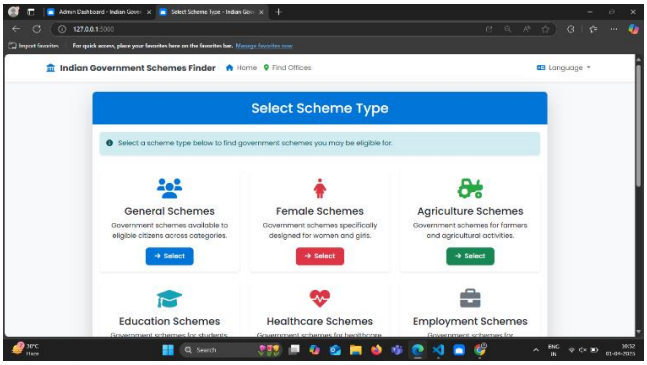

Figure 2.1 System dashboard

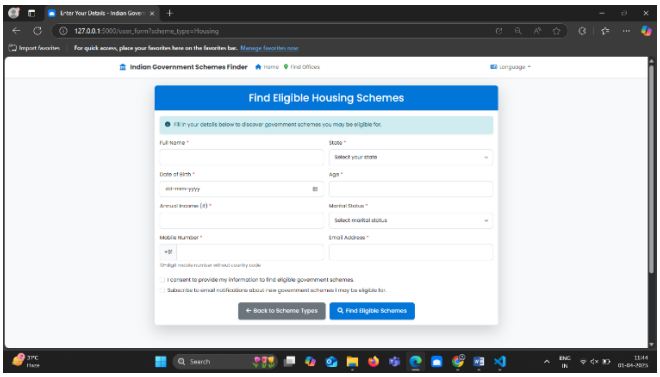

Figure 2.2 User details form

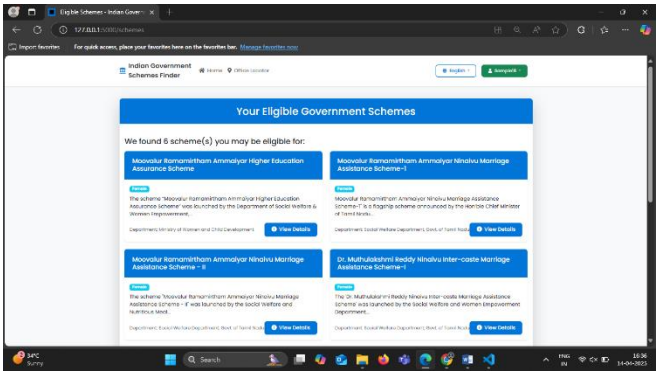

Figure 2.3 Scheme eligibility

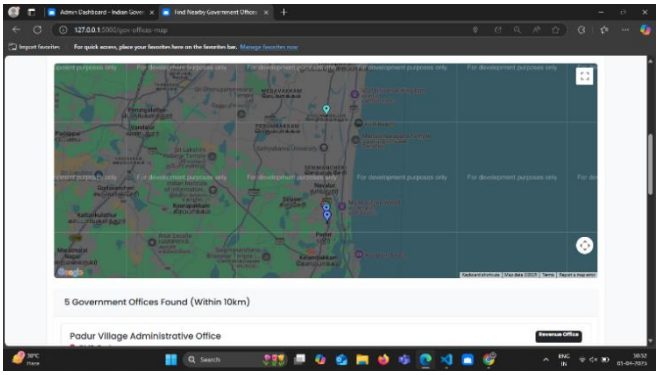

Figure 2.4 GIS system

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 5, May 2025

DOI: 10.17148/IJARCCE.2025.14518

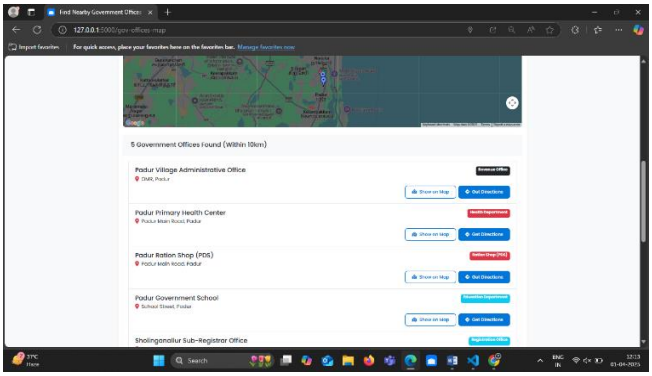

Figure 2.5 GPS view

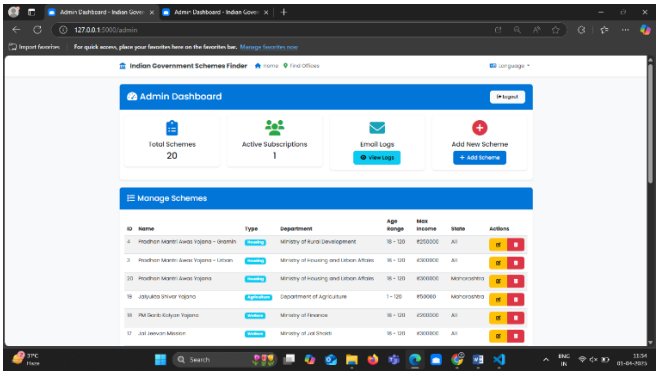

Figure 2.6 Admin panel

A. Survey-Based Evaluation of Welfare Scheme Awareness and Utilization

This study adopted a comparative-descriptive, dual-phase survey design incorporating both qualitative and quantitative methodologies to assess the awareness and usage of government welfare schemes. The sample consisted of 200 participants, including 150 beneficiaries and 50 technology experts. Data were gathered through structured questionnaires and semi-structured interviews during both pre- and post-implementation phases of the Government Scheme Navigator platform. The pre-implementation results showed significant gaps between scheme awareness and actual utilization—particularly in agricultural (gap: 55.2%), female-centric (59.4%), and entrepreneurship-related schemes (92.0%). Contributing factors identified through interviews included complex eligibility criteria, procedural inefficiencies, and low levels of digital literacy. In contrast, educational (81.4%) and health-related schemes (84.8%) demonstrated high utilization rates among participants who were aware of them.

Post-implementation analysis was conducted with a demographically similar group, with 71% of users accessing the platform via mobile devices, demonstrating strong digital reach across education and income levels. Despite stable awareness levels, utilization did not significantly improve, and the utilization gaps remained unchanged. This highlights the need for further development of user-friendly interfaces and targeted outreach strategies. The platform improved accessibility but did not fully translate into increased scheme usage. Table III provides a side-by-side comparison of pre- and post-implementation awareness, utilization, and resulting gaps across six major categories of government welfare schemes.

Table IV Post-Implementation Awareness And Utilization

Services	Pre-impl Aware (%)	Pre-impl Util (%)	Post-impl Aware (%)	Post-Impl Util (%)
Agricultural scheme	87.0	44.8	87.0	44.8
Female scheme	32.0	40.6	32.0	40.6
Educational scheme	56.5	81.4	56.5	81.4
Banking and finanacial	21.5	62.8	21.5	62.8

DOI: 10.17148/IJARCCE.2025.14518

Business and entrepreneurship	37.5	8.0	37.5	8.0
Health and wellness	66.0	84.8	66.0	84.8

VI. CONCLUSION AND FUTURE ENHANCEMENTS

This study addresses the challenges marginalized communities face in accessing government welfare schemes in India, proposing the Scheme Navigator, a web application that uses rule-based and machine learning techniques to match citizens with relevant schemes in real-time. Despite ongoing efforts to improve welfare access, barriers such as lack of awareness, complex eligibility criteria, and bureaucratic hurdles remain prevalent. The Scheme Navigator offers a data-driven solution to enhance accessibility by providing tailored scheme recommendations. It bridges the gap between awareness and utilization and contributes valuable insights for improving digital solutions in e-governance.

Future enhancements could include AI-driven personalized recommendations, blockchain-based tracking for transparent application processes, and interactive forums for user engagement. Additionally, virtual workshops, webinars, and smart contract-based verifications could streamline and secure the application process, further improving the effectiveness of the system. These improvements would empower citizens and enhance the reach of government welfare schemes.

REFERENCES

[1] Ministry of Rural Development, “Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA),” [Online]. Available: https://nrega.nic.in
[2] Ministry of Housing and Urban Affairs, “Pradhan Mantri Awas Yojana (PMAY),” [Online]. Available: https://pmaymis.gov.in
[3] Ministry of Rural Development, “Deendayal Antyodaya Yojana – National Rural Livelihood Mission (DAY-NRLM),” [Online]. Available: https://aajeevika.gov.in
[4] Ministry of Rural Development, “Pradhan Mantri Gram Sadak Yojana (PMGSY),” [Online]. Available: https://pmgsy.nic.in
[5] National Health Authority, “Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB-PMJAY),” [Online]. Available: https://pmjay.gov.in
[6] Government of India, “Digital India Programme,” [Online]. Available: https://digitalindia.gov.in
[7] NITI Aayog, “JAM Trinity: Jan Dhan-Aadhaar-Mobile,” [Online]. Available: https://www.niti.gov.in
[8] Kaur, M. & Singh, P., “GIS and Big Data Analytics in Rural Development,” International Journal of Advanced Research in Computer Science, vol. 10, no. 5, pp. 1–7, 2019.
[9] Sharma, A., & Gupta, R., “Barriers to Accessing Government Welfare Schemes Digitally in Rural India,” Journal of Rural Development Studies, vol. 12, no. 2, pp. 45–53, 2021.
[10] MyScheme, “Discover Government Schemes,” [Online]. Available: https://myscheme.gov.in
[11] SchemeShaathi App, “Government Scheme Information Portal,” [Mobile App]. Available on Google Play Store.
[12] Ministry of Electronics and IT, “UMANG (Unified Mobile Application for New-age Governance),” [Online]. Available: https://web.umang.gov.in
[13] Ministry of Education, “National Scholarship Portal (NSP),” \[Online]. Available: https://scholarships.gov.in
[14] Ministry of Agriculture and Farmers Welfare, “PM-Kisan Samman Nidhi,” \[Online]. Available: https://pmkisan.gov.in
[15] Ministry of Labour and Employment, “e-Shram: National Database of Unorganised Workers,” \[Online]. Available: [https://eshram.gov.in](https://eshram.gov.in
[16] Singh, R., & Kumar, A., “E-Governance and Digital India: A Study on Rural Empowerment Through Digital Technologies,” International Journal of Research in Engineering, IT and Social Sciences, vol. 9, no. 3, pp. 59–65, 2019.
[17] Reddy, P., & Swaminathan, A., “Digital Transformation of Public Services in India: A Case Study on UMANG App,” Journal of E-Government Studies and Best Practices, vol. 2020, pp. 1–8.
[18] Das, A., & Dutta, A., “Bridging the Gap: Access to Government Welfare Schemes in Rural India through ICT,” International Journal of Rural Development and Management Studies, vol. 14, no. 2, pp. 21–34, 2021.
[19] Ministry of Women and Child Development, “Pradhan Mantri Matru Vandana Yojana (PMMVY),” \[Online]. Available: https://pmmvy.nic.in
[20] Verma, S., & Chauhan, M., “Effectiveness of Mobile Applications in Disseminating Government Scheme Information: A Study on MyScheme and UMANG,” Journal of Digital Governance, vol. 5, no. 1, pp. 11–19, 2022.