



MidOcean University

College of Leadership and Innovation

Master of Entrepreneurship Program

The Impact of Smart Technologies on Residential Property Management: An Applied Study in The Saudi Real Estate Sector

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1. Introduction

Residential real estate management has become a task burdened with many paths and arduous work within the framework of developing modern systems in the real estate world. With technological advancement, real estate management has branched out within different technical programs' framework (Dobrain, ٢٠١١). Nowadays, modern residential real estate companies are well equipped with property management software, where most of the tasks are performed by property managers with the help of modern technological techniques.

Indeed, smart technologies have revolutionized various sectors, and residential real estate management is no exception. The integration of Internet of Things (IoT) devices, artificial intelligence (AI), and other advanced technologies has changed the way real estate is managed, providing unprecedented levels of convenience, efficiency, and security for both property managers and residents as well as real estate entrepreneurs.

Adoption of smart home technologies has grown significantly, driven by increasing demand for automation and improved living experiences. According to a report by Statista, the global smart home market is expected to reach \$١٣٥,٣ billion by ٢٠٢٥, with a compound annual growth rate (CAGR) of ٢٥% from ٢٠١٩ to ٢٠٢٥ (Statista, ٢٠٢١). This increase is fueled by developments in the Internet of Things, which enables devices to communicate and work together seamlessly, creating an interconnected ecosystem within residential properties.

In the Kingdom of Saudi Arabia, many modern technologies have emerged in the field of real estate, as one of the primary benefits of smart technologies in property management is enhancing operational efficiency. IoT devices, such as smart thermostats, lighting systems, and water leak detectors, allow property managers to monitor and control various aspects of a property remotely. This remote management capability not only reduces the need for field visits, but also allows for proactive maintenance, preventing potential problems before they escalate into costly repairs (Deloitte, ٢٠١٨). For example, smart HVAC systems can be programmed to optimize energy use based on occupancy patterns, resulting in significant cost savings and reduced environmental impact.

In addition to operational efficiency, smart technologies also enhance security and safety within residential properties. Smart locks, security cameras, and

alarm systems provide real-time monitoring and alerts, allowing property managers and residents to quickly respond to any security breaches or emergencies. These technologies can be integrated with mobile applications, allowing remote access and control, adding layer of convenience and peace of mind (Halvitigala & Gordon, ٢٠١٤). Furthermore, AI-powered analytics can detect unusual activities or patterns, providing predictive insights that can further enhance security measures. Therefore, it is important to realize the impact of these modern and intelligent systems on the field of real estate management, as this paper aims to study the potential impact within the framework of real estate project management in the Kingdom of Saudi Arabia.

٢. Research Problem

Integrating smart technologies into residential real estate management within the Saudi sector is a vital matter at present, especially within the framework of Vision ٢٠٣٠. This is for many reasons, the most important of which is improving security and raising the level of operational efficiency and management experiences. However, one of the concerns related to these smart systems is data privacy, as the increased connectivity and data sharing inherent in smart systems increases the risks of cyber-attacks and reveal vulnerabilities that can be exploited by malicious actors. Ensuring strong cybersecurity measures and complying with strict data protection regulations is essential to protecting sensitive information (McKinsey & Company, ٢٠٢٠).

In addition, the financial implications of implementing smart technologies are a major constraint. The initial investment required for these technologies can be significant, presenting a financial challenge for property owners, managers, and those behind these large projects. This is especially true for older buildings, which may require extensive and expensive upgrades to support new systems. Assessing the financial viability of such investments, especially given the economic conditions and market dynamics that are unique to Saudi Arabia, is crucial. (Al-Otaibi & Alzamil, ٢٠١٩)

Rapid urbanization and the ambitious development plans outlined in Saudi Arabia's Vision ٢٠٣٠ underscore the need to understand the potential and pitfalls of smart technologies in residential real estate management, especially within the

scope of real estate entrepreneurship (Al-Otaibi & Alzamil, ٢٠١٩). The integration of Internet of Things (IoT) devices, artificial intelligence (AI), and other advanced technologies can play a pivotal role in achieving the vision's goals, however, the practical challenges of implementation must be carefully considered.

Therefore, the main research problem lies in the following question: What are the main challenges and opportunities associated with integrating smart technologies into residential property management and real estate entrepreneurship in Saudi Arabia, and how can they be addressed to ensure effective, safe and financially feasible implementation in line with Vision ٢٠٣٠?

٣. Research Significance

The importance of this research lies in many areas, as the research contributes to providing new insights related to the use of smart systems in the field of real estate entrepreneurship and the implementation of these systems in line with the vision of the Kingdom of Saudi Arabia ٢٠٣٠. Therefore, this research contributes to improving the field of real estate business management through implementing paths Smart technologies and thus achieving sustainable development goals. Smart systems can improve energy consumption, reduce waste, and enhance the overall environmental performance of residential properties. By promoting energy efficiency practices and integrating renewable energy sources, smart technologies can support Saudi Arabia's commitment to environmental sustainability as outlined in Vision ٢٠٣٠.

On the other hand, the research contributes to providing new insights related to smart systems that demonstrate the economic benefits and potential cost savings associated with smart property management. Therefore, the research can attract local and international investors. This could lead to increased funding for smart technology projects, promoting economic growth and innovation within the sector.

The research is also closely aligned with the paths of Saudi Vision ٢٠٣٠ based on exploring the integration of smart technologies in residential real estate management. Vision ٢٠٣٠ aims to diversify the Saudi economy, reduce dependence on oil, and develop key sectors such as real estate and urban development. These results can guide policies and initiatives that promote smart urban development and

contribute to achieving the overall goals of economic diversification and modernization.

٤. Research Objectives

- a) To evaluate the efficiency of smart technological systems in the field of residential real estate management in the real estate sector of the Kingdom of Saudi Arabia.
- b) To identify viable financing models and strategies that can support real estate entrepreneurs in adopting smart technologies.
- c) To develop insights into the specific challenges and opportunities faced by real estate entrepreneurs in implementing smart systems in the Kingdom of Saudi Arabia
- d) To measure the impact of smart technologies on operational efficiency and resident satisfaction in residential properties managed by real estate entrepreneurs in the Kingdom of Saudi Arabia.

٥. Research Questions

- a) How efficient are smart technological systems in the field of residential real estate management in the real estate sector of the Kingdom of Saudi Arabia?
- b) Are there viable financing models and strategies that can support real estate entrepreneurs in adopting smart technologies?
- c) What are the most prominent challenges and specific opportunities that real estate entrepreneurs face in implementing smart systems in the Kingdom of Saudi Arabia?
- d) To what extent do smart technologies impact operational efficiency and resident satisfaction in residential properties managed by real estate entrepreneurs in the Kingdom of Saudi Arabia?

٦. Research Variables and Model

Independent Variable (IV): Smart Technology Integration

Dependent Variables (DV's): Residential Property Management

- a) Operational Efficiency & Management Costs
- b) Property Value & Marketability
- c) Real-time Problem-Solving Capabilities

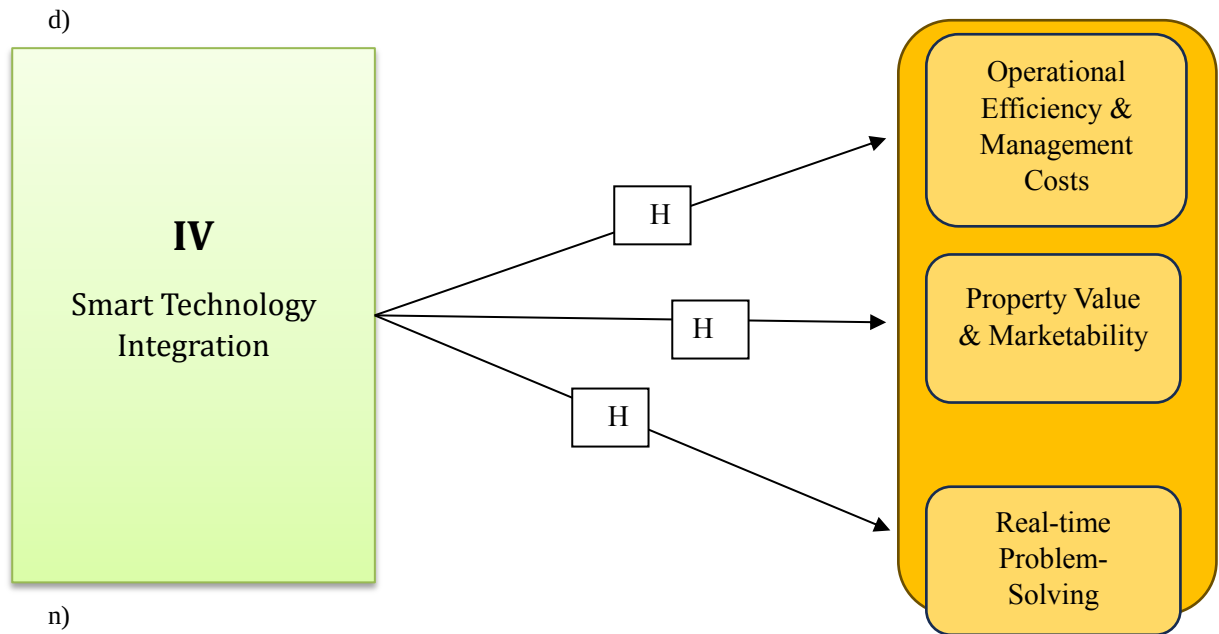


Figure 1: Research Model (By the researcher)

V. Research hypotheses

Hypothesis 1 (H¹): Smart technology integration increases operational efficiency and reduces management costs within the Saudi real estate sector.

Hypothesis 2 (H²): H⁰: Adoption of smart technologies positively impacts property value and marketability.

Hypothesis 3 (H³): Continuous monitoring and feedback mechanisms facilitated by smart technologies enhance real-time problem-solving capabilities.

VI. Literature Review

In a previous study by Siniak et al. (2020), the real estate industry is undergoing a profound digital transformation driven by the emergence of PropTech. This transformation encompasses a broad spectrum of advanced technologies such

as home matching tools, drones, virtual reality, building information modeling (BIM), AI, IoT, blockchain, smart contracts, crowdfunding, fintech innovations, smart cities, smart homes, and the shared economy. The study identifies key trends and concerns associated with this shift, including the enhancement of operational efficiency and customer experience through PropTech applications, improved market transparency, potential competitive advantages for regions and companies, and implications for labor markets and education. It underscores PropTech's potential to reshape market dynamics, foster transparency, support territorial growth strategies, and influence market structures across different institutional contexts.

Also, Ullah et al., (٢٠١٨) emphasize the necessity for the real estate sector to embrace disruptive technologies to transition from traditional practices to smart real estate (SRE). The study comprehensively reviews the adoption and impact of nine disruptive technologies, collectively termed the Big^٩, which include drones, Internet of Things (IoT), cloud computing, Software as a Service (SaaS), big data, ٣D scanning, wearable technologies, virtual and augmented realities (VR and AR), and artificial intelligence (AI) and robotics. Through analysis of ٢١٣ published articles, the research evaluates how these technologies enhance consumer decision-making by providing crucial information that mitigates potential regrets. The study also examines dissemination mechanisms such as smartphone apps, websites, and social media platforms, highlighting their role in promoting SRE principles of sustainability, innovative technology, and user-centric design. Key stakeholders, including consumers, agents, government authorities, and complementary industries, are identified along with their specific needs and interactions. The findings propose extensions to the traditional Technology Adoption Model (TAM), linking the adoption of Big^٩ technologies to stakeholder needs and emphasizing opportunities for enhancing consumer satisfaction while minimizing regrets through informed decision-making.

In their study, Al-Otaibi & Alzamil (٢٠١٩) investigate the impact of property management on maintaining the value of residential properties in Saudi Arabia. The research compares two property management models: one managed by a professional property management system and another managed solely by the owner. Through a field questionnaire distributed among ١٢٥ real estate management institutions and offices in Riyadh, the study finds compelling results. Properties managed by professional systems experience a mere ١٠٪ decrease in value over a

five-year period, whereas owner-managed properties see a significant depreciation of over ٥٠% in the same timeframe. These findings underscore the critical role of effective property management in enhancing the quality and sustaining the market value of residential products. The paper recommends collaborative efforts between governmental and private sectors to establish a Real Estate Data Center (REDC). This center would classify residential properties based on management criteria, quality standards, and economic considerations, aiming to further strengthen the real estate market infrastructure in Saudi Arabia.

Also, Residential property values are influenced by several critical factors, as highlighted in the literature. Muyingo (٢٠١٧) identifies factors such as the absence of strategic planning, inadequate funding, maintenance deficiencies, and ineffective marketing strategies as contributors to potential decreases in property value within the real estate market. Spatial location emerges as a pivotal determinant, with properties near central areas typically commanding higher prices compared to those situated on the outskirts of cities.

Research by Hui, Lau, and Khan (٢٠١١) underscores the positive impact of effective property management systems on property prices, suggesting potential increases ranging from ٢,٨٤% to ٤,٩٢%. Conversely, Heller (١٩٩٨) discusses challenges related to shared property ownership, noting issues like mismanagement and neglect of common areas such as elevators and parking lots, which can lead to a decline in property values over time—a concept termed the "tragedy of the commons." Furthermore, the principle of supply and demand in the housing market directly influences property values, with scarcity often driving up prices due to increased demand for limited housing units.

٩. Methodology and methods

٩.١ Research Design

According to Kothari (٢٠٠٤), the research design serves as the underlying framework that guides the execution of research, encompassing the methodology for data collection, measurement, and analysis. As per the findings of Saunders, Lewis, and Thornhill (٢٠٠٩). The explanatory research design is utilized to investigate a particular situation or problem to elucidate the relationships between

variables. As such, this research design is deemed more suitable for the present study .

The researcher will develop a set of questionnaires utilizing the Likert scale as a means of gathering primary data. According to De Vaus' (٢٠١٣) research, a questionnaire is a printed format designed to collect data via written responses from a selected employee sample. The researchers utilized a self-design questionnaire to elicit responses from participants, which were then rated on a Likert-type scale ranging from ١ to ٥. The survey was self-administered, thereby ensuring anonymity and reducing the likelihood of bias as the questions were standardized and consistently presented.

٩,٢ Research Tools

The questionnaire for this research study will be created by the online survey builder, Google Form. The questionnaire will be distributed to the target sample via the Internet. The survey will be open for participants to participate in the survey during a certain period of time from January ٢٠٢٣ to February ١٠, ٢٠٢٢, which is a sufficient period of time to collect the required data and the number of participants.

٩,٣ Research Community

Real estate sector professionals, including developers, property managers, investors, and residents in Saudi Arabia.
data analysis

٩,٤ Data Analysis

The research will use the statistical program SPSS٢٣ to analyze the data obtained through the questionnaire using the following methods: Alpha coefficient: to measure the reliability of the questionnaire, frequencies, percentages, mean, standard deviation and relative weight to describe the Pearson correlation. For the study sample. Coefficient: Determine the level of internal homogeneity of the study instrument and identify the relationships between the study variables. Regression coefficient: to know the effect of the independent variable on the dependent variable.

٩.٥ Ethical considerations

- a) Data, results, methods, procedures, and publication status are reported truthfully, and data are not produced, falsified, or distorted in any way.
- b) Any patents, copyrights or other forms of intellectual property, including the use of various data, methods, results or research in general, are carefully referenced, with full indication of the author or authors and the year of publication and publication. a house.
- c) Participation in questionnaires related to the research topic is maintained, as data on participants is kept and not published at the end of the study.

١٠. Limitations

- a) Spatial constraints: The difference in the adoption of smart technology between urban and rural areas in the Kingdom of Saudi Arabia may be a real limitation in the context of the difference in the application of smart systems.
- b) Spatial boundaries: Some previous research and studies in the same field may not be applied due to differences in time and arrangement.
- c) Substantive limitations: Variation in stakeholder experience and understanding of smart technologies that impact data reliability.

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