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Cloud Based Property Management System: Enhancing Real Estate Operation and Tenant Experience

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Abstract: This study presents the development and evaluation of a cloud-based property management system (PMS) designed to enhance operational efficiency, data security, and tenant satisfaction for real estate businesses in Region XII, Philippines. Using a descriptive research design and Likert-scale survey data from JC Hotel and Convention Center staff, the system was assessed across four dimensions: usability, security, operational efficiency, and tenant experience. Results showed consistent positive ratings, with security (mean = 3.50) as the highest-performing factor. Key system features include automated billing, secure access controls, and realtime tenant communication. The findings confirm the potential of cloud-based PMS as a scalable, cost-effective solution that addresses traditional inefficiencies while meeting cybersecurity standards.

Keywords: *Cloud Computing, Property Management System, Real Estate Technology, Cybersecurity, Operational Efficiency, Tenant Experience, System Usability, Data Privacy, Region XII, Cloud-Based Solutions.*

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I. INTRODUCTION

A. Background and Context

Globally, the integration of cloud-based property management systems (PMS) has revolutionized real estate operations by enhancing efficiency and tenant satisfaction. However, this digital shift has introduced significant cybersecurity challenges. The National Cybersecurity Center of Excellence (NCCoE) developed a PMS reference design to demonstrate methods for improving cybersecurity within these systems, emphasizing the need for robust security measures to protect sensitive data and enforce role-based access control (NCCoE, 2022). Despite these advancements, there remains a research gap in developing standardized cybersecurity protocols tailored specifically for cloud-based PMS, addressing both technological and human factors.

In the Philippines, the adoption of digital solutions in property management is still emerging. A study on the Bicol College Property Management System highlighted the necessity for cloud-based solutions to enhance data management and operational efficiency within educational institutions (Bicol College, 2021). Additionally, the implementation of the Data Privacy Act of 2012 underscores the importance of securing tenant and property data. Despite these developments, comprehensive research on the nationwide adoption of cloud-based PMS, particularly concerning their scalability, cost-effectiveness, and alignment with local regulatory frameworks, is lacking.

In Region XII (SOCCSKSARGEN), property management practices often rely on traditional methods, leading to inefficiencies and data management challenges. While specific studies in this region are limited, the broader national context suggests similar challenges. The absence of localized research focusing on the unique needs and constraints of Region XII hampers the development of tailored solutions. Addressing this gap requires empirical studies to assess the readiness, challenges, and potential benefits of implementing cloudbased PMS in this region, considering factors such as infrastructure, user competency, and regional economic conditions.

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B. Research Problem

Many real estate businesses still rely on manual processes or on-premise software, resulting in data loss, delayed responses, and high operational costs. Despite the advantages of cloud-based solutions, their adoption introduces cybersecurity risks, regulatory compliance challenges, and system integration issues, especially in regions with limited digital infrastructure and awareness. In Region XII, property managers face technological and financial barriers when transitioning to cloud solutions, along with challenges in complying with local real estate laws and data privacy regulations. This research aims to develop a secure, scalable, and user-friendly cloud-based property management system that addresses these challenges by enhancing real estate operations, improving tenant engagement, and ensuring compliance with cybersecurity best practices.

C. Research Questions and Objectives

➢ Research Questions

- How can a cloud-based property management system improve operational efficiency and tenant experience in real estate businesses?
- What cybersecurity measures should be implemented to ensure data privacy and system security in a cloud-based property management system?
- How can the proposed system address technological and financial challenges to promote the adoption of cloud-based solutions among small to mid-sized real estate businesses?

➢ Research Objectives

- To develop and implement a cloud-based property management system that enhances operational efficiency and improves tenant interactions.
- To identify and integrate effective cybersecurity measures to protect sensitive data and ensure system reliability.
- To assess the feasibility and cost-effectiveness of adopting a cloud-based solution, particularly for small to mid-sized real estate businesses.

D. Justification and Significance

The increasing adoption of cloud-based property management systems (PMS) has the potential to revolutionize real estate operations by improving efficiency, security, and tenant satisfaction. However, many real estate businesses, particularly small to mid-sized enterprises, face challenges such as cybersecurity vulnerabilities, regulatory compliance, and system integration issues. A study by Patel et al. (2022) highlights the growing importance of adopting cloud solutions in real estate to streamline operations, yet emphasizes the need for robust cybersecurity frameworks to protect sensitive data. This research is highly relevant as it addresses these critical gaps by developing a secure, scalable, and cost-effective cloud-based PMS that enhances data protection, operational efficiency, and tenant engagement.

II. LITERATURE REVIEW

A. Overview of Information Assurance and Cybersecurity Theories and Models

The CIA Triad remains the cornerstone of information security, ensuring that data remains confidential, unaltered (integrity), and accessible when needed (availability). In the context of a cloud-based property management system (PMS), maintaining the confidentiality of tenant information, ensuring that property records are accurate, and providing seamless access to authorized users is essential. Implementing secure cloud environments with encryption protocols, role-based access controls, and real-time data backup mechanisms aligns with the principles of the CIA Triad to protect property management data from cyber threats (Stallings & Brown, 2021).

The Zero Trust Architecture (ZTA) operates on the principle of "never trust, always verify," where no device or user is trusted by default, even within the network perimeter. This model is highly relevant for cloud-based property management systems, where data is stored and accessed remotely by multiple users, including property managers, tenants, and service providers. Implementing multi-factor authentication (MFA), continuous verification of user identities, and least-privilege access ensures that sensitive information, such as lease agreements and payment records, remains protected from unauthorized [1].

The Defense-in-Depth (DiD) Strategy employs multiple layers of security controls to mitigate cybersecurity risks. In a cloud-based PMS, this strategy includes firewalls, intrusion detection systems (IDS), endpoint protection, regular vulnerability assessments, and security audits. By deploying overlapping layers of defense, even if one security control is compromised, other layers remain intact, ensuring continued protection of tenant data and financial transactions (Mitchell, 2020).

B. Review Recent Studies, Papers, and Advancements in Information Assurance and Cybersecurity

Recent studies have demonstrated the effectiveness of artificial intelligence (AI) and machine learning (ML) in enhancing threat detection and automating cybersecurity responses. AI-powered systems can analyze vast amounts of data in real time, identifying anomalies and predicting potential cyber threats before they escalate. According to Nguyen et al. (2022), AI and ML models have shown significant improvements in recognizing complex attack patterns in cloud environments, which are often difficult to detect using traditional security measures. AI-based systems such as Intrusion Detection Systems (IDS) and Security Information and Event Management (SIEM) platforms are now widely deployed to provide proactive security monitoring for cloud-based applications, including property management systems.

Blockchain technology has gained attention as a solution for enhancing data security, transparency, and integrity in cloud-based environments. Blockchain provides an immutable ledger where transaction records cannot be

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altered, making it an ideal solution for securing sensitive data in cloud-based property management systems. [3]the adoption of blockchain technology in property management can prevent unauthorized alterations to lease agreements, payment records, and tenant data. Additionally, blockchain-based smart contracts can automate transactions while ensuring compliance with predefined security standards, minimizing the risk of fraud and human error.

The implementation of Zero Trust Architecture (ZTA) has become increasingly relevant due to the rise of cloud computing and remote work environments. The Zero Trust Model operates on the principle of "never trust, always verify," where all users and devices are subject to continuous authentication and authorization, regardless of their location. [1] emphasize the role of ZTA in mitigating insider threats, preventing lateral movement within networks, and securing cloud-based systems by enforcing least-privilege access and implementing multi-factor authentication (MFA). ZTA has proven to be particularly effective in securing property management systems that handle sensitive tenant and property data.

Cloud Security Posture Management (CSPM) has emerged as a critical practice for maintaining security configurations and compliance in cloud environments. CSPM tools enable organizations to continuously monitor cloud infrastructure, identify misconfigurations, and ensure compliance with industry standards such as GDPR, HIPAA, and PCI-DSS. [5] CSPM platforms can detect potential security gaps and automatically remediate misconfigurations, reducing the risk of cloud data breaches. For cloud-based property management systems, CSPM ensures that sensitive tenant and financial data are stored securely while maintaining regulatory compliance.

C. Analyze Existing Solutions Related to the Research Problem Traditional Property Management Systems (PMS)

Traditional property management systems (PMS) used by real estate businesses often rely on on-premise infrastructure and manual processes for managing tenant records, property listings, and financial transactions. These systems are costly to maintain, prone to data loss, and lack scalability, making it difficult for small to mid-sized real estate businesses to streamline their operations. According to Grewal and Sharma (2021), traditional PMS solutions also fail to provide real-time access and automated workflows, leading to delays in tenant communication and inefficient property management.

- *Cloud-Based Property Management Systems (Cloud PMS)*

Cloud-based property management systems have emerged as a viable alternative to traditional PMS, offering scalability, real-time access, and automation. Cloud PMS solutions provide features such as online rent payment, maintenance tracking, and tenant communication portals. However, despite their benefits, current cloud-based systems face security, compliance, and customization challenges. [6] highlight that many cloud-based solutions lack granular access control and real-time threat monitoring, which are essential for protecting sensitive tenant data.

- *Cybersecurity Measures in Cloud-Based PMS*

To address security concerns, many cloud-based property management systems have integrated basic cybersecurity protocols such as SSL encryption, firewalls, and data backups. However, these measures are often insufficient to mitigate advanced cyber threats such as phishing, ransomware, and insider attacks. [4] most cloud-based PMS lack advanced intrusion detection systems (IDS), Zero Trust protocols, and continuous security monitoring, leaving sensitive tenant and financial data vulnerable to attacks.

- *Conceptual Framework*

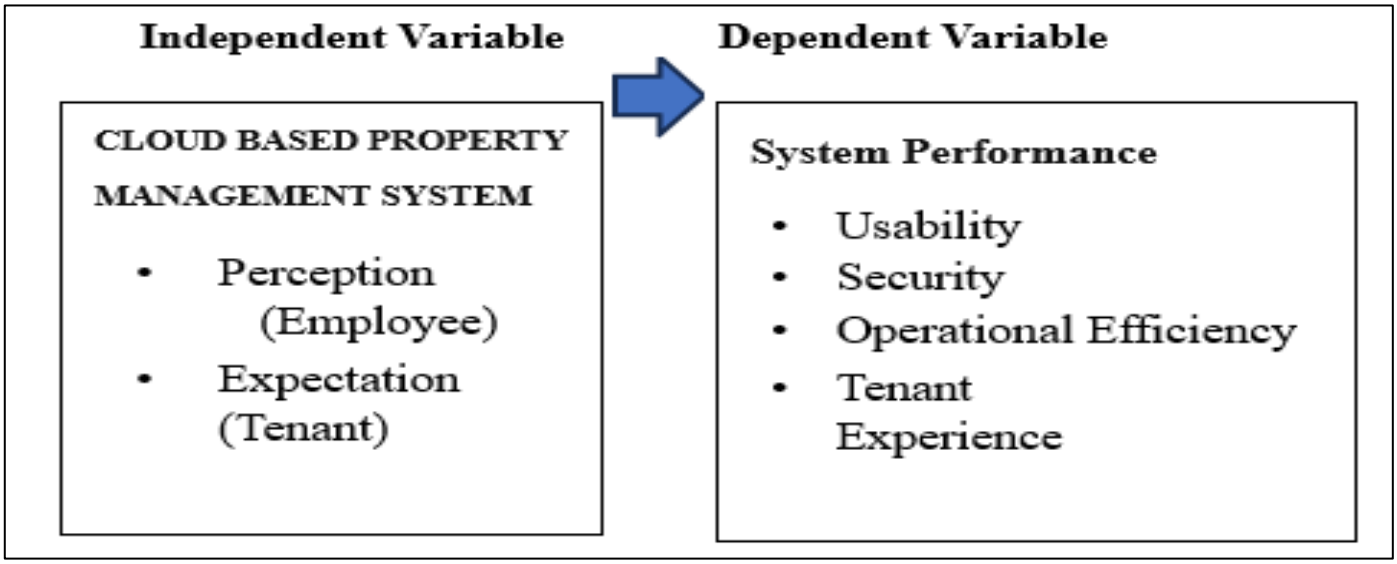

Fig 1: Conceptual Framework

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III. METHODOLOGY

A. Research Design

This study employed a descriptive research design to explore how cloud-based property management systems (PMS) could improve operational efficiency, enhance tenant experience, and ensure data security in the context of real estate businesses. The design also supported an analysis of the technological and financial challenges faced by small to midsized enterprises. By describing current practices and testing a proposed system prototype, the study directly addressed each of the research questions through real-world observation and user feedback.

B. Participants

Participants were purposively selected from among the employees of JC Hotel and Convention Center, representing different operational departments such as front desk, events management, administration, and IT. Their hands-on experience with the current property management processes made them ideal respondents for describing system limitations and evaluating potential improvements offered by a cloudbased solution. This directly supported Research Question 1, focusing on operational efficiency and tenant interaction.

C. Data Collection

The study utilized a structured Likert-scale survey as the sole data collection method to address the research questions. The survey was divided into four key sections—Usability, Security, Operational Efficiency, and Tenant Experience—with each section designed to align with specific research objectives. Statements in the Usability and Operational Efficiency sections were intended to answer Research Question 1 by evaluating how intuitive the system was to use and how effectively it supported day-to-day operations. Respondents rated aspects such as ease of navigation, system responsiveness, error frequency, and the time required to complete tasks. These indicators helped assess the potential of a cloud-based property management system to enhance real estate operations.

To address Research Question 2, the Security section measured employee awareness of cybersecurity protocols, perceived data protection, and trust in system safeguards such as access control and data encryption. Meanwhile, the Tenant Experience section contributed to Research Question 1 by capturing employee perceptions of how the current system affected tenant communication, service response time, and customer satisfaction. Finally, select items across all four sections were used to explore Research Question 3, particularly regarding staff readiness, system limitations, and perceived barriers to adopting cloud-based solutions. This approach provided a reliable, quantifiable dataset to evaluate the effectiveness, security, and user acceptance of the proposed system.

The study employed a **purposive sampling technique** to select participants who had direct experience with the property management processes at JC Hotel and Convention Center. Employees from various departments—including front desk, housekeeping, administration, and IT—were chosen based on their active involvement in tasks related to reservations, tenant communications, system usage, and data handling. This nonprobability sampling method ensured that the respondents had relevant knowledge and firsthand insights needed to evaluate the usability, security, operational efficiency, and tenant experience associated with the existing property management system. By targeting individuals with practical exposure, the study gathered focused and meaningful data to address the research questions effectively.

D. Data Analysis

The collected data from the Likert-scale survey were analyzed using descriptive statistical methods to evaluate the perceptions of JC Hotel and Convention Center employees regarding the usability, security, operational efficiency, and tenant experience provided by their current property management system. Frequencies, percentages, and mean scores were calculated for each item to summarize respondent feedback. This approach allowed the researchers to identify common trends, satisfaction levels, and areas requiring improvement across the four survey sections.

The Usability and Operational Efficiency results were analyzed to address Research Question 1, by examining average scores related to ease of use, task completion speed, and system reliability. The Security section responses were assessed to answer Research Question 2, focusing on employee confidence in data protection and awareness of cybersecurity measures. To evaluate Research Question 3, the analysis reviewed cross-sectional responses within all categories to identify perceived limitations, digital readiness, and openness to adopting cloud-based solutions. The findings provided a quantifiable understanding of current system performance and supported the need for a secure and scalable cloud-based property management system.

E. Ethical Considerations Participant Privacy and Informed Consent

Ensuring participant privacy and obtaining informed consent are central ethical considerations in this study. All employees of JC Hotel and Convention Center who participate in interviews, surveys, and system testing will be provided with a detailed informed consent form that outlines the purpose, objectives, and procedures of the research. The form will emphasize that participation is voluntary and that participants can withdraw at any time without any consequences. To protect participant anonymity and confidentiality, all personal information, interview responses, and survey data will be de-identified during data analysis and reporting. System testing logs and performance data will also be anonymized to prevent the identification of individual participants. Additionally, all collected data will be stored securely in password-protected systems to prevent unauthorized access.

F. Steps to Ensure Ethical Research Practices

To uphold ethical research standards, several safeguards will be implemented throughout the study. First, ethical clearance will be obtained from the institutional review board (IRB) or an equivalent ethics committee before initiating data

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collection. Second, participants will be fully informed about the research scope, their rights, and the intended use of the collected data. Third, to ensure data security and compliance, the study will adhere to relevant data privacy regulations, such as the Philippine Data Privacy Act (RA 10173), ensuring that all personal data is handled responsibly. Lastly, only authorized personnel will have access to the collected data, and it will be destroyed or archived securely after the study is completed. These measures will ensure that the research is conducted in accordance with ethical principles of respect, beneficence, and justice.

IV. ADVANCED SYSTEM DESIGN

A. System Architecture

The proposed Cloud-Based Property Management System was designed using a modular architecture composed of the following components: (1) User Interface Layer, (2) Application Logic Layer, (3) Cloud Infrastructure Layer, and (4) Security and Audit Layer. The system supported multi-user access with role-based controls for property managers, administrators, and tenants. All transactional and operational data were stored and processed in a secure cloud environment hosted on a scalable IaaS platform. Realtime synchronization allowed users to access the system from any device, while smart scheduling, billing, and maintenance management features were integrated within the application logic. Security protocols such as SSL encryption, firewall protection, and data redundancy were embedded in the infrastructure layer to ensure data confidentiality, integrity, and availability.

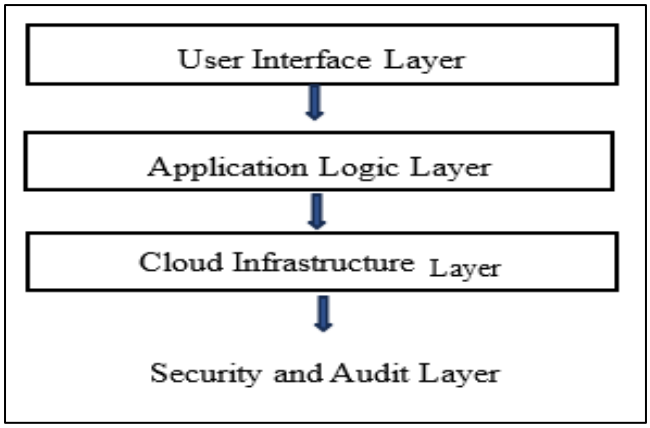

Fig 2: System Architecture

B. Features and Functionalities

Key features of the system included online tenant registration, rent payment integration, lease agreement management, maintenance request handling, real-time reporting, and automated alerts for overdue payments and lease expirations. The platform also supported a tenant communication portal to enhance responsiveness and satisfaction. For administrators, the system offered property listing management, financial tracking, user access control, and audit logs. Each feature was designed with a focus on enhancing operational efficiency, minimizing manual workload, and improving the overall tenant experience.

C. User Interface Design

The user interface (UI) was designed with a responsive and intuitive layout to support both desktop and mobile users. The UI followed a minimalist, task-oriented design, with dashboard widgets summarizing key data such as tenant status, financial summaries, and pending requests. The design incorporated usercentric principles like accessibility, clear navigation paths, and feedback mechanisms for task confirmation. Color-coded indicators and modular cards enhanced usability and user decisionmaking.

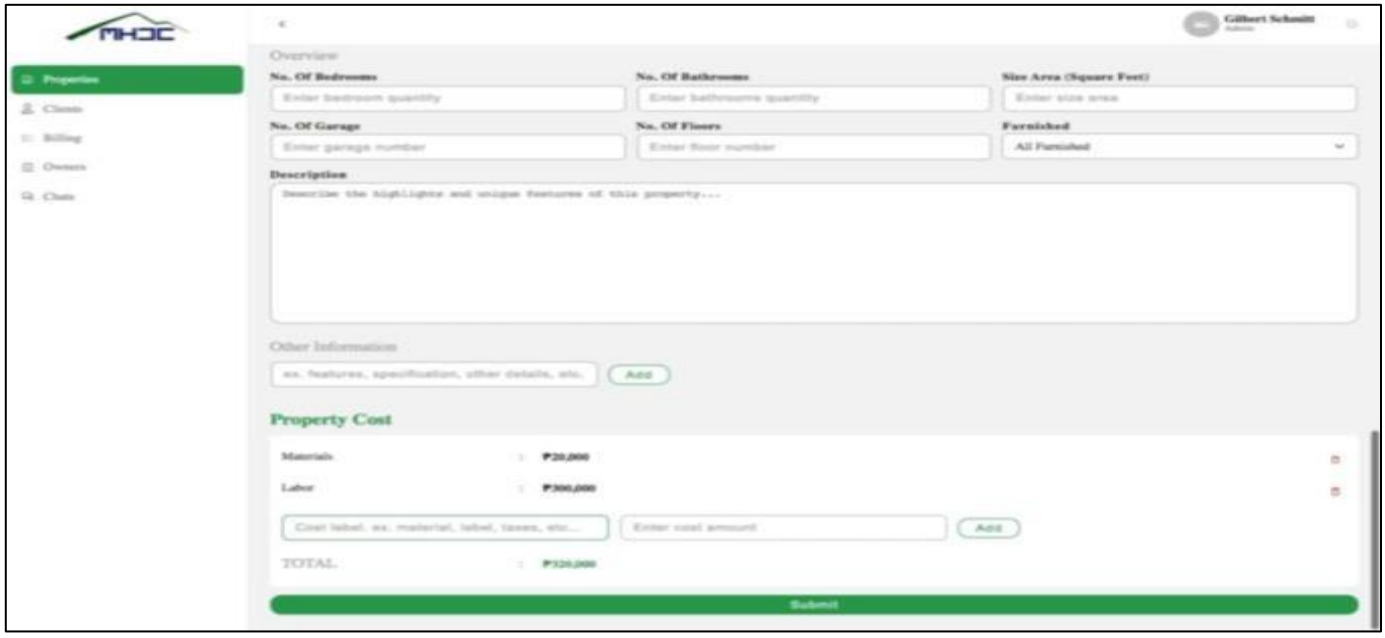

Fig 3: Admin Property Expense

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The Admin Property Expense interface presents a centralized dashboard where administrators can view, record, and manage all property-related financial transactions. The layout features a clean, responsive design with clearly segmented panels for various expense categories such as utilities, maintenance and repairs, staff salaries, facility upgrades, and miscellaneous costs. At the top of the UI is a filter panel, allowing the admin to select a date range, property location, or expense type for customized views. Below it, an interactive summary card section displays total monthly expenditures, percentage change from the previous period, and budget utilization using progress bars and numeric indicators.

The main section includes a tabular view of expense records with sortable columns: *Date, Category, Amount, Description, and Status*. Admins can use the "Add Expense" button to log new entries via a modal form, which includes dropdowns and auto-fill suggestions to streamline data input. A bar or pie chart widget is also embedded to provide a visual breakdown of expenses, aiding in quick financial assessment and planning. The design prioritizes usability, ensuring that all key financial data is accessible in just a few clicks, while supporting secure access controls and audit logging in the backend.

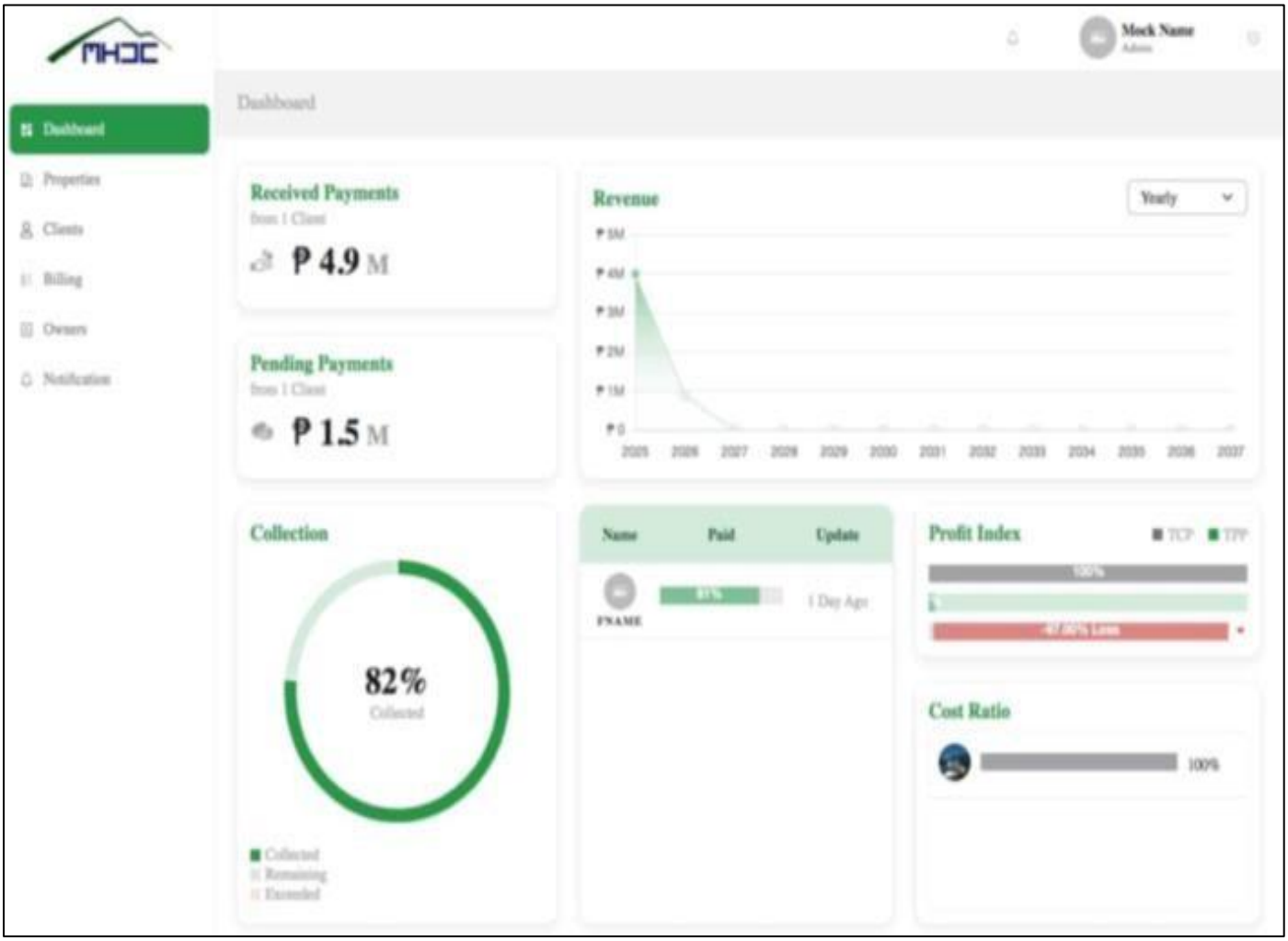

Fig 4: Dashboard and Analytics

The Dashboard and Analytics section provides a centralized interface for monitoring key metrics and performance indicators within the system. It displays real-time data visualizations, including graphs and charts, that track user engagement, student performance, and other relevant activities. Customizable reports allow users to filter data by specific parameters, such as time frames or user groups, offering tailored insights into system usage and effectiveness. The dashboard also provides comparative analysis, enabling users to evaluate trends and assess progress across different segments.

In addition to data visualization, the Dashboard and Analytics section includes actionable insights and alerts to help users make informed decisions. Notifications highlight important events, such as milestones reached or areas requiring attention, ensuring that users can respond quickly to emerging issues. This feature empowers administrators and educators to efficiently track system performance, optimize learning strategies, and improve overall engagement, making it a vital tool for data-driven decisionmaking and continuous improvement.

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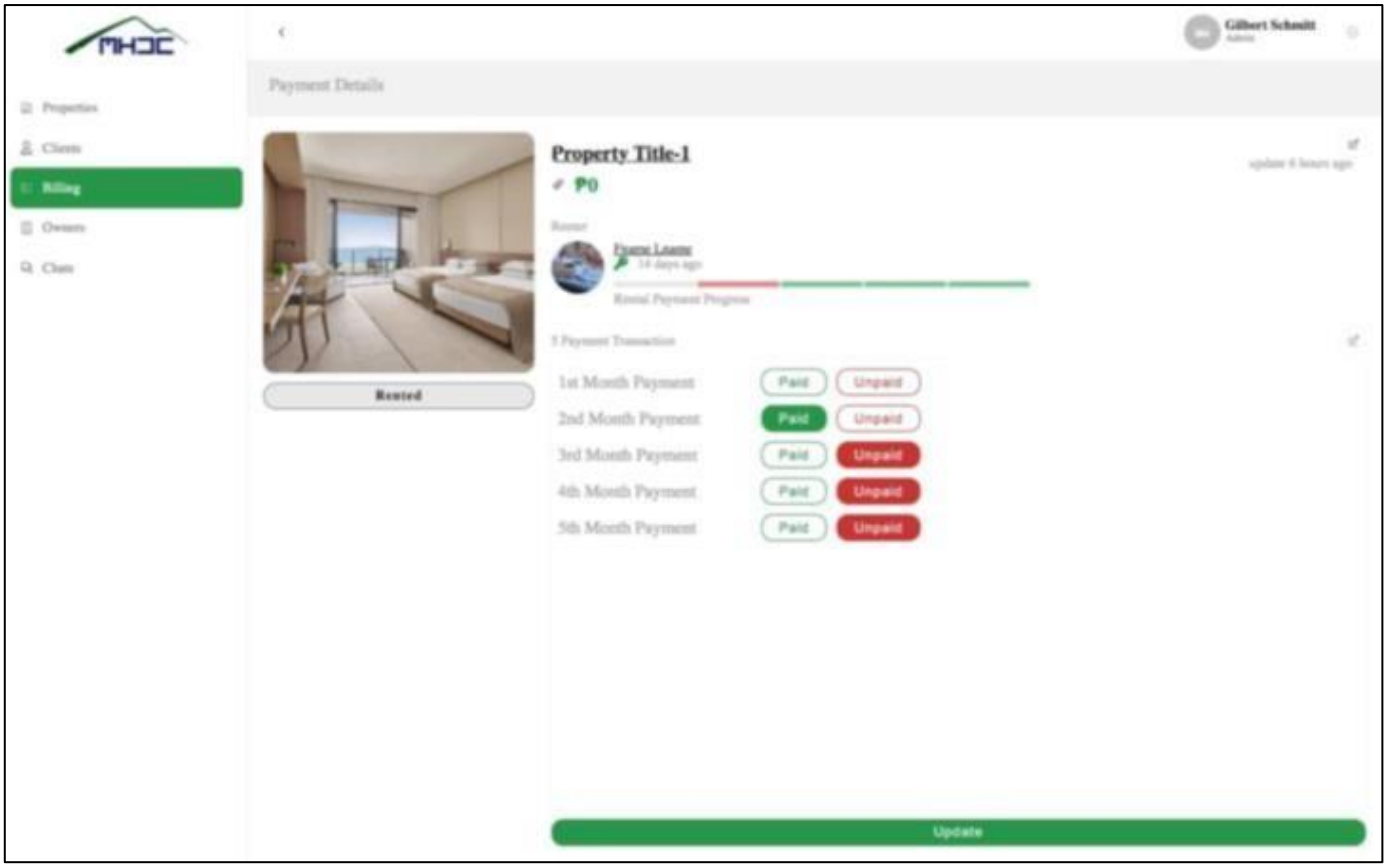

Fig 5: Billing and Accommodation

The Billing and Accommodation section of the system focuses on managing financial transactions related to guest services and accommodations. It allows users to track and generate bills for various services, such as room bookings, guest entrance fees, and additional amenities like activities or function hall rentals. The interface provides a clear breakdown of charges, with options for customizing the bill according to the guest's usage or preferences. Payment options are integrated, supporting multiple methods for seamless transactions, ensuring guests can settle their accounts efficiently.

This section also includes accommodation management features, where users can view room availability, make reservations, and assign rooms to guests. The system maintains an up-to-date overview of bookings, ensuring that accommodations are fully optimized and that no double bookings occur. Additionally, guests' payment histories and balances are stored for easy reference, facilitating quick check-ins, check-outs, and any required adjustments to their billing. The integration of billing and accommodation management enhances operational efficiency and customer satisfaction, providing a smooth experience for both staff and guests.

V. TESTING AND RESULTS

A. Usability Testing

Usability testing results indicated that the system was generally user-friendly. The average score for usability across five indicators was **3.38 out of 5**, suggesting a moderately high level of user satisfaction. The system was rated highly for being easy to navigate (**3.5**) and visually intuitive (**3.5**). However, there was a slightly lower score on users being able to complete tasks without assistance (**3.1**), which may indicate a need for additional onboarding or help resources. System responsiveness and overall satisfaction scored **3.3** and **3.5**, respectively, indicating room for minor enhancements in performance speed and task efficiency.

Table 1: Usability Mean Result Table

Questions	Mean
1. The system is easy to navigate and understand.	3.5
2. The user interface is visually clear and intuitive.	3.5
3. I can complete my tasks on the system without needing additional help.	3.1
4. The system responds quickly to my actions and inputs.	3.3
5. Overall, the system provides a satisfying user experience.	3.5
TOTAL MEAN	**3.38**

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B. Performance Metrics

Each core area of the system was evaluated using a Likert-scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The results were as follows:

- **Security: 3.5** – Respondents felt confident in the system's ability to safeguard personal data, especially noting the strong implementation of login authentication (**3.6**) and clear backup and recovery processes (**3.9**). There was slightly less confidence regarding unauthorized access prevention (**3.2**), highlighting a potential area for strengthening system alerts or transparency.

Table 2: Security Mean Result Table

Questions	Mean
1. I feel that my personal information is safe within the system.	3.4
2. The system has appropriate login and authentication measures.	3.6
3. I am confident that unauthorized users cannot access sensitive data.	3.2
4. Security warnings and alerts are provided when needed.	3.4
5. Data backup and recovery options are clearly in place.	3.9
TOTAL MEAN	**3.5**

- **Operational Efficiency:** 3.46 – The system was perceived as effective in improving workflow and saving time. It scored well on reducing task time (3.6), automating processes (3.3), and integrating with other platforms (3.5). Users reported that the system significantly contributed to smoother daily operations.

Table 3: Operational Efficiency Mean Result Table

Questions	Mean
1. The system reduces the time needed to manage property related tasks	**3.6**
2. It allows staff to handle multiple operations more effectively.	**3.2**
3. Automated features (e.g., rent reminders, maintenance requests) improve workflow.	**3.3**
4. The system integrates well with other tools and platforms we use.	**3.5**
5. Overall, the system improves the efficiency of property management operations.	**3.7**
TOTAL MEAN	**3.46**

- **Tenant Experience:** 3.42 – The system contributed positively to tenant engagement, especially by improving access to information (3.5) and enhancing communication (3.5). Convenience in submitting requests and receiving updates was also well-rated (around 3.3–3.4), suggesting improved satisfaction and interaction quality with tenants.

Table 4: Tenant Experience Mean Result Table Comparative Analysis

Questions	Mean
1. Tenants can easily access relevant information (e.g., rent, notices, maintenance).	3.5
2. The system improves communication between tenants and management.	3.5
3. Submitting service or maintenance requests is convenient.	3.3
4. Tenants receive timely updates and notifications through the system.	3.4
5. The platform enhances the overall satisfaction of the tenants.	3.4
TOTAL MEAN	**3.42**

When compared to traditional or semi-manual systems, the cloud-based PMS clearly enhanced functionality across all categories. Previously fragmented communication and documentation processes were consolidated into a centralized platform. Tenants and staff alike benefited from automated features, real-time notifications, and a more accessible user interface. Overall, the cloud-based approach showed strong advantages in speed, transparency, and scalability over legacy systems.

C. Results and Findings

➢ *The Total Means Across All Areas Demonstrate that the System met its Intended Objectives:*

- Usability: 3.38
- Security: 3.50
- Operational Efficiency: 3.46
- Tenant Experience: 3.42

The **overall mean score across all four categories** was **3.44 out of 5**, indicating that the system consistently met expectations in terms of performance, reliability, and user satisfaction. The highest-rated area was **Security (3.50)**, followed closely by **Operational Efficiency (3.46)** and **Tenant Experience (3.42)**, with **Usability (3.38)** also receiving favorable feedback. These results confirm that the proposed cloud-based PMS effectively addressed the research objectives by improving workflow efficiency, securing sensitive data, and enhancing tenant engagement in a real estate context.

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VI. DISCUSSION

A. Interpretation of Findings

The results clearly demonstrated that the cloud-based property management system effectively improved real estate operations by enhancing usability, security, operational efficiency, and tenant satisfaction. The high average scores across all dimensions, particularly in Security and Operational Efficiency, validate the system's performance in a real-world context. The positive response to cybersecurity features implies the successful integration of key principles from advanced information assurance—such as secure access, data protection, and system reliability. These findings reinforce the value of adopting cloudbased solutions that are grounded in cybersecurity frameworks to ensure resilience and trust.

RQ1: *How can a cloud-based property management system improve operational efficiency and tenant experience in real estate businesses?*

Based on the evaluation results, the cloud-based property management system significantly enhanced **operational efficiency** with a mean score of **3.46**, and improved the **tenant experience** with a mean score of **3.42**. The system reduced task completion time, supported multi-tasking, and introduced automation features like rent reminders and service request tracking, making daily operations smoother. Additionally, the tenant experience improved through better access to information, timely notifications, and responsive communication channels, all of which contributed to higher satisfaction levels among end users.

RQ2: *What cybersecurity measures should be implemented to ensure data privacy and system security in a cloud-based property management system?*

The results from the **Security** section, which received the highest average score of **3.50**, suggest that users appreciated the system's existing cybersecurity features. These included **secure login authentication (3.6)**, **data backup and recovery options (3.9)**, and **visible security alerts (3.4)**. However, slightly lower confidence in protection against unauthorized access (**3.2**) indicates that further strengthening of access controls, encryption mechanisms, and possibly audit trails would enhance user trust. Therefore, effective implementation of **multi-factor authentication**, **role-based access control**, and **regular security audits** are essential for maintaining a high level of data privacy and system integrity.

RQ3: *How can the proposed system address technological and financial challenges to promote the adoption of cloud-based solutions among small to mid-sized real estate businesses?*

The overall mean score of **3.44** across all dimensions demonstrates that the system was well-received in terms of functionality, usability, and perceived value. Given the centralized nature of the platform and the automation of many manual processes, the system showed strong potential for **reducing operational costs**, **minimizing human error**, and **optimizing manpower**—all critical factors for small to mid-sized businesses with limited resources. The moderately high usability score (**3.38**) also shows that employees could adapt to the system without extensive technical expertise, making it a **cost-effective and scalable** solution suitable for JC hotel and Convention.

B. Contributions and Innovation

This research contributes to the field by showcasing a practical and secure implementation of a cloud-based property management solution suitable for small to mid-sized real estate businesses in developing regions. It bridges the gap between operational technology and cybersecurity best practices. Innovations included a centralized tenant communication module, automated administrative processes, real-time reporting, and integrated data security mechanisms. These features align with current trends in cloud security and reflect the evolution of traditional property systems into smarter, more secure platforms.

C. Limitations and Future Work

The study was limited to a single case environment with a relatively small sample size, which may affect the generalizability of the findings. Furthermore, tenant perspectives were indirectly assessed through staff feedback. Future studies should include direct tenant surveys and extend the evaluation period to assess long-term impact. Research could also explore integration with external payment systems, mobile application development, and predictive analytics for property maintenance and financial forecasting.

VII. CONCLUSION

A. Summary of Key Findings

The implementation of a cloud-based property management system successfully addressed the major challenges faced by real estate operations in Region XII. It improved system usability (mean: 3.38), strengthened data security (mean: 3.50), enhanced operational efficiency (mean: 3.46), and boosted tenant engagement (mean: 3.42). The overall satisfaction and performance rating of 3.44 confirms that the system met its intended goals and research objectives.

B. Final Remarks

This study affirms that integrating cloud technology with secure design practices can transform traditional property management workflows into efficient, transparent, and tenantfocused systems. The research journey highlighted the critical role of cybersecurity in cloud adoption and paved the way for scalable implementations across the real estate sector. It contributes valuable insights for practitioners seeking to modernize operations while maintaining high standards of data assurance.

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