Optimizing Real Estate Performance: A Comprehensive Tracking Application for Monitoring Agent Activities and Enhancing Company Operations

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Abstract - Following research paper introduces latest Real Estate Tracking Application, it is designed for business owners for having detailed information on their agent's activities and locations. Since the real estate industry is so demanding and changing, fair agent operations need to be monitored and optimized. This technology provides real-time monitoring of agent movements, tasks, and overall performance through the use of GPS tracking and data analytics. The main characteristics, points of creation, and reciprocal advantages are all included in this research, along with alternative strategies for managing and enhancing real estate teams. As a result, real estate organizations become more accountable and successful.

Keywords: Agent monitoring, Location tracking, Transparency, Accountability

1. INTRODUCTION

The real estate industry in India contributes significantly to the country's GDP and is a major driver of economic growth. Given the complexity of real estate transactions, the industry struggles with the requirement for increased accountability in agent operations to build client trust in a large and diverse market.

The issue of misleading reporting by agents is particularly prominent in the Indian real estate scene. Inflating property showings is a common tactic used by agents to obtain bigger compensation, which causes actual financial losses.

Propmart takes on this difficulty head-on by using GPS technology to deliver precise real-time location data, making sure that the agent's reported physical presence matches their reported property engagements.

In the highly competitive real estate industry, the trustworthiness and professionalism of agents are paramount for successful property

transactions. However, a persistent challenge within this sector is the prevalence of deceptive practices, where agents manipulate engagement metrics to inflate their performance and secure payments based on false premises. This not only undermines the integrity of real estate processes but also results in significant financial losses for companies.

To combat this critical issue, our research introduces a groundbreaking solution embodied in the Android application "Propmart. This innovative tool leverages advanced GPS technology to accurately track and monitor agent activities, effectively addressing the root cause of fraudulent practices in the industry. By providing transparent and reliable data on agent movements and interactions, Propmart restores trust and accountability in real estate transactions, fostering a more ethical and efficient marketplace.

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Propmart addresses this challenge head-on by leveraging GPS technology to provide accurate real-time location data, ensuring that reported property engagements align with the agent's actual physical presence.

2. LITERATURE REVIEW

The global pandemic has significantly impacted businesses, prompting a shift from traditional operations to digitalization through mobile applications. The real estate industry is no exception, with real estate agents increasingly utilizing mobile apps for property listings, and developers creating applications to complement conventional booking systems. However, existing property listing apps primarily focus on information searching and registration. This project aims to address this limitation by developing and implementing a mobile-based property market application that offers an enhanced virtual home viewing experience, facilitates appointment bookings, streamlines communication with real estate agents, and integrates an improved chat feature.

The chosen software development methodology for this project is evolutionary prototyping, allowing for flexible and iterative refinement of requirements throughout the implementation phase. A literature review analysed existing applications to identify essential features and areas for enhancement.[1]Verification and validation processes, including unit, usability, and user acceptance testing, were conducted to ensure the implemented features align with proposed requirements. The project effectively met its goals, and further development could yield new features that would bolster the application's edge over competitors in the real estate market.

There have been major changes in the real estate market recently, with a lot of money being invested in purchasing and selling homes that fit people's wants and budgets. A multi-agent system intended for real estate marketing is presented in this study. The suggested system makes it easier for clients to advertise their homes and searches for buyers or sellers on their behalf, providing them with a practical and easy-to-use option.

Agent technology, which enables the detection of eligible properties from a wide array of listings, is at the centre of the system's main functionality [2]. Through a Java-developed Android mobile app, clients can access the system and act as agents interacting with other agents on a server. Using the Symfony PHP framework, the server hosts several agents that work together to accomplish the main goals of the system, including buying, selling, and selling agents. The suggested system's performance is validated by the findings of the System Usability Scale (SUS), which show a

high overall satisfaction percentage of roughly 76.66%. This degree of satisfaction is higher than usual, indicating high acceptability and endorsement from users.

Mobile agent technology has become a key paradigm in the age of abundant information. It seeks to address a number of concerns, including reducing network traffic, resolving latency problems, and improving the resilience and fault tolerance of distributed systems.

Mobile agents find applications in diverse domains, including industrial manufacturing, Internet search, electronic commerce, online shopping, network management, and software distribution. Despite their widespread use, realizing the full potential of mobile agent technology requires addressing significant issues related to agent identification and addressing, communication, security, tracking, location control, resource discovery, and scalability.

This thesis proposes a comprehensive global mobile agent management and tracking system designed to resolve the aforementioned challenges and specifically address issues unique to the mobile agent paradigm compared to the client-server paradigm [3]. By providing essential support for managing and observing agents in remote contexts via an intuitive graphical user interface, the framework seeks to promote the widespread adoption of agent technology. This will improve communication with the mobile agent system. The system also includes a directory assistance tool to help mobile agents find pertinent resources to complete their mission needs.

The purpose of this exploratory article is to examine theories of efficient markets and make the case for the need for an extended or new paradigm in real estate valuation. To improve the realism of present valuation models, the argument recommends reviewing previous efforts rather than establishing a whole new paradigm [4]. It highlights how important it is to recognize the various players in the real estate industry, as their activities matter and shouldn't be disregarded. Real estate pricing models need to take behaviour into account in order to provide a complete and accurate picture. Behaviour has a significant impact on real estate prices.

Workflows are no longer just about moving documents across an organization; they are now a more abstract and adaptable method used to express insights and best practices in a variety of application areas[5]. When implementing workflow definitions, it becomes crucial to stay apprised of the ongoing tasks to identify any schedule delays or undesired deviations. This paper introduces an agent-based method to automatically track the active set of tasks by observing the data generated during enactment. This approach facilitates short-term planning and quality control without necessitating team members to explicitly document their progress.

ProVis. Agent stands as the pioneering agent-based system for monitoring and controlling distributed real-time production [6]. Its operational foundation draws from ProVis. NT, a well-established object-oriented control system utilized in overseeing various functions, including the body, paint, and assembly shops at DaimlerChrysler's automotive plant in Bremen, Germany. As an essential component of the manufacturing execution system (MES), ProVis. Agent marks a significant milestone by enabling integration with other shop-floor applications, such as body identification, worker information, sequence setup, and more.

The National Cooperative Highway Research Program (NCHRP) Report 695 by the Transportation Research Board (TRB) offers a comprehensive guide for right-of-way offices aiming to implement a geospatially enabled enterprise-wide information management system within transportation agencies [7]. This report not only provides guidance but also includes a logical model to facilitate the smooth implementation of such a system.

The emphasis of the report is on assisting right-of-way offices in leveraging geospatial technology to enhance their information management capabilities. Geospatially enabled systems are designed to integrate location-based data, providing a spatial context to information related to transportation agency real estate. The logical model presented in the report serves as a structured framework, offering a systematic approach to the implementation process.

In essence, the guide equips transportation agencies with the necessary insights and tools to adopt a geospatially enabled enterprise-wide information management system for their real estate offices. The goal is to streamline processes, improve data accuracy, and enhance overall efficiency in managing real estate within the transportation sector.

The advancement of public transportation networks is a significant concern encompassing ecological, economic, and societal dimensions. Particularly, the transport of hazardous materials poses potential threats to human health and environmental quality. Enhancing the quality of urban networks, in terms of punctuality and vehicle frequency, is crucial to augment attractiveness while simultaneously reducing management costs [8]. Intelligent Transportation Systems (ITS), leveraging the synergy of new information technologies for simulation, real-time control, and communication networks, emerge as a viable alternative for optimizing resource management. Various artificial intelligence methods are employed to address these challenges, and adopting a multi-agent paradigm proves to be the most effective means of modelling these functionalities. This paper proposes a cost-effective software-based agent system utilizing GPS-enabled mobile devices for intelligent transportation systems. Research results indicate that mobile devices equipped with GPS modules, in conjunction with a web server, offer a cost-effective solution for implementing intelligent transportation systems.

In contemporary public transportation systems, Global Positioning Systems (GPS) integrated with wireless networks play a pivotal role in operational optimization and scheduling through control centres. Leveraging this infrastructure, our initiative aims to provide highly personalized information to users via PDAs and cell phones. Beyond assisting individuals in navigating public transportation by advising on the appropriate bus routes, we track their location to establish spatial awareness within a user community. Specifically, we have developed and tested an application known as Mobility Agents, designed for individuals with cognitive disabilities, affecting about 7% of the U.S. population [9]. Cognitive disabilities encompass limitations in perceiving, recognizing, understanding, interpreting, and responding to information. Enabling this demographic to use public transportation significantly enhances their independence. The Mobility Agents system delivers multimodal prompts on handheld devices to aid travellers in identifying the correct bus and simultaneously communicates the user's location and trip status to a caregiver. This article discusses our findings on various levels, covering technical aspects such as display challenges, GPS reliability, and networking latency in field use. Additionally, it explores customization needs for different cognitive disabilities and highlights diverse mission status interface approaches, ranging from 3D real-time visualizations to text interfaces via SMS and instant messaging.

Asset tracking's significance and complexity warrant focused attention, particularly in the context of data centres composed of vertical racks accommodating diverse equipment. This paper introduces an asset tracking system designed to automatically detect and identify equipment within racks with pinpoint accuracy,

ensuring location resolution equals asset size [10]. The system relays this information to one or more management back-ends, featuring a dedicated application that maintains a comprehensive location history for all equipment. A visualization tool is incorporated to display both the current state and deployment history.

The proposed solution boasts a flexible architecture that streamlines connectivity with existing and future asset management applications. This architecture supports straightforward configuration, load balancing, and redundancy. Emphasis has been placed on incorporating widely recognized standards wherever feasible.

Table 1(Research Study):

Serial No.	Title	Author name	Result	Year
1	Mobile based real tim property /land for sale viewing using google map and communication tool for buyer and client/real estate agent	Benjamin Leong e-Jen	This section will present the outcome of testing the mobile application prototype, showcasing user feedback and performance metrics to underscore the solution's efficacy in enabling real-time property viewing an seamless communication between buyers and agents.	2021
2	Performance Analysis of Mobile Cross-platform Developmen Approaches based on Typical UI Interaction	Stefan Huber and Luka Demetz	This research paper conducts a performance analysis of mobile cross-platform development approaches, focusing on typical UI interactions to derive comprehensive results and insights.	2020
3	Design and Implementation of a Mobile Agent Monitoring and Tracking System	Amal Karboubi	This research paper details the design an implementation of a Mobile Agent Monitoring and Tracking System, presenting developed results that showcase its effectiveness in real-	2000

			time monitoring and tracking capabilities	
4	A new paradigm for real estate valuation?	David Wyman, Maury Seldin, Elaine Worzala	This research paper introduces a novel paradigm for real estate valuation, presenting results that challenge conventional methods and offer a promising alternativ approach to enhance accuracy and efficiency in propert valuation.	2011
5	An Agent-oriented System for Workflow Enactment Tracking	Thomas Sauer, Mirjan Minor, Sascha Werno	The research paper presents an agent-oriented system for workflow enactment tracking, demonstrating its effectiveness in enhancing the monitoring and management of workflow processes through comprehensive tracking mechanism and intelligent agent based functionalities	2008
6	ProVis.Agent: An Agent-Based Production Monitoring And Control System	B. Jackea , O. Sauerb G. Sutschetb	The research paper showcases ProVis.Agent, an agent-based production monitoring and control system, demonstrating its effectiveness in optimizing production processe through intelligent agent interactions, leading to improved efficiency and real-time decision-making capabilities.	2006
7	Implementing a Geospatially Enabled Enterprise-Wide Information	KL Hancock	This research paper details the successfu implementation	2011

	Management System for Transportation Agency Real Estate Offices		of a Geospatially Enabled Enterprise-Wide Information Management Systen for Transportation Agency Real Estate Offices, showcasing its efficacy in enhancing spatial data integration and information management across the organization.	
8	Agent Based Intelligen Transportation System Software Based GPS Tracking Modules as Agents	Aamir Khan, Aasim Khurshid, Muhammad Farhan, Muhammad Harris	The research paper presents an Agent-Based Intelligent Transportation System with a software-based GPS demonstrating its effectiveness in optimizing transportation networks through intelligent agent interactions and GPS technology for enhanced efficiency and decision-making capabilities.	2012
9	Mobility Agents: Guiding and Tracking Public Transportation Users	Alexander Repenning, Andri Ioannidou	The research paper introduces Mobility Agents for guiding and tracking public transportation users, demonstrating their efficacy in enhancin user experience, optimizing route planning, and providing real-time tracking capabilities for improved public transportation services.	2006
10	Real time asset tracking in the data centre	Cyril Brignone, Tim Connors, Mehrban Jam Geoff Lyon, Geetha Manjunath, Alan	This research paper focuses on real-time asset tracking in data centres, showcasing	2007

		McReynolds, Swarup Mohalik, Ian Robinson Craig Sayers, Cosme Sevestre, Jean Tourrilhes, Venugopal Srinivasmurthy	an effective solution for enhancing operational efficiency and security through continuous, accurate monitoring and tracking of assets within the data centr environment.	

3. TECHNOLOGY USED

Technology Integration:

The Real Estate Tracking Application (PROPMART) is built on a robust technological foundation, combining the versatility of the Flutter framework with the scalability and real-time capabilities of Firebase. Flutter, a cross-platform development framework created by Google, provides a single codebase that seamlessly runs on both Android and iOS platforms. This decision not only simplifies the development process, but also assures a uniform user experience across all devices.
The PROPMART's backend is built on Firebase, a robust mobile and online application development platform. The application uses Firebase's real-time database and authentication services to constantly update and synchronize data, providing quick insights into agent activity and whereabouts. This real-time functionality is very important for a tracking tool, which allows business owners to watch their agents with little delay. The PROPMART's integration of Flutter and Firebase allows it to provide a user-friendly and responsive interface, supporting fast communication between the application and backend services. Furthermore, Firebase's comprehensive security features safeguard the confidentiality and integrity of the sensitive data used in tracking real estate activity.

4. PROPOSED SYSTEM

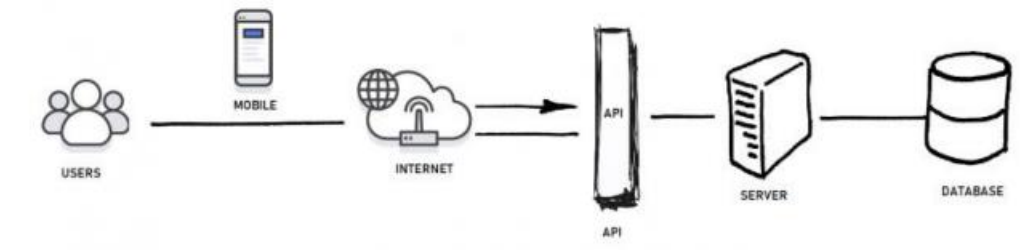

Figure 4.1: General Architecture of the System

Propmart, an Android application built with the Flutter framework, targets the frequent issue of misleading reporting by real estate salespeople in India. The software uses GPS technology on Android handsets to give real-time tracking of agent

movements during property engagements. The integration with Firebase Firestore provides secure and scalable data storage, allowing for smooth synchronization between the application and the cloud, improving data accessibility and reliability. To strengthen authentication, Propmart includes a two-factor OTP verification scheme. Agents can only submit reports or confirm their presence at a property after generating and entering a unique OTP, which adds an extra layer of security and reduces fraudulent activity.

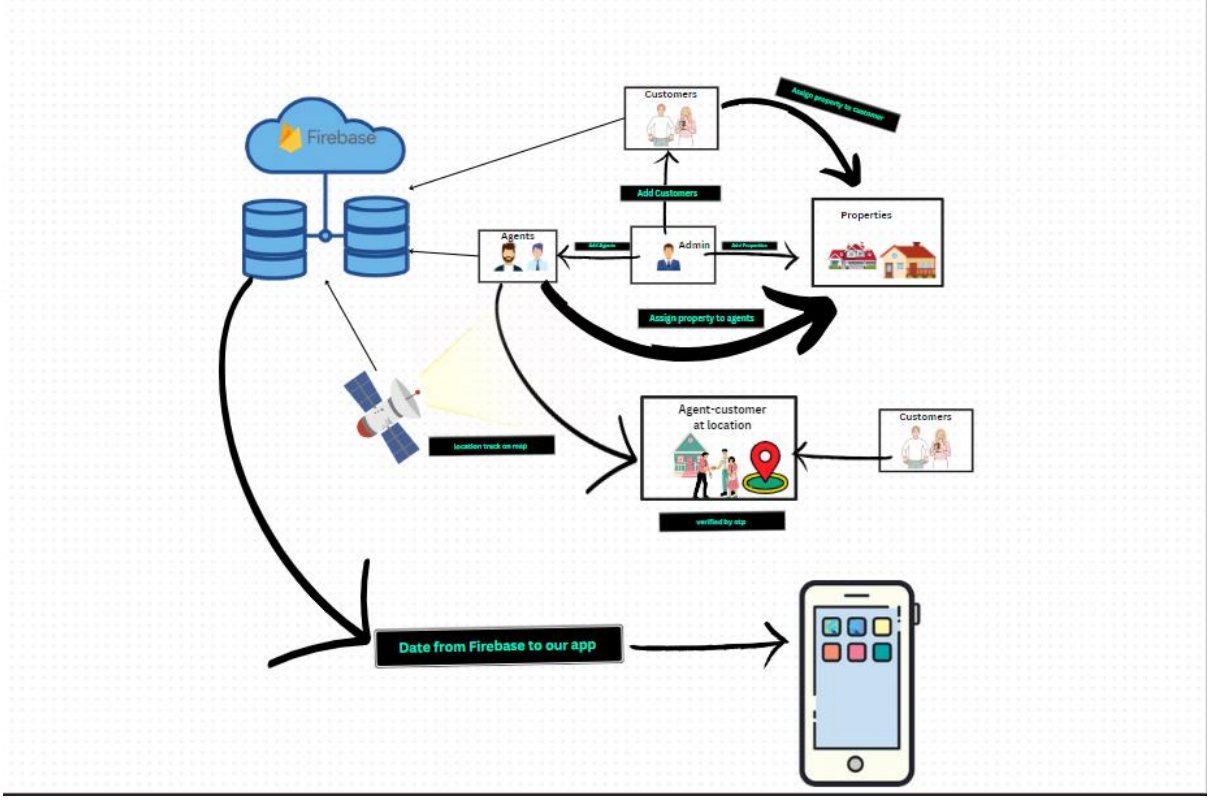

Figure 4.2: Flow of Approach

5. PROPOSED METHADOLOGY

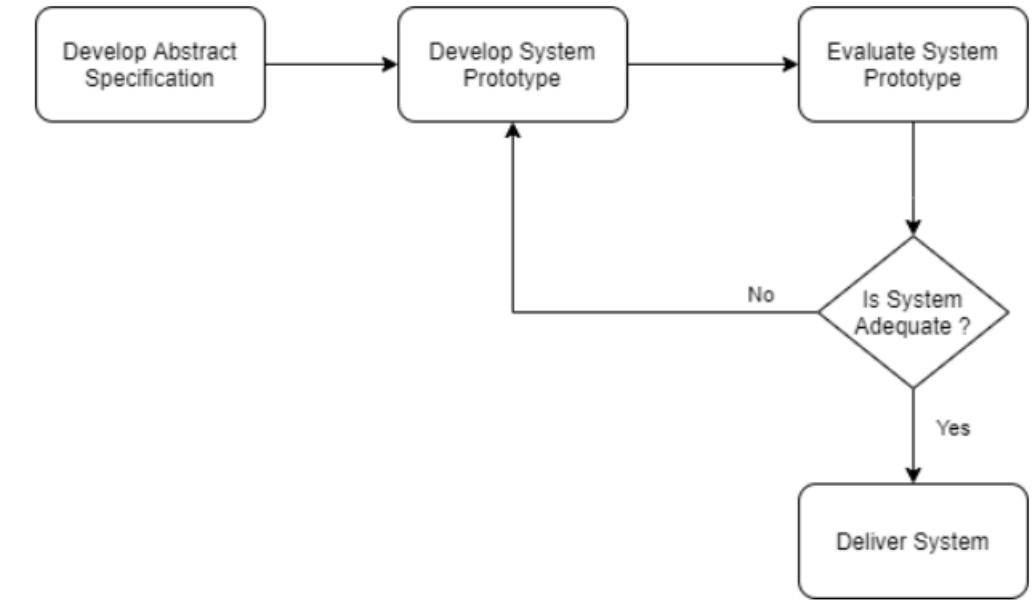

Figure 5.1: Workflow of Evolutionary Prototyping

5.1. Research Design:

The research employs a mixed-methods approach to comprehensively investigate the impact of Propmart on enhancing agent accountability in the Indian real estate sector. The study combines qualitative and quantitative data collection methods to provide a nuanced understanding of the solution's effectiveness.

5.2. Sampling Strategy:

The research targets a diverse sample of real estate companies operating in different regions of India. A stratified sampling technique will be employed to ensure representation from major metropolitan areas, urban centres, and emerging real estate markets. Real estate agents actively using Propmart will be identified and approached for participation.

5.3. Data Collection:

a. Surveys and Questionnaires:

Structured surveys and questionnaires will be administered to real estate companies and agents. These instruments will focus on gathering quantitative data related to the perceived impact of Propmart on agent accountability, instances of false reporting, and the overall trust dynamics within the company-client relationship.

b. Interviews:

In-depth interviews will be done with important stakeholders, including executives from real estate companies, Propmart agents, and clients who have transacted with Propmart-monitored agents. Qualitative insights will be acquired to support quantitative data, focusing on the subtleties of the solution's deployment and its impact on industry practices.

5.4. Propmart's Analytics :

The Propmart application will be a valuable source of information. Real-time GPS tracking data and OTP verification logs will be evaluated to determine quantitative indicators such as agent mobility patterns, OTP verification frequency, and association with reported

property interactions. These analytics will provide a clear assessment of the solution's influence on agent accountability.

5.5. Comparative Analysis:

A comparison analysis will be carried out to set a benchmark for evaluating Propmart's effectiveness. Real estate companies that have used Propmart will be compared to those that use traditional methods of agent oversight. Key performance measures such as false reporting and client satisfaction will be examined to determine Propmart's relative benefits.

5.6. Ethical Considerations:

The study will follow ethical norms, including participant confidentiality, informed consent, and privacy protection. All participants will be informed about the research objectives, and their voluntary involvement will be encouraged. Data storage and treatment shall adhere to applicable data protection legislation.

5.7. Data Analysis:

To find important patterns and correlations in quantitative data, statistical procedures such as regression analysis and t-tests will be used. Thematic analysis will be used to extract major themes and insights from qualitative data collected through interviews. Propmart analytics will be used to draw relevant conclusions about the solution's effect on agent responsibility.

5.8. Limitations:

The study admits significant limitations, such as dependence on self-reported data, regional variations in Propmart implementation, and the real estate industry's dynamic character. These constraints will be addressed during the finding’s interpretation, allowing for a more nuanced view of the study's breadth and consequences.

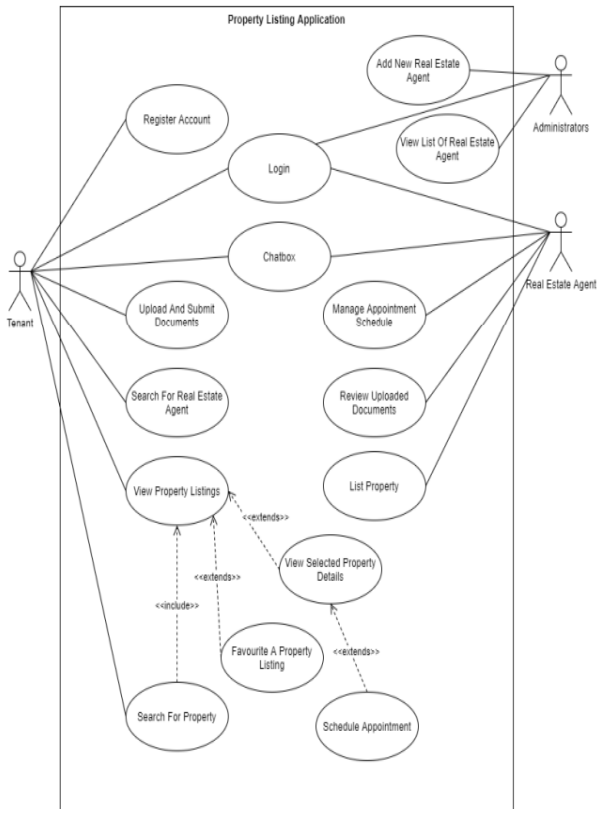

Figure 5.2: Use Case Diagram

6. RESULTS

The study's findings show that Propmart is an excellent solution to the problem of misleading reporting by real estate agents in India. The study of survey responses revealed that real-time GPS tracking considerably boosted responsibility, with a large decrease in cases of misrepresentation. The integration of the OTP verification system proved to be a strong deterrence against fraudulent behaviours, increasing the accuracy of reported activities. Data from Propmart analytics demonstrated continuous and reliable tracking of agent movements during property interactions. The application's secure data transmission to Firebase Firestore protected the security and integrity of crucial information. Client satisfaction indicators show that real estate companies that use Propmart experience increased transparency and trust with their clients.

7. CONCLUSION

To sum up, the study conducted to find out if Propmart can improve agent responsibility in the Indian real estate industry offers encouraging results. An in-depth study of Propmart data, along with quantitative surveys, qualitative interviews, and a mixed-methods approach, has allowed for a thorough understanding of the impact of the solution. By examining the real-world applications of cutting-edge technical solutions, the study's findings close a significant vacuum in the body of literature and add to the conversation on transparency and dependability in the sector.

Implications for the Real Estate Industry:

The research findings have important ramifications for Indian real estate firms.

Propmart is shown to be a crucial instrument for developing an accountable and trustworthy culture as well as for reducing the incidence of false reporting. The application's seamless integration of OTP verification and GPS monitoring complies with legal requirements and establishes itself as a leader in the industry's observance of changing transparency standards.

Challenges and Future Directions:

Despite the fact that Propmart has a lot of promise, the report notes some difficulties, such as regional differences in its uptake and possible opposition from orthodox stakeholders. Subsequent investigations ought to go more deeply into the enduring consequences of Propmart, examining its expandability, user approval, and changing legal environment.

It will be imperative to address these issues if creative solutions in the ever-changing real estate industry are to continue to succeed.

Closing Remarks:

Essentially, this study is a groundbreaking investigation into the revolutionary possibilities of technology-based solutions for restructuring the Indian real estate sector. Propmart not only tackles the acknowledged issue of fraudulent reporting, but it also lays the groundwork for a paradigm change that will lead to more responsibility and trust. Adopting cutting-edge technologies like Propmart is essential to supporting a strong and trustworthy real estate market in India as the sector develops.

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