

Property Management Software (PMS) Application Effect Toward Property Management Operation in Johor Bahru

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Abstract

Recent technological advances have notably changed property management. Johor Bahru's vibrant real estate scene offers an excellent backdrop to explore how Property Management Software (PMS) applications impact operational efficiency and efficacy. However, the specific landscape of PMS usage in Johor Bahru is largely unexplored, lacking essential information about software availability. This knowledge gap poses risks, as the absence of a clear understanding of PMS benefits, drawbacks, and best practices exposes companies to potential inefficiencies, decreased tenant satisfaction, and financial losses. The study aims to examine current property management software practice and to investigate the property management software application effect toward property management operation in Johor Bahru. The qualitative method was used through semi-structured interview with property management professionals and analysing the data using content analysis. The result shows that the current property management software align with PropTech 4.0 yet lacks full integration of emerging tech such as blockchain and 3D scanning. However, it notably boosts operational efficiency, reduce costs, and enhances tenant experience, fostering better integration and collaboration. This emphasizes the need for adapting property management software to emerging technologies, offering valuable insights for Johor Bahru professionals and stakeholders.

1. Introduction

As the twenty-first century progressed, the world became truly digital with the introduction of the internet and connected technologies (Talmatchi, 2020). Real estate has been targeted for digital transformation. In the era of smart sustainable development and growth, companies are interested in solutions that allow processes, machines, workers, even products and the service itself, to be integrated into a single integrated network for data collection, data analysis, company development evaluation, and performance improvement (Siniak, 2020). The realm of property management also has undergone significant transformations in recent years, spurred by technological advancements and the integration of sophisticated tools. In this context, Johor Bahru, with its dynamic real estate environment, stands as a compelling backdrop for investigating the impact of Property Management Software (PMS) applications on operational efficiency and overall efficacy.

The Property Management Software (PMS) can be categorized as a form of PropTech, where "PropTech" refers to the integration of technology solutions within the real estate and property management sector. In

essence, the Property Management System, being a digital platform designed to streamline and optimize property-related operations, aligns with the broader PropTech trend that leverages technology to enhance efficiency and effectiveness in property management practices. PropTech is changing how commercial property management professionals conduct business. For example, “i-Neighbour” is a property management software and tools that are designed to automate building management tasks like collecting rent, managing requests for maintenance, and lease management. These software solutions may significantly decrease administrative workload while also providing real-time updates to both property managers and tenants (Institute,2023).

1.1 Research Background

At the start of the 20th century, the living conditions for those residing in tenement housing were exceedingly challenging. These dilapidated structures lacked proper ventilation, suffered from inadequate plumbing, insufficient lighting, and lacked essential safety measures for fire and construction hazards. During this era, apartment management was primarily in the hands of owners who often neglected anything beyond the most essential repairs. The absence of oversight meant that tenants had limited choices and minimal protection, fostering a human rights issue within our cities.

In the first decade of the 20th century witnessed a surge in industrialization and a mass migration to urban centres. This influx of people created an unprecedented demand for housing, leading to a stark imbalance with the limited supply available. Working-class families found themselves paying exorbitant amounts to live in subpar conditions. Recognizing this issue, the federal government initiated the first widespread crackdown on negligent property owners. As a result, the early decades of the 20th century marked a turning point. The quality of apartments improved, and modern multifamily buildings began to emerge. This era witnessed a significant improvement in living conditions for the general population, a historic shift that brought about increased income, improved health, longer lifespans, and the implementation of more stringent laws governing the quality and maintenance of rental properties.

1.2 Problem Statements

Johor Bahru, Malaysia, is currently experiencing a surge in urban development and an increasing demand for quality housing. Thus, the current property management sector in Johor Bahru is witnessing an increasing reliance on property management software. This has created a dynamic environment for property management companies, necessitating efficient operations and elevated resident experiences. However, the specific landscape of property management software (PMS) usage in Johor Bahru remains largely unexplored. Dixon et al. (1993) noted that the selection of property management software faces challenges due to a lack of information about software availability, impeding companies' ability to identify and adopt the most effective PMS solutions for their specific needs.

This knowledge gap makes property management companies fear in choosing the wrong platform (Williams, 2022). This can lead to analysis paralysis (Williams, 2022). . While according to Raffaelli (2023), the adoption of property management software faces formidable challenges, prominently centred around the fear of change. The fear of change poses a substantial barrier as property managers may be apprehensive about potential disruptions to established routines and processes (Williams, 2022; Raffaelli, 2023). Property managers may feel overwhelmed by the multitude of software options, unsure about which one aligns best with their needs (Raffaelli, 2023). Encouraging property managers to adopt a patient yet decisive approach helps them navigate through the options, select a suitable platform, and commit to a software solution that enhances their property management operations.

Next, according to Williams (2022), technical complexity stands as another hurdle, as property managers and their teams may fear the learning curve associated with adopting new software. Moreover, according to Raffaelli (2023), the lack of technical expertise among property managers, primarily focused on property management rather than software coding, creates a formidable obstacle, leading to hesitancy in adopting property management software due to concerns about understanding, effective utilization, ongoing technical support needs, and the associated costs of hiring or training staff with technical expertise. These concerns vary based on the overall technological competence of the team members. To overcome this fear, collaboration with implementation teams and leveraging the expertise of platform professionals becomes crucial. This not only eases the transition but also ensures that the property management team feels comfortable and competent in navigating the new digital environment.

1.3 Research Questions

- What are the current property management software practice among property management companies in Johor Bahru?
- What are the property management application effect toward property management operation in Johor Bahru?

1.4 Research Objectives

- To study current property management software practice among property management companies in Johor Bahru.
- To investigate the property management software application effect toward property management operation in Johor Bahru.

1.5 Scope of the Study

- Research is conducted on the property management professionals in Johor Bahru.
- Research is focus on the property management software application effect toward property management operation in Johor Bahru.
- It is not attempted to change the property management software practice but to assess the property management application effect toward property management operation in Johor Bahru.

1.6 Significance of the study

Research on property management software in Johor Bahru is groundbreaking, addressing a significant knowledge gap. For academics, it enriches literature by delving into local PMS practices. Private companies, especially property management firms, can enhance efficiency and resident satisfaction through insights gained. Benchmarking against findings enables workflow improvements, cost reduction, and informed software decisions. Early adopters gain a competitive edge, solidifying their leadership. The research also appeals to investors, shedding light on the growing potential of property management technology in Johor Bahru, potentially attracting investment for innovative, region-specific PMS solutions. Finally, the study holds implications for regulators and stakeholders concerned with sustainable development. Insights into the ability of PMS to improve operational efficiency and resource utilization can contribute to crafting environmentally conscious policies and regulations within the property management sector. By promoting the adoption of technology that fosters sustainability, this research can play a valuable role in shaping a greener future for Johor Bahru.

2. Literature Review

2.1 Evolution of PropTech

All With the introduction of the first personal portable computers in the 1980s, the digital transformation of real estate began a long time ago. Since then, there have been four waves of evolution in PropTech. Midway through the 1980s, PropTech 1.0 began to emerge, and it continued through the early 2000s. The most important piece of technology that changed real estate practice is Excel, which has evolved into a vital tool for data organization and analysis (Baum, 2017). Software like Argus, and CoStar that offers solutions for the management and analysis of commercial real estate investments is also referred to as PropTech 1.0 (Snow, 2023). These technologies are typically regarded as closed-form enterprise services that frequently require extensive and costly client customization.

The rise of the online residential market sector in the early 2000s marked the beginning of the shift from PropTech 1.0 to PropTech 2.0. PropTech 2.0 was driven by the widespread use of Wi-Fi, 3G telephony, and personal mobile devices like phones and tablets to access the internet. PropTech 2.0 includes the distribution of information through digital platforms like Zoopla in the UK and Trulia in the US, which are currently market leaders and are followed by a large number of comparable platforms around the world (Snow, W. , 2023). Open-source software, social networking, and e-commerce are the three main technologies of PropTech 2.0 (Snow, 2023).

According to Snow, (2023), with the introduction of the iPhone in 2007, the CRE technology industry entered a new era of mobile computing. This change enabled us to easily access the innovations introduced by PropTech 1.0 and 2.0 via our smartphones. PropTech 3.0 placed a strong emphasis on the value of the user experience because it understood that it was just as important as the underlying technology (Snow, 2023). Interfaces improved as a result, becoming more intelligent, collaborative, and social. Simultaneously, investors and PropTech startups shifted their attention from established on-premises software to newly emerging Software as a Service (SaaS) business models (Wes Snow, 2023). In this model, applications were hosted by cloud service providers and made online accessible to users (Snow, 2023).

Now, blockchain, artificial intelligence (AI), the internet of things (IoT), cloud computing, drones and 3D scanning, virtual reality (VR), and augmented reality (AR) are among the disruptive technologies associated with PropTech 4.0 (Baum, 2017; JLL, 2018; Shaw, 2018; Ullah et al., 2018; Snow, 2023). In order to optimize current structures and reduce costs, a new fourth wave of PropTech is set to disrupt the real estate industry. The property industry is experiencing significant changes in a variety of areas, from planning and construction to the sale and purchase of property, due to all these successive waves of innovation and capital supporting PropTech.

Table 1 Evolution of PropTech indicator
(Source: Baum, 2017; JLL, 2018; Shaw, 2018; Ullah et al., 2018; Snow, 2023)

PropTech Level	Item
1.0	<ul style="list-style-type: none"> ● Excel ● Software
2.0	<ul style="list-style-type: none"> ● Wi-Fi ● 3G telephony ● Personal mobile devices ● Distribution of information through digital platforms ● Open-source software ● Social Networking ● E-commerce
3.0	<ul style="list-style-type: none"> ● Software as a Service (SaaS)
4.0	<ul style="list-style-type: none"> ● Blockchain ● Internet of Things (IoT) ● Cloud computing ● Drones ● 3D scanning ● Virtual Reality (VR) ● Augmented Reality (AR)

2.2 The Role and Responsibilities of Property Management Professionals

The field of property management plays a pivotal role in the real estate industry, serving as the linchpin between property owners and tenants. The responsibilities shouldered by property managers are diverse and multifaceted, covering aspects crucial for the seamless operation and optimization of real estate assets.

i. Tenant acquisition and management

One of the primary responsibilities of residential property management is tenant acquisition and management. Property managers advertise and market vacant properties, employing strategies to attract potential tenants (Miller, K. 2022). They conduct thorough tenant screenings, including background checks, credit assessments, and rental history verification, to ensure the selection of reliable occupants. Additionally, property managers are responsible for preparing and executing lease agreements and rental contracts, collecting rent payments, addressing tenant inquiries and complaints promptly, and conducting property inspections to assess tenant compliance.

ii. Property maintenance and repairs

Effective property management necessitates regular maintenance and repairs to preserve the condition and functionality of residential properties. Property managers oversee scheduled maintenance tasks and coordinate with contractors, repair technicians, and service providers to ensure that repairs are conducted promptly and efficiently. They also handle emergency repairs to safeguard tenant safety and protect the property from further damage. Implementing preventive maintenance measures is another crucial aspect of their role, helping to minimize potential issues and prolonging the lifespan of property assets. Property managers also employ cleaning staff or janitorial services to ensure the regular upkeep of shared spaces like lobbies, hallways, and parking areas. By maintaining cleanliness and sanitation standards, property managers enhance the overall appeal and liveability of the property.

iii. Financial management

Property managers are responsible for various financial aspects of residential property management. They determine rental rates by conducting market analysis to ensure competitive pricing. Additionally, property managers collect and manage security deposits, handle financial transactions such as rent collection, bill payments, and vendor invoices, and maintain financial records and reports (User, 2020). Budgeting and financial planning are integral parts of their responsibilities, helping property owners to make informed decisions about property-related expenses and maximize their returns on investment (User, 2020).

iv. Legal and regulatory compliance

Compliance with local, state, and federal laws and regulations is paramount in residential property management (Miller, 2022). Property managers stay updated on landlord-tenant laws and regulations, implementing necessary changes to ensure compliance (Miller, 2022). According to Miller, (2022) most property managers must hold a property management license or a real estate broker's license in order to conduct real estate transactions related to managing and leasing rental properties. They handle eviction processes and legal disputes when necessary, safeguarding the rights of both property owners and tenants (Home, 2023). Additionally, property managers maintain appropriate insurance coverage to protect the property from potential liabilities.

v. Property administration

Property administration is essential for the smooth operation of residential properties. Property managers maintain accurate records of leases, tenant information, and financial transactions, ensuring transparency and accountability. They handle property documentation, including contracts, leases, and legal agreements, and coordinate property inspections, repairs, and maintenance schedules. Additionally, property managers manage property-related correspondence, such as notices and communications with tenants, fostering effective communication and relationships with all stakeholders.

vi. Owner communication

Property managers act as intermediaries between property owners and tenants, facilitating effective communication. According to User (2020), the relationships formed between the manager and the landlord, and the manager and the tenants, are crucial in building expectations of both parties to the lease, seeing how both parties will expect and seek certain benefits and rights out of it. Property manager regularly update property owners on property performance, occupancy rates, and financial matters, providing detailed reports and recommendations. By keeping property owners informed, property managers enable them to make informed decisions and take necessary actions to optimize property investments.

2.3 Property Management Software (PMS)

In the dynamic realm of property management, technological advancements have paved the way for innovative solutions to streamline operations, enhance communication, and elevate the overall experience for property owners, residents, and managers. Here are some popular systems used by residential property managers, along with their strengths:

i. CSS

According to the CSS Strata Management Sdn Bhd., CSS offers a comprehensive suite of products tailored for efficient property management. In the realm of financial accounting, CSS provides solutions for general ledger management, financial statements, accounts receivable and payable, cash book, bank reconciliation, profit and loss statements, balance sheets, fixed assets, budget planning, sinking fund calculations, and service charge budgeting. Additionally, CSS addresses task management needs with features like work order assignment, maintenance reports, task alerts, and customer service entries related to defects management, property occupant information, dynamic task types, severity and priority levels, task distribution, multiple assignees and observers, file and picture attachments, and task action history.

The CSS Smart Office App extends these capabilities to smartphones, facilitating work order management, customer service, purchase approval, leave submission and approval, payment collection, cash and bank transactions, sales invoices, tenancy status monitoring, debt aging summaries, and account payable summaries. The "Klik"-eCommunity cater to residents' needs, offering features such as announcements, statements and payments, bank-in slips, forms, visitor management, facilities booking, service requests, meeting minutes, by-laws, committee management, emergency contacts, SOS buttons, messages, notifications, and a marketplace. CSS ensures secure online payments through various channels like FPX, Mastercard, Visa, Shopee Pay, Touch 'n Go eWallet, and more.

For robust security measures, CSS introduces a visitor management system with embedded OCR modules, app screen lock, resident privacy protection, visitor reports, app notifications, QR scanning, contact lists, visitor management system logs, and panic button alerts. The security patrol module enables guard clocking, incident

report submissions, facility booking logs, and emergency contacts. CSS takes security a step further with an access card blocker system that seamlessly communicates with the latest defaulter list from the CSS credit control system. This ensures real-time access card unlocking for residents upon payment confirmation.

ii. Condo Master

According to Comet Catcher Sdn Bhd., Condo Master serves as a comprehensive operational platform with a focus on efficient data management in various crucial aspects. This includes overseeing units, owner contacts, tenants, car parks, and vehicles. The system's capabilities extend to handling essential operational tasks like managing issues, maintenance tasks, meter readings, renovations, and legal cases.

One noteworthy feature is its management of notices and documents, offering the convenience of e-notices via email and providing a platform for uploading minutes, reports, forms, and various other documents. This enhances communication and documentation within the community or property management setting. Condo Master goes beyond mere data management by incorporating features for equipment management. This includes maintaining an asset and equipment list, tracking repair cost history, and monitoring depreciation, contributing to efficient asset management.

The product's robust accounting capabilities further enhance its functionality, allowing users to manage expenses, handle billing processes, manage receipts, and generate comprehensive reports. This financial management aspect adds a layer of efficiency to the overall operational workflow. Moreover, Condo Master addresses resident needs by offering a dedicated access app. This app empowers residents to view crucial information such as bills, accounts, and make payments, thereby ensuring transparency and convenience for parcel owners. In essence, Condo Master is a versatile solution that integrates data management, operational efficiency, and financial control to streamline property and community management processes.

iii. iNeighbour

According to TimeTec Computing Sdn. Bhd., there is various iNeighbour products and each products play a crucial role in fostering efficient, secure and interconnected environments. Here are the products of iNeighbour. The iNeighbour Resident App serves as the central hub for residents, providing them with a seamless platform to access community information, connect with neighbors, and stay informed about upcoming events. This user-friendly mobile app bridges the communication gap within communities, fostering a sense of unity among residents.

Financial management is a pivotal aspect of property ownership, and iNeighbour addresses this with its i-Account Property Accounting feature. This product streamlines property accounting tasks, ensuring transparency and accuracy in financial transactions related to the property. Security is paramount in any community, and iNeighbour recognizes this through its Visitor Management and Guard Patrolling solutions. The Visitor Management system simplifies the process of registering and monitoring visitors, enhancing overall security. Meanwhile, Guard Patrolling enables security personnel to conduct efficient patrols, contributing to a safer living environment.

For managing parking and addressing resident concerns, iNeighbour offers the VP and Defect Management module. This feature efficiently handles visitor parking and ensures timely resolution of defects or issues reported by residents. In response to the evolving nature of residential arrangements, iNeighbour introduces the Short Stay Module, catering to the management of short-term stays or rentals within the community. This adaptive feature reflects the platform's commitment to accommodating diverse living scenarios.

The integration of technology is a key strength of iNeighbour. The Access Control & IoT feature leverages smart technology for access control while integrating with the Internet of Things (IoT) for enhanced security and automation. This synergy provides residents with advanced tools to manage and secure their living spaces. Residents seeking to embrace smart living will find value in the Smart Home feature, which empowers them to automate and control various aspects of their homes. This not only contributes to a more intelligent living environment but also aligns with the growing trend of smart home integration.

Efficient property and community management extend beyond residential spaces, and iNeighbour acknowledges this with products such as maintenance and workflow management, ensuring prompt resolution of issues, and the Attendance Management System, which monitors and enhances security by keeping track of individuals entering and exiting the community. For commercial spaces within communities, iNeighbour offers the i-Tower Commercial App and Commercial Parking Management, tailoring its solutions to the specific needs of businesses operating within the community. This inclusive approach underscores iNeighbour's commitment to catering to the diverse requirements of its user base.

Moreover, the Marketplace feature creates a dynamic platform for residents to engage in community commerce, fostering a vibrant ecosystem for the exchange of goods and services within the community. Finally, iNeighbour's scope extends to the management of entire townships or cities with its Smart Township/Cities solution. This comprehensive offering integrates various services, reflecting the platform's ambition to create cohesive and interconnected urban environments.

iv. JaGaSolution

According to Red Ideas Sdn. Bhd. (2023), the JaGaSolution product, known as JaGa app 2.0, acts as an integrated platform catering to security guards, residents, and management within a community. This platform provides a comprehensive suite of features, including a sophisticated Visitor Management System, facilitating efficient handling of guests and residents alike. Additionally, it incorporates an In-App Payment system, streamlining financial transactions and enhancing user convenience.

Furthermore, the JaGaCard Access Control & IoT component introduces a set of proprietary APIs (Application Programming Interfaces) specifically crafted to elevate access control capabilities. This results in improved control over visitors and residents within the community, enhancing overall security measures.

Another key element of JaGaSolution is JaGaRonda, a Security Management solution designed to boost the efficiency of security teams. Operating on a cloud-based infrastructure, JaGaRonda offers guard tracking and patrolling functionality. This cloud-based approach ensures accessibility and real-time monitoring, ultimately optimizing the security team's operations.

Lastly, Hey JaGa serves as a service marketplace, connecting users with service vendors. This feature is designed to alleviate concerns related to managing bookings and resources in real-time. By functioning as a dynamic platform, Hey JaGa aims to simplify the process of securing services that come directly to the user, providing a seamless and efficient experience for both users and service providers.

v. iResidenz

According to The Residenz Solution Sdn Bhd., the i-Residenz product is a comprehensive solution designed to cater to both Owners & Tenants and Property Management, offering a diverse array of features. For Owners & Tenants, the product facilitates profile management and the convenient viewing of notices, bills, useful contacts, picture albums, house rules, documents, and more. Users are empowered to engage actively through messaging, providing feedback, making payments, bookings, renovation applications, and other related activities.

On the Property Management side, i-Residenz provides a monitoring dashboard for overseeing various aspects. It includes messaging capabilities for disseminating general notices, private messages, and SMS messages. Property Management can efficiently handle feedback, bookings, renovations, picture albums, house rules, documents, and more through this platform. The system enables the viewing of online payments, creation of journal entries, and generation of comprehensive reports.

Additionally, i-Residenz incorporates a Visitor Management feature, streamlining the process of handling visitors. This includes functionality such as checking in new or registered visitors, viewing visitor logs, checking out visitors, viewing blacklisted visitors, and pre-registering visitors. Moreover, residents and visitors benefit from tap-to-call (intercom) functionality, enhancing communication within the community. In essence, i-Residenz is a multifaceted solution that brings together essential tools for seamless residential management and communication.

2.4 Property Management Software (PMS) Application Effect

There are several property management system application effects such as operational efficiency, cost reduction, enhanced tenant experience, integration, and collaboration:

i. Operational efficiency

Operational efficiency refers to the ability of an organization to utilize its resources effectively in order to maximize productivity and achieve desired outcomes. It involves streamlining processes, reducing waste, and optimizing resources to minimize costs and improve overall performance. Operational efficiency is a key focus for businesses across various industries as it directly impacts profitability, customer satisfaction, and competitive advantage.

Property management companies are increasingly seeking technological solutions to streamline their operations and improve efficiency. Property management software can automate routine tasks such as rent collection, maintenance scheduling, and communication, reducing manual workloads (Matellio, 2023). For example, Internet of Things (IoT) devices and sensors are used to collect data and optimize building operations.

ii. Cost reduction

Property Management Software can help property management companies reduce costs associated with manual processes, paperwork, and traditional property management methods. By implementing digital solutions, companies can minimize administrative expenses, optimize resource allocation, and improve overall cost-effectiveness (Graham, 2023).

This due to Property management system (PMS) platforms automate manual and repetitive tasks, reducing the need for human intervention and minimizing labor costs (Cancél, 2023). In addition, Property management system (PMS) tools optimize operational workflows, eliminating inefficiencies and reducing costs associated

with delays, errors, and redundancies. For example, by centralizing information and providing real-time access to stakeholders, Property Management Software improve communication, coordination, and decision-making, resulting in cost savings (Graham, 2023).

Lastly PMS facilitate faster and more transparent property transactions, reducing costs associated with traditional brokerage fees and legal paperwork. Block chain-based solutions also eliminate intermediaries, lowering transaction costs and increasing trust and security.

iii. Enhanced tenant experience

Providing a superior tenant experience is a key priority for property management companies. Property Management Software offer online tenant portals or mobile apps, allowing residents to conveniently access information, make maintenance requests, pay rent, and communicate with management (ProBro, 2023). This improves communication and customer service, leading to higher tenant satisfaction and retention rates.

For example, PMS platforms provide efficient and streamlined communication channels such as online portals, and others between tenants and property managers or owners. Thus, tenants can easily report maintenance issues, submit requests, or seek assistance. So, it can improve response times and ensures that tenant concerns are addressed promptly.

iv. Integration and collaboration

Property management software applications play a crucial role in fostering integration and collaboration among stakeholders in the real estate industry. These applications streamline communication, centralize data, and enhance coordination, leading to more efficient and collaborative property management practices. For example, a property management software may feature a centralized communication platform where property managers, tenants, maintenance staff, and other relevant parties can interact (StrategicERP Business Automation Solutions, 2023). This can include real-time messaging, announcement boards, or shared document repositories. This centralized communication hub facilitates quick and effective information exchange, promoting collaboration among different stakeholders (ArthurProperty, 2022).

Furthermore, integration capabilities within property management software enable seamless connectivity with other relevant tools and systems. For instance, integration with accounting software streamlines financial processes, while integration with maintenance management tools enhances the coordination of repair and maintenance tasks.

3. Methodology

This study employs a qualitative research methodology to answer the questions outlined in its objectives. This methodological approach ensures a systematic and organized investigation, facilitating the collection and analysis of primary data. The primary data in this study will be gathered through semi-structured interviews with three property management professionals.

The research flow in this study comprised three phases. In the first phase, a preliminary review was conducted to identify research problems, research objectives, and research scope. The second phase involved data collection for the study, focusing on achieving the first research objective: studying current property management software practices among property management companies in Johor Bahru. In the third phase, data collection continued, targeting the second research objective: investigating the property management software application's effect on property management operations in Johor Bahru.

During the second phase, the semi-structured interview method was employed to achieve the first research objective. These interviews, conducted with property management professionals in Johor Bahru, aimed to explore the effects of property management software (PMS) application on property management operations. Through these sessions, the researcher identified the current property management software (PMS) practices among property management companies in Johor Bahru.

In the third phase, the semi-structured interview method was again utilized to achieve the second research objective. These interviews, conducted with property management professionals in Johor Bahru, focused on variables such as operational efficiency, cost reduction, enhanced tenant experience, sustainability and energy efficiency, integration, and collaboration within the second objective. Through these sessions, the researcher identified how the property management software application impacted operational efficiency, cost reduction, enhanced tenant experience, sustainability and energy efficiency, integration, and collaboration in property management operations.

Table 2 Research methodology overview

Objectives	Research Method	Variables	Research Tools	Expected Outcome
To study current property management software practice among property management companies in Johor Bahru.	Qualitative (semi- structure interview with 3 property management professionals)	Property management software such as CSS, i-Neighbour, JaGaApp	Content Analysis	Can identify current property management software practice among property management companies in Johor Bahru according to evolution PropTech indicator.
To investigate the property management software application effect toward property management operation in Johor Bahru.		a) Operational Efficiency b) Cost Reduction c) Enhanced Tenant Experience d) Integration and Collaboration		Can determine whether the use of property management software can give effect toward operational efficiency, cost reduction, enhanced tenant experience, integration, and collaboration in Johor Bahru.

4. Result and Discussion

By This section analyses data from interviews, observations, and a literature review to fulfil the research objectives. The background holds utmost importance in gathering information for this study, ensuring that respondents are qualified and suitable to address the posed questions. Three property management professionals in the Johor Bahru area are involved in this research.

Table 3 Respondent background

Respondent	Position	Company Name	Experience
R1	building manager	Kensington Strata Management Sdn. Bhd.	2 years
R2	building manager	Dualtap Property Management Sdn. Bhd.	6 years
R3	acting senior associate director	SCM International Property Management Sdn. Bhd.	15 years

- a) Result Objective 1: To study current property management software practice among property management companies in Johor Bahru.

The data in Table 4 shows the property management software that currently used by R1, R2 and R3. R1 and R2 utilize CSS property management software while R3 is employs their own property management software, known as iSCM.

Table 4 Property management software that currently used by respondents

Respondent	Property Management Software Currently Used
R1	CSS
R2	CSS
R3	iSCM

Next, the data presented in table 5 are the results of research conducted for the first objective which is to study current property management software practice among property management companies in Johor Bahru. This table 5 illustrates that the existing property management software currently used is aligned with PropTech

4.0. However, it does not fully incorporate emerging technologies such as blockchain, 3D scanning, drones, augmented reality, and virtual reality.

According to respondents, they utilize 3D scanning and augmented reality to monitor the humidity of buildings at specific times, activities that are not currently incorporated into property management software. Moreover, respondent 2 indicated that blockchain has the potential to facilitate secure and transparent data sharing between landlords and tenants. However, these possibilities remain largely unexplored within the realm of property management software. Furthermore, this notion is supported by Marisa Brown et al. (2023), who stated that many of these technologies are still in early developmental stages, and their widespread adoption within established industries, such as property management, remains to be observed. For instance, the security and scalability of blockchain, though promising, are still undergoing real-world application testing.

Table 5 Analysis of interview data for the first objective

Current Property Management Software Practice	R1	R2	R3
Excel	/	/	/
Software	/	/	/
Wi-Fi	/	/	/
3G Telephony	/	/	/
Personal mobile devices	/	/	/
Distribution of information through digital platforms	/	/	/
Open-source software	/	/	/
Social Networking	/	/	/
E-commerce	/	/	/
Software as a service (SaaS)	/	/	/
Blockchain			
Internet of Things (IoT)	/	/	/
Cloud computing	/	/	/
Drones			
3D scanning			
Virtual Reality (VR)			
Augmented Reality (AR)			

b) Result Objective 2: To investigate the property management software application effect toward property management operation in Johor Bahru.

i. Operational Efficiency

By conducting interviews with three respondents, several themes emerged regarding how property management software contributes to operational efficiency. According to Table 6, all respondents agree that property management software impacts operational efficiency, as it streamlined process, provides real-time data and analytic, enhanced communication and collaboration, along with improved maintenance and asset management. This is supported by the fact that property management software can automate routine tasks, including tenant screening, rent collection, maintenance scheduling, and communication, thereby reducing manual workloads (Matellio, 2023).

Table 6: Property management software effect toward operational efficiency

No	Themes	R1	R2	R3
1.	Streamlined process	/	/	/
2.	Real time data & analytic	/	/	/
3.	Enhanced communication & collaboration	/	/	/
4.	Improved maintenance & asset management	/	/	/

ii. Cost Reduction

Next, for cost the highlighted key aspects such as optimizing the operation, reducing manual works and labour cost, improve resource allocation and operational expense such as printing. According to table 7, respondents R1, R2, and R3 unanimously agree that property management software application contributes to cost reduction by optimizing operations and decreasing manual work, thereby reducing labour costs and through reduce operational expense such as printing. This alignment is reinforced by Cancél (2023), who emphasized that property management software is specifically designed to alleviate the manual labour and paperwork traditionally associated with property management, ultimately contributing to cost savings. In addition, according to Michael (2019), property management software reduced the use of paper that can contribute to cost reduction.

Table 7 Property management software effect toward cost reduction

No	Themes	R1	R2	R3
1.	Optimizing the operations	/	/	/
2.	Reducing manual works - labour cost	/	/	/
3.	Improve resource allocation	/	/	0
4.	Operational expense-printing	/	/	/

iii. Enhanced Tenant Experience

By conducting interviews with three respondents, several themes emerged regarding how property management software contributes to operational efficiency. The highlighted key aspects such as seamless communication, convenient self-service option, proactive and timely notification, enhanced maintenance and issue resolution, community engagement and amenities, automated payment. Based on table 8, all respondents agree that property management software effect toward enhanced tenant experience by seamless communication and enhanced maintenance and issue resolution, proactive and timely notification, community engagement and amenities and automated payment. This due to the software facilitates efficient communication channels such as online portals, allowing tenants to easily report maintenance issues, submit requests, and seek assistance. This streamlined communication improves response times, ensuring prompt resolution of tenant concerns. Additionally, property management software often includes features that enable tenants to track the status of their requests in real time, providing transparency and reassurance (Trojanovic, 2023). Moreover, according to Trojanovic, U. (2023) tenants can make secure online payments through the software, eliminating the hassle of writing cheques or visiting the property management office and benefit from instant receipting. Moreover, according to Matellio (2023), facilitating online rent payments not only simplifies the entire process for both tenants and property managers but also offers the convenience of avoiding in-person meetings or adhering to specific hours. In addition, according to Tec Team (2018), the online tenant portals help in paying rent, and these portals also give customers 24/7 access to information such as communication histories, rental receipts, and maintenance requests that can enhance tenant experience. In addition, according to SoftwareWorks (2023) property management software prioritizing tenant engagement by offering user-friendly portals that facilitate easy communication, rent payments, and maintenance requests.

Table 8 Property management software effect toward enhanced tenant experience

No	Themes	R1	R2	R3
1.	Seamless communication	/	/	/
2.	Convenient self-service option	/	/	0
3.	Proactive & timely notification	/	/	/
4.	Enhanced maintenance & issue resolution	/	/	/
5.	Community engagement & amenities	/	/	/
6.	Automated Payment	/	/	/

iv. Integration and Collaboration

By conducting interviews with three respondents, several themes emerged regarding how property management software contributes to integration and collaboration. Based on table 9, respondents agree that property management software effect toward integration and collaboration by centralized data management, communication and messaging tools, task and workflow management. By using property management This finding is substantiated by the fact that PMS centralizes property-related data, ensuring easy accessibility and real-time updates on information related to tenants, leases, maintenance, and other aspects. This centralized data repository promotes collaboration by offering a shared platform for stakeholders (StrategicERP Business Automation Solutions, 2023). Property management software frequently incorporates communication and messaging features, facilitating seamless interactions among property managers, tenants, and other stakeholders (ArthurProperty, 2022) This real-time communication enhances collaboration and ensures efficient sharing of crucial information. Moreover, according to Amos (2023) property management software can enhance communication and collaboration in building maintenance, fostering interaction among landlords, property managers, contractors, and tenants through a centralized platform.

Table 9 Property management software effect toward integration and collaboration

No	Themes	R1	R2	R3
1.	Centralized data management	/	/	/
2.	Communication & messaging tools	/	/	/
3.	Task & workflow management	/	/	/
4.	Procurement management	0	0	/
5.	Work order & maintenance	/	/	0
6.	Integration on 3 rd party	0	0	/

5. Conclusion

The research aim is to study current property management software practice among property management companies in Johor Bahru and to investigate the property management software application effect toward property management operation in Johor Bahru due to lack of information about software availability. Based on findings, the current property management software is aligning with PropTech 4.0, the full integration of emerging technologies like blockchain and 3D scanning is lacking. However, property management software significantly enhances operational efficiency, reduces costs, improves tenant experience, and enhances integration and collaboration. The study shows the importance of adapting property management software to emerging technologies and provides valuable insights for professionals and stakeholders in Johor Bahru.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Azreen Azman, Mohd Hafizal Ishak; **data collection:** Azreen Azman; **analysis and interpretation of results:** Azreen Azman; **draft manuscript preparation:** Azreen Azman, Mohd Hafizal Ishak. All authors reviewed the results and approved the final version of the manuscript.

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