Role of Artificial Intelligence in the Real Estate Industry of the UAE: A Case Study of Al Zaeem Commercial Brokers

by

Salem Al-Karbi

A thesis submitted in partial fulfilment for the requirements for the degree of Doctor of Business Administration (DBA) at the University of Lancashire

January 2026

RESEARCH STUDENT DECLARATION FORM

Type of Award **Doctor of Business Administration**

School **Business**

1. Concurrent registration for two or more academic awards

I declare that while registered as a candidate for the research degree, I have not been a registered candidate or enrolled student for another award of the University or other academic or professional institution

2. Material submitted for another award

I declare that no material contained in the thesis has been used in any other submission for an award and is solely my own work

3. Collaboration

4. Use of a Proof-reader

No proof-reading service was used in the compilation of this thesis.

Signature of Candidate _____

Print name: _____**Salem Al-Karbi**_____

ACKNOWLEDGEMENTS

I would like to thank my supervisors, Dr Ahmad Abu-Arja and Dr Janed Green, who provided invaluable guidance, support, and constructive feedback to me in this research. I also would like to thank the examiners and the committee members whose comments are insightful, and have made this thesis better.

I would like to thank the management and the employees of Al Zaeem Commercial Brokers, who helped me and provided the materials that I used to conduct this study.

Lastly, I would like to thank my family, friends, and colleagues who have always encouraged and supported me throughout the course of my studies.

ABSTRACT

This thesis investigates how Artificial Intelligence (AI) can be used to improve operational efficiency, profitability, and customer satisfaction in the UAE real estate market with a specific case study of Al Zaeem Commercial Brokers. The study intends to assess the change that AI technologies are bringing to the industry, specifically in property valuation, customer relationship management, and operational processes. The research gives a detailed discussion of how AI tools, including machine learning, automated valuation models, and predictive analytics, have been integrated in streamlining the real estate processes and enhancing decision-making.

In this study, the author uses a focused case study of Al Zaeem Commercial Brokers to identify the issues as well the opportunities of using AI in an established industry. The results show that AI not only leads to increased efficiency but also brings to the company considerable financial benefits, such as reduced costs, increased revenues, and better return on investments (ROI) to real estate companies. In the paper, the authors also determine the main barriers to the application of AI, including high implementation costs, workforce adjustment, and regulatory issues that should be overcome in order to be successfully integrated.

This thesis will add to the expanding literature on the effects of AI on the real estate sector in the Gulf region by investigating how AI is applied in the UAE real estate market. It offers a rich insight to scholars and professionals who want to know how AI can be used to drive innovation, streamline operations, and enhance the overall business performance of real estates. The study also adds to the theory of the adaptation of AI in the new markets, and provides a suggestion on the way to improve AI-based strategies in the changing real estate of the UAE.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ML	Machine Learning
AVM	Automated Valuation Model
CRM	Customer Relationship Management
IoT	Internet of Things
PropTech	Property Technology
UAE	United Arab Emirates
GDP	Gross Domestic Product
CRE	Commercial Real Estate
ROI	Return on Investment
PWC	PricewaterhouseCoopers
VTS	View the Space
PFAT	Property Forecast Accuracy Theory

CHAPTER 1: INTRODUCTION

1.1 Chapter Outline

This is Chapter 1 of the thesis which sets the stage for this work by exploring the definitions of the main variables and the background information. This part gives historical background, movement and treaties to justify the study and attract the target audience. It goes to a clearly stated Problem Statement which defines the main problems being researched. This section also brings out why these issues need to be explained in the context of the research.

The chapter also provides a Rationale for the Study where the importance of the real estate sector in the context of the UAE economy is described. This shows that the need for the study lies in the strategic nature of this sector while at the same time affording the study solid ground. The section on research aim, questions and objectives presents four research questions and objectives. These components give further definition to the study and emphasise the need for the research. The research context grounds the research within the UAE's real estate industry with a focus on the sector's economic impact and the role of artificial intelligence in solving existing problems. This section employs data references to support the relevance of the sector and its relationship to the study's objectives. After this, the significance of the study explains how the knowledge the research contributes to the literature is useful to scholars and professionals.

Last of all, the chapter ends with a description of the further sections of the thesis to be written. This roadmap provides a clear and coherent structure for the reader and helps to identify the flow of topics discussed further in the subsequent chapters.

1.2 Background of the Research

Artificial intelligence (AI) is a scientific discipline that offers unlimited capabilities to solve research and practical problems by incorporating cognitive capacities into machines (computers) so that they can perform like humans in different situations (Kabaivanov and Markovska, 2021). AI enables data-driven decision-making across sectors, including real estate, where it supports more accurate pricing, forecasting, and customer insights. However, AI is usually referred to as machine intelligence to differentiate it from human intelligence (Manne and Kantheti, 2021). It has also significant applications in the real estate industry. Around thirty-seven per cent of organisations by the year 2019 have adopted AI to augment the operations of their workplaces

(Agrawal et al., 2021). AI adoption has increased at an exponential rate between 2015 and 2019, and it is expected to rise similarly. By the end of the year 2030, it has been estimated that AI will become a fifteen trillion-dollar industry, as per a PWC (PricewaterhouseCoopers) study (PWC, 2019) conducted on global AI. Businesses that have embraced AI technology have shown a tremendous increase in their operational performance, strategic decision-making, and improved quality of products. In the US, AI is supposed to replace sixteen per cent of the workforce, indicating that a large part of current businesses will become automated shortly.

AI technology has widespread uses and implications in the real estate industry, enabling professionals to make smart choices by leveraging their potential to make strategic, functional, and operational decisions using powerful algorithms and efficient data pipelines (Treleaven et al., 2021). One of the significant achievements in using AI in real estate occurred in 2018 when Skyline AI together with AION partners purchased two apartment buildings in Philadelphia for $ 26 million using high-frequency algorithms (Lisowski, 2022). Professionals associated with this industry can calculate the values of property by using related AI applications. AI is useful for professionals in terms of recognising market trends and analysing debt (Viriato, 2019). AI has the potential to analyse big data and give insight into the buying behaviours of clients. It further improves the real estate practises and assists in the decision-making process to be more effective and efficient. When compared to traditional practices of estate agents, modern real estate practices are characterised by extremely efficient use of time, money, and other resources of the business. Previously, the agents had to manually visit the streets and inquire from the residents about any property to be sold in the short term. Nowadays, real estate agents have almost all the necessary data on their computers to know about any property available for rent, sale, or construction.

Technology advancement is a universal phenomenon in every sector, enhancing performance and productivity to a substantial extent. Ullah et al. (2021a) opined that the integration of AI in real estate has enhanced the digitalisation of property information, optimisation of processes, and decision-making, as well as enhancement of investment prediction. AI also involves the development of data-driven systems, which would help the industry reach improved operational effectiveness. The real estate sector on its part accounts for about 9.3% of the Gross Domestic Product (GDP) in the UAE (Lambourne, 2021). Returning between 10% and 11% on its investments, the sector has good potential for risk-averse investors (Lambourne, 2021). Besides,

the real estate industry has cut across to other important sectors such as mining, construction of commercial buildings and housing schemes sectors. Such interconnections demonstrate how AI can bolster the role of the sector in diversifying the economy, which is in line with the sustainable development goals of the UAE.

Prices set by the real estate sector have a considerable influence on the sales and purchases of commercial buildings, houses, and other facilities (He et al., 2021). In real estate development, it is the most crucial activity to ensure the accuracy of models required to predict real estate prices. This is because the stakeholders of the real estate must have all essential data organised, analysed, and interpreted as per their specific requirements available at their desks. The availability of this data must also be made timely and regular with a focus on developing relevant and useful information to carry out effective decision-making. It is only due to precise prediction of the real estate prices and the availability of relevant information that real estate professionals can carry out effective decision-making (Lambourne, 2021).

However, it is extremely challenging for real estate agents to effectively manage and structure enormous amounts of data as they are low in maintaining considerable knowledge bases about the industry and lack adequate information about widely accepted standards. In this regard, the role of AI can be immensely significant in altering the current situation of real estate by enabling the agents to have necessary information timely, process relevant data efficiently, and manage the records related to the entire project life cycle optimally (Renigier-Biłozor et al., 2021). AI-enabled automated information extraction can be essentially instrumental in developing innovative models and accomplishing complex activities. Examples of AI-empowered activities include exploring big data, benchmarking, documentation, reviews, validation, and data evaluation in an automated way. Real estate agents still find it challenging to have reliable and updated information as they lack the means for acquiring, analysing, and interpreting data as per their specific business needs. AI augments the operations of real estate by providing information that is reliable, effective, and up-to-date.

Van der Maas, Snoek and Stevenson (2021) describe that AI can lead to the development of systems based on machine intelligence that understands, synthesise, and interpret the information provided by external sources and deliver useful information that can be feasibly used by real estate agents in making profitable choices. Thus, AI can help real estate to achieve strategic

organisational goals and meet the requirements of clients. AI, as coined by John McCarthy in 1956, is defined as the science and engineering of making intelligent machines. Since then, it has evolved to replicate human behaviour in solving real-world problems and has been integrated across sectors including real estate (Jigyasu, 2021). At its core, AI focuses on learning human behaviour and replicating it in different real-world problems. Thus, AI has the inherent attributes of replacing humans in related work activities. This trend is also likely to shift the power of making strategic and operational decisions from humans to machines.

Since the impact of AI on society will bring about such changes, it is believed that practises about sales and purchase of products will be significantly altered. With the help of AI, it has been illustrated that market trends can be predicted with 90% accuracy according to Shalwa (2024). Subsequently, this capability allows organisations to fine-tune sales plans and enhance the decision-making process. Furthermore, in marketing, the use of artificial intelligence to stage homes has boosted the number of inquiries by 200% showing potential for change in this market (Shalwa, 2024). These progressions depict the increased role of AI in sales and marketing since it assists in creating the marketing mix strategies, and guarantees their successful implementation depending on the changes in the market. Currently, the tools in the UAE have provided efficiency to a good extent, and the forecast of the utilisation of AI indicates that it will contribute up to 14% of the GDP of the UAE by 2030 (PWC.com, 2024).

One of a number of strategic initiatives of the nation, such as the UAE Vision 2031 and the Dubai 2040 Urban Master Plan, Artificial Intelligence (AI) integration into the United Arab Emirates (UAE) real estate sector helps to boost the nation into sustainability, smart infrastructure, and digitization and transformation (Abubakar and Alshammari, 2023; Dakrory, 2023). The purpose of these initiatives is to efficiently develop the cities by leveraging AI and big data analytics, improving the efficiency in the real estate transactions, and improving market transparency. Predictive maintenance in property management has used AI to the fullest extent as it can help monitor the status of equipment and infrastructure in real time which in turn results in less downtime and expense on maintenance. Predictive systems powered by AI utilize the UAE's smart and energy efficient urban planning vision (Härmand, 2021) in order to improve efficiency and sustainability of operations. Furthermore, AI based Customer Relationship Management (CRM) systems are also important in the UAE real estate sector as they help in analysing client preferences

and automating interactions to provide personalized services and thereby enhance customer satisfaction (Del Giudice et al., 2020).

Nevertheless, there are challenges with AI adoption in the UAE's real estate industry. Among them are data privacy and data security concerns as well as the massive investment in AI infrastructure along with the upskilling of the employees to effectively use AI technologies. Furthermore, the regulatory environment in the UAE is being shaped in such a way as to ensure that the adoption of AI is in line with international best practices and compliance standards (Hafifi and Magraoua, 2021). To address these challenges government regulators, real estate developers and AI developers have to collaborate together to create a robust governance framework to help innovation and avoid the risk.

In regards to Al Zaeem Commercial Brokers, AI brings valuable opportunities of streamlining property transactions, improving valuation accuracy and customer interaction optimization (Ashok and Rajesh, 2020). The company can improve its pricing strategy and investment decision making through leveraging of AI driven market analytics and automated valuation models (AVMs) (Treleaven et al., 2021). In addition, AI based customer management systems can also improve rental operations by facilitating lease tracking, facility maintenance optimization and tenant communication, which is in line with the UAE's wider smart city objectives (Munawar et al., 2020). Overall the UAE's commitment to AI driven innovation offers a transformative opportunity for the real estate industry. Al Zaeem Commercial Brokers can use AI to enhance operational efficiency, improve customer engagement, and contribute toward alignment with regulatory expectations and support the broader goals of a smart and sustainable real estate sector in the UAE. This has underscored the centrality of AI in enhancing organisational performance, particularly for the real estate industry through increasing organisational productivity, effective utilisation of information for decision making and customer satisfaction.

Amann et al., (2020) conclude that AI systems have significance in making informed decisions based on comprehensive analyses of large amounts of data related to the marketing and sales functions. Data includes information about different aspects of the real estate business, including opportunities, resources, improvements, and current projects. AI can help the agents classify these different types to utilise for their best pursuits and facilitate them to achieve strategic goals. For real estate dealers, it is pivotal to understand customers' behaviours, preferences, and expectations

to provide them with the best solutions (Renigier-Biłozor et al., 2022). Considering their scope of business, real estate companies can use AI to address the needs and wants of their potential customers by optimising their real estate activities, especially activities focused on providing excellent customer services. When dealing with the buying centres, the anticipating barriers and potential drawbacks are essential to be identified. This study was initially prompted by practitioner observations at Al Zaeem Commercial Brokers, where systemic inefficiencies and outdated practices highlighted the urgent need for AI integration. These reflections, aligned with national transformation goals under UAE Vision 2031, shaped the study's direction.

1.2.1 Initial Prompt for the Study

The initial prompt for this study emerged from the researcher's engagement with professionals at Al Zaeem Commercial Brokers in Abu Dhabi, who described specific operational inefficiencies in managing customer interactions, property valuation, and compliance documentation. While AI-based solutions were emerging globally, these had not yet been adopted locally in any structured way. This contrast between the global rise of AI adoption and the relatively slow uptake within the UAE's real estate sector motivated the researcher to explore the potential benefits, challenges, and practical applications of AI within a real-world firm. The alignment of this practical gap with national-level initiatives like UAE Vision 2031, which aims to transform the UAE into a smart and technology-driven economy, further shaped the decision to undertake this research (Dakrory, 2023; Abubakar and Alshammari, 2023).

1.3 Problem Statement

The UAE's real estate sector is facing increasing regulatory expectations, especially with international frameworks such as the International Property Measurement Standards Coalition (IPMSC), which promote valuation consistency, market transparency, and investor trust (IPMSC, 2024). Non-compliance can result in penalties such as fines, operational restrictions, or license suspensions—particularly in regions like Abu Dhabi, where oversight is stringent (Binashour et al., 2021). Despite these regulatory imperatives, many firms, including Al Zaeem Commercial Brokers, still rely on manual documentation and fragmented processes, heightening the risk of legal and financial exposure. The adoption of AI tools—such as automated valuation models, compliance tracking systems, and document review algorithms—can help ensure auditability,

reduce regulatory risk, and enable firms to stay competitive in a fast-evolving market (Koelemaij, 2022).

Nevertheless, the literature review shows that there is still a long way to go as several studies suggest that few firms in the UAE real estate sector have effectively implemented such technologies (Tavasoli et al., 2021). The study employs a single case study research design that looks at the use of AI in the UAE real estate sector using Al Zaeem Commercial Brokers as the research subject. Such methodological approach makes it possible to examine the effect of AI on work productivity, customer acquisition and other relevant factors in the context of the selected industry leader firm. One of the significant issues of concern in Al Zaeem Commercial Brokers is the incorporation of AI in property valuation, client management, and compliance. The firm has been experiencing challenges in manual valuation, slow automation of customer service, and compliance with regulatory requirements, therefore, the need for AI integration. This research aims at exploring how AI can address these issues and analyse its implications on the UAE real estate industry.

On the potential benefits of Artificial Intelligence, the solutions that are expected can include predictive analysis, decreased human intervention and more precise decisions, yet, with regard to full integration there are problems that are going to be faced such as data protection issue, integration with the workforce and costs (Binashour et al., 2021). Thus, this study does not presume AI as an omnipotent tool but rather discusses the potential and challenges of its implementation in a real estate firm in the context of the UAE's dynamic legal environment. Further, it aims to examine the global trends associated with the utilisation of these technologies in organisations, including the relations with the stakeholders, and the impact of these changes on the UAE's real estate industry competitiveness.

1.4 Rationale of the Research

The UAE real estate sector is one of the most important sectors of the country and it contributes almost a quarter of the country's GDP (PWC.com, 2024). AI is rapidly becoming a tool of change in the industry as it eliminates the need for manual labour in tasks such as property valuations, marketing, and portfolio analysis and as a tool for managing large data sets to identify market trends and customer preferences (Shalwa, 2024). These capabilities are essential to solve such

sectoral issues as high transaction costs, information asymmetry, and the long time required for closing a deal, which influence strategic decision-making and market outcomes (Lisowski, 2022). This is evident, for instance, through virtual staging which has increased property inquiries by 200% and market trend predictions, which are now 90% accurate (Shalwa, 2024; PWC.com, 2024). These advantages not only justify the idea of applying AI solutions to increase efficiency and improve the range of audiences but also create a foundation for sustainable development. This research will also review the best practices for AI implementation and assess the effectiveness of AI on the UAE's real estate market and economy, to understand the prospects and limitations of AI.

1.5 Research Aim, Questions and Objectives

1.5.1 Research Aim

To evaluate the role of artificial intelligence (AI) in enhancing efficiency, compliance, and client satisfaction in the real estate industry of the UAE, with a focus on Al Zaeem Commercial Brokers.

1.5.2 Research Questions

Following are the research questions that this research intends to answer:

- Which aspect of the UAE real estate market, specifically in Al Zaeem Commercial Brokers, has benefitted the most from AI in terms of efficiency and profitability?
- How does AI improve the operational efficiency, risk management, and regulatory compliance of the UAE real estate market with reference to Al Zaeem Commercial Brokers?
- How AI influenced the property valuation, market prediction, and customer relations in Al Zaeem Commercial Brokers and the UAE real estate market?
- To what extent do automation through AI and improvement of customer service affect the increase of client satisfaction and overall value creation in Al Zaeem Commercial Brokers?

1.5.3 Research Objectives

This study will address the following objectives:

- To identify specific segments within the real estate market, like sales, rental, customer satisfaction and cost, that have been positively impacted by AI technology.

- To analyse and discuss the potential benefits of adopting AI to enhance efficiency, profitability, and market competitiveness in the real estate industry.
- To explain how the use of Artificial Intelligence transformed activities like property appraisal, marketing as well as customer relations, by making them faster, cheaper and more effective.
- To provide recommendations about how best to implement the benefits of AI technology to clients within the real estate business to increase satisfaction rates and provide value.

1.6 Research Context

AI is in many cases called machine intelligence to differentiate it from human intelligence. It has found its place in almost every sector starting from the real estate sector Sircar et al., 2021; Kumar et al., 2021; Kabaivanov and Markovska, 2021. Continuing from the above PWC global Artificial Intelligence study, AI technology is estimated to generate a market value of approximately $15 trillion in the year 2030. Also, according to the PWC study, a third of the global organisations had implemented AI technologies at the workplace by December 2019, and industries that are significantly affected are finance, healthcare and technology. Over the last few years, using IoT has become popular where IoT's usage rate was augmented by 270% in the period 2015-2019, which shows the trend of technological advancement in organisations. The organisations that have adopted the use of AI technologies have better operational performance, functional performance, and enhanced quality of products and services. However, automation could potentially shrink the US workforce by 16% through artificial intelligence (PWC, 2019) while calling for new skills and new forms of work relations. In the real estate industry, more and more AI solutions are applied as tools to help specialists in decision-making based on data pipelines and algorithms. For instance, the use of real estate AI was first seen in 2018 in a deal driven by AI formulas (Lisowski, 2022). They use it in activities like property appraisal (McGrath, et al., 2019), assessment of debts (Viriato, 2019), and analysis of client behaviour by big data (Souza et al., 2020). It has also replaced manual work, where before, agents had to go physically to properties to predict timelines for sale, something that AI can now do in a few seconds (Olick, 2021).

According to Conway (2018), technology is paramount in the process of liberalising industries and real estate, AI solutions are revolutionising practises by enhancing investing, properties, and operations. Likewise, Kabaivanov and Markovska (2021) pointed out that the role of real estate as

an intermediary and for investors to be important are interlinked. The real estate sector is one of the largest in the UAE occupying 9.3% of the country's GDP and provides an average return of 10 to 11% which is quite appealing to low-risk investors (Ubhar Capital, 2022). In addition, real estate provides input to other industries, including construction and mining, which increases its importance to the economy (PWC, 2022). Big data applications help real estate firms streamline their operations, reduce the use of time, and offer timely information to management (Treleaven et al., 2021). These capabilities place AI as a strategic enabler for decision-making in real estate organisations (McGrath, et al., 2019).

The costs of real estate are used to determine the extent of purchasing and selling of the properties. An important element of accurate price modelling is the ability to predict the results of the models used in real estate development and decision-making, which will help to gain the confidence of clients (Pinter, et al., 2020, Lin et al., 2021). AI systems offer feedback analysis in real time to generate better decisions for enhancing stakeholder satisfaction. According to Bondenbender et al. (2019), time and relevance of information is crucial; here, AI's capability of dealing with large data sets, and automating processes such as benchmarking, validation and data evaluation. Nevertheless, the issues remain, for instance, in managing and organising huge records of data, which are often available in insufficient amounts of resources and knowledge of standards in the field for real estate agents (Treleaven et al., 2021; Krcmar, 2015). Automated information extraction using AI is central to the development of new business products and models. Kaplan and Haenlein (2019) discussed the subjectivity of AI systems which they said helps firms to understand external information and employ it in the right manner. All these advancements conform to the UAE's macroeconomic aspirations of innovation and sustainable growth. However, Pasquale (2021) warned that AI may transfer the power of decision-making to machines and therefore transform society. Likewise, Marr (2016) pointed out that AI gives essential information on the figures of sales and marketing plans are essential for industries, such as real estate. The use of AI in the UAE real estate sector is expected to pick up with AI contributing up to $ 14bn of the GDP by 2030 (PWC.com, 2024).

Al Zaeem Commercial Brokers operates within Abu Dhabi's competitive real estate sector, which contributes approximately 9.3% to the UAE's GDP and offers stable returns of 10–11% on average (Lambourne, 2021). Despite this economic strength, Al Zaeem has shown a slow pace in adopting

digital innovations, particularly artificial intelligence (AI) tools. Interviews revealed that several employees have occupied the same roles for extended periods, resulting in a stable but change-resistant organisational culture. This has led to underutilisation of data analytics, CRM tools, and automation opportunities—elements that are increasingly vital in competing with newer, more agile market entrants. If such firms do not align with strategic national goals such as UAE Vision 2031, they risk losing market share in an evolving digital economy (Dakrory, 2023; Abubakar and Alshammari, 2023). This study, therefore, uses Al Zaeem as a representative case to examine how real estate firms can harness AI to close these gaps and meet both internal performance goals and external strategic benchmarks.

1.7 Significance of the Study

This study offers insights into how artificial intelligence (AI) can support operational improvements, compliance management, and client service within a real estate context, using Al Zaeem Commercial Brokers as a case. It contributes to both academic and practical discussions by situating the firm's challenges within broader national goals, such as the UAE Vision 2031. Academically, it addresses a literature gap concerning AI adoption in real estate firms in the Gulf region, providing a firm-level perspective in an underexplored context.

Practically, the study's findings can assist managers in identifying the specific areas where AI implementation yields measurable gains in efficiency and customer satisfaction. For investors and policymakers, the research highlights the potential of AI to improve regulatory compliance, transparency, and operational responsiveness.

While acknowledging the potential benefits of AI, the study also emphasises the challenges related to integration costs, workforce adaptation, and data privacy. It therefore offers a balanced perspective, contributing actionable insights without overstating impact.

1.8 Organisation of the Study

This thesis is structured across five chapters to reflect the logical flow of the research process.

Chapter One has introduced the research context, identified the problem, outlined the objectives, and explained the study's significance.

Chapter Two provides a review of relevant literature concerning artificial intelligence in real estate, including definitions, theoretical models, and prior studies. It also establishes the conceptual framework that guides the analysis.

Chapter Three presents the research methodology, including philosophical underpinnings, data collection methods, and justification for the chosen qualitative approach.

Chapter Four details the analysis of the interview data and the thematic findings arising from it.

Chapter Five discusses the results in relation to the research objectives and literature, offers conclusions, and presents recommendations for practice and future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, the author presents a literature review of the current state of AI adoption within the real estate industry. It starts with a familiarisation of key concepts such as the theory of search, theory of choice, theory of the accuracy of property forecast, theory of Artificial Intelligence neural networks, theory of chatbots, and theory of the internet of things, among others. These theories make up the foundation on which the changes in property valuation, resource management and customer relations in the real estate market through the integration of AI technologies can be explained. The chapter also discusses more empirical patterns of AI use about its effect on performance, risk management, and customer-oriented approaches. It assesses the strengths and weaknesses of applying artificial intelligence in the sector and informs the practical applications and real-life constraints of the solutions. Furthermore, the chapter also highlights the most important gaps in the current literature and outlines the significance of this research and its intent to advance the discussion of these topics. Based on the critical analysis of the theoretical and empirical evidence presented in this chapter, the research groundwork for the study is laid down as well as the understanding of how it fits within the goals and objectives of the work.

2.1.1 Literature Review Methodology

The present literature review follows a systematic approach of identifying, evaluating, and integrating existing literature on the use of Artificial Intelligence (AI) in the Real Estate industry. The aim of adopting a structured process was to maintain methodological rigour which helped in identifying the trends, theories and gaps that are important to achieve the objectives of the study (Synder, 2019). The review scope was refined based on the research objectives and was mainly concerned with AI applications in property valuation, resource management and customer touch points within the context of the UAE real estate market.

To this end, the present study adopted a rigorous search strategy through academic databases including Scopus, Web of Science, and Google Scholar as well as industry reports. The criteria for selecting articles included studies that were published in the last 10 years to capture current practices, and seminal works important in mapping the development of AI in the sector. Sources were identified depending on their ability to provide theoretical and empirical knowledge on how AI improve operations, meets customer needs and impacts the market. The integration of the

literature review included the analysis of the significant patterns and the comparison of methodologies used in the previous research, as well as the analysis of the relations between AI tools and real estate activities. This critical approach made the review to be more than just a replication of previous research works but highlighted areas that needed more research. The current systematic review presents the preliminary findings that undergird the study and positions the research within the scholarly and professional literature on AI in real estate.

2.2 Theoretical Review

2.2.1 Theory of Selection and Theory of Search

An extensive analysis of the property valuation process in the real estate sector (Treleaven et al., 2021; Ullah et al., 2021a; and Renigier-Biłozor et al., 2019) shows that data is one of the main components of decision-making. This research has established that the ability of property management firms to effectively undertake valuation practices depends on the quality of data used and data maintenance. There are basic concepts that offer a framework for the process of property valuation; these are the Theory of Selection and the Theory of Search. According to Bellman (2018), the Theory of Selection believes that the potential customer within the segment of real estate has to use the data collected to make the appropriate choice. This theory puts more consideration on the factors of precision and usefulness of data in decision making by the buyer. The Theory of Search, on the contrary, assumes that potential buyers are majorly influenced by the source of information, its relevance to their goals. This theory dwells on the problem of the acquisition, monetizing and effectively deploying of data. Lisi (2021) indicated the significance of the Theory of Search by observing that time taken by most buyers and valuers in the real estate sector is used in search of data. However, it is important to remember that with the inaccuracy of the information source, the evaluation of the properties and the research of certain aspects of data that are used to describe the real estate market could be wrong. These get magnified by absence of centralized and standardized sources of data that causes issues such as; absence of standard prices, lack of transparency of data and complex methodologies of data presentation. Second, the Theory of Search also has multiple limitations as further determined by Renigier-Biolozor et al. (2019) since it is difficult to get access to real and accurate data in the context of the modern informational environment, whereby there exists excessive noise that is irrelevant or incomplete. Such data problems render decision making in the process of property valuation a challenging task. In this respect, Ullah et al. (2018) emphasized the practical and systematic knowledge related to data

when considering the perspective of the real estate market. They include assisting clients in property evaluation, and property condition rating, control of risks as well as observing how clients respond to market trends.

2.2.2 Property Forecast Accuracy Theory

Property Forecast Accuracy Theory (PFAT) is a concept that looks at how accurate and reliable a prediction of property value is, especially in a changing housing market. Correct forecasting is critical in carrying out effective investment choice, risk evaluation and valuation processes. The theory is monumental since it supports the plausibility of the AI-derived valuations in the markets requiring precision, especially in the emerging economies. Investing it, Newell (2006), one of the most active contributors to the theory, called attention to the relevance of the basic principles of the theory, in balancing the investment choice to the regulation and limits the biasedness of estimation. According to the theory, the predictability enhances transparency and efficiency as they help meet anticipations at various levels amongst parties like investors, developers and regulators (Newell, 2006). PFAT is of even greater significance in the context of AI integration since more and more machine learning models are applied to automate and improve such predictions. Newell (2006) stresses the fact that the accuracy of the forecast directly influences investor confidence, in addition to market efficiency, especially in the first world. He determines that any small inaccuracy in the estimation of the rent or yield may lead to large and resulting misallocation of capital. De Francesco et al. (2013) also point out that proper forecasts are the basis of successful valuation modelling and allocation of portfolio plans. These research studies are inclusive of the fact that the application of AI such as automated valuation models (AVMs) in forecasting could tremendously help curb bias and error levels within the UAE real estate market that is largely undocumented and eventually managed manually.

To this end, the Property Forecast Accuracy Theory is applied in this study to determine how the AI-based tools assist in valuation exactness at Al Zaeem Commercial Brokers to improve both investment planning and regulatory compliance. This theoretical guideline stands firm on the research objective regarding increasing organisational performance using more use of data in valuation and forecasting.

2.2.3 AI theory of neural networks

The theory associated with AI Neural Networks known as the architecture theory of actual intelligence forms the basis for some of the most sophisticated AI structures in today's civilisation (Viriato, 2019). Neural networks also referred to as artificial neural networks are computational models that are based on the connections of the human brain neurons (Sing et al., 2022). These networks mimic the brain's operations in that instead of operating based on programmed instructions, they operate based on past experiences. This learning process enables neural networks to produce outcomes from the data and previous learning which makes them a part of the computational evolution learning system.

Neural networks in real estate have proved to be useful in the provision of accurate and flexible property price forecasts (Varma et al., 2016). For example, these networks can connect macroeconomic information with relevant market data to enhance valuation activities. Besides, they can evaluate the direct and indirect connections between the real estate market and relevant financial structures, for example, stock exchanges (Varma et al., 2018). Through the analysis of available information through data clusters, neural networks provide new insights into the potential for enhancing property valuation and the discovery of potential assets.

Moreover, the use of neural networks improves customer segmentation through the analysis of demographic, geographic, and behavioural data, aimed at satisfying the expectations of certain segments of the market (Shaw, 2020). That is why they are so useful when it comes to identifying the major characteristics of the real estate assets, and customer preferences being captured accurately. Moreover, these networks help to carry out extensive market analysis considering updated information to be included in pricing models to make more accurate and flexible decisions. Machine learning (ML) integrated with neural networks enhances market flexibility because these algorithms can store, modify and update the data depending on the customers' preferences and new inputs. However, AI and neural networks require a solid digital substrate to operate because the quality of the data affects the accuracy of the algorithms. The above foundation enables the development of a visualisation of the prediction frameworks, which in turn consider customers' requirements and enhance property valuation in the real estate industry.

2.2.4 Chatbot Theory

The Chatbot Theory discusses the possibilities of applying artificial intelligence, or AI, to improve customer relations and organisational performance in several industries with an emphasis on the real estate industry. Conversational chatbots also known as intent-based chatbots are artificial intelligence programs that enable conversation and respond to users' inquiries in natural language (Marcondes, Almeida, and Novais, 2018). In the real estate sector, chatbots help in customer interaction by matching the buyer or tenant with the seller through personalised messages and easy-to-follow links to properties for sale or rent. They also give real-time support in that they give immediate and continuous responses in twenty-four hours depending on the specific need of a user. Several advantages of chatbots for real estate firms include: flexibility of customer support, lower cost of service, and enhanced lead acquisition and conversion. Using chatbots, customers' engagement is optimised as it guarantees timely responses to their inquiries. Also, chatbots can arrange property appointments, offer personalised recommendations, and perform subsequent processes; therefore, chatbots are essential for real estate agents (Cîmpeanu, 2021). Quick and effective replies from chatbots affect positive change in customer experience and thus generate more business through referrals.

There are two main approaches to chatbot implementation: Two categories of chatbots are – Artificial Intelligence-based chatbots and Rule-based chatbots. AI-based chatbot utilises different higher-order technologies like neural networks, finite state machines, naïve Bayes Classifiers and support vector machines. Most of these chatbots can be trained and this means that they are capable of determining the intention of a user and getting its corresponding response. AI-based chatbots are different from those which operate based on rules; the latter provide broader and less strict answers. In turn, the rule-based chatbots work according to a certain system of rules designed by programmers. Though these systems are easier to build and apply, they have a quite inflexible structure and cannot handle open or rather complex questions. In the context of the UAE real estate sector, AI chatbots offer a great opportunity for enhancing the clients' service and optimising organisational activities. They allow real estate firms to transact with a broad market of clients and offer services that suit personal needs. However, challenges remain. According to Raval (2020), even though chatbots deliver instant replies, they can have trouble understanding complex real estate questions and, therefore, misinterpret some inquiries leading to frustration. However, the fact that financial and personal information is being processed by chatbots is a big issue due to

privacy and security concerns provoked by the legislation of countries like the UAE. Compliance with local laws is very important to minimise legal and corporate image exposures.

First of all, the cost of installing the chatbot application and the expenses necessary to maintain it are also essential for considering the potential profitability, including more significant customer satisfaction and organisational effectiveness. On the positive side, chatbots may help to minimise labour expenses and be always available to assist, yet, further evaluation of the return on investment is required. Also, firms need to assess whether the application of chatbots can be effective in the management of various types of inquiries from customers, as well as in the preservation of the trust of buyers. Lastly, AI-assisted Chatbot Theory provides a conceptual direction for improving the customer experience and business performance in the UAE's real estate industry. However, to achieve these improvements more effectively, firms face challenges with concerns to understanding the user query, data privacy, and cost. It therefore becomes possible for real estate organisations to adopt the use of chatbot technology in a way that optimises its benefits without compromising on its drawbacks in a way that enhances the organisation's growth and customer satisfaction.

2.2.5 Internet of Things (IoT) Theory

IoT is a system of objects, sensors, and nodes that collect and share information through the internet connection. In the real estate business, IoT is well implemented to connect various equipment including energy management systems, monitoring cameras and smart thermostats for enhanced functionality. These devices feed data to AI algorithms for better decision-making and improving efficiency of the business operations in the commercial real estate sector.

The more general IoT framework is described by Teizer et al. (2017) and concerns data location and cloud-based information systems in construction management. This framework focuses on developing environments free of hazards in addition to adding value and delivering high-quality projects. Reja and Varghese (2019) built on this by examining how IoT technologies, connected to the 5G network, improve construction management activities. In real estate, IoT solutions help in the proactive maintenance of building structures, the detection of flaws, and the prevention of possible mishaps that may lead to property management.

Artificial intelligence and the Internet of Things (IoT) facilitate prediction analysis, which uses algorithms like outlier detection and clustering (Aldahiri, Alrashed, and Hussain, 2021). These analyses assist in providing a rationalisation of decisions in the valuation of properties. He et al. (2021) showed how IoT technologies that are crucial for digitalised operations in real estate can also generate new value propositions in the industry. However, the main challenges of adopting IoT-based systems in real estate are data openness, tenants' knowledge, and privacy concerns. In the UAE, the legal requirements of data protection have to be met to prevent legal and ethical problems when dealing with data including, financial or personal data. IoT also enhances the smart management of buildings since it manages features such as heating, ventilation air conditioning, and lighting. However, there are still controversies on the effectiveness of the technologies and the Return on Investment (ROI) it can bring to implement these technologies. Though cutting costs and improving tenant satisfaction, there are need to perform assessments for the reliability and sustainability of these predictive maintenance systems. However, one of the largest issues that need to be overcome in the UAE context is the problem of the privacy of tenants and simultaneously providing them with better experiences through data collection. According to IoT theory, the issue of legal requirements compliance is critical towards the sustainability of IoT technology; for instance, cybersecurity legislations and standards for the integration of IoT devices. In addition to this, IoT and AI systems can also assist the UAE with sustainability by providing better support to energy-efficient technologies. Therefore, it is crucial to perform a critical evaluation of these systems, the advantages and the disadvantages of these systems to determine the impact of these systems on the UAE's real estate sector.

2.2.6 Theoretical Perspective of Machine Learning

In the context of the developed theoretical framework of machine learning (ML), its practical usage has been expanded in the field of real estate, including property pricing and prediction. While in the past, machine learning was rather popular in some industries, it has become one of the central tools for predictive analysis in real estate (Aldahiri, Alrasted, and Hussain, 2021). The hedonic pricing models which are part of the machine learning application work in estimating property prices based on structural and non-structural features. These models use features including location, size, quality, and age of the property to calculate the additional value of each feature. However, Mullainathan and Spiess (2017) have criticised hedonic models stating that their structure is opaque and does not relate clear theory to the model. To solve these problems, Wei et

al. (2022) suggest the integration of deep learning algorithms to improve robustness while still promoting interpretability.

Machine learning has new approaches, such as sophisticated hedonic models and regression equations, in assessing property (Lechner et. al., 2020). In the present algorithms, accuracy is enhanced by the ability to process large data sets and improve the ability to forecast property prices and trends. However, models of this kind need large amounts of accurate data and a large number of data points to work efficiently. Otchere et al. (2021) opine that integration of multiple data types with the ML models provides a fair and holistic approach, to fill the gap between scarce conventional data and modern analytical needs.

Another major development within the field of machine learning for real estate valuation is the inclusion of extra-geometric information sources. Such sources include social media, mobile telecommunication data, and citizen-generated data, which provide details of hyperlocal property trends (Truong et al., 2020). For instance, one may capture sentiments from social media, mobility signals from mobile phones and the distance from service stations or dining facilities that are not easily captured by conventional measures. The use of such unconventional data sources enhances the various predictions hence benefiting the real estate appraisers and buyers. Nevertheless, this study has established that machine learning has some limitations in dealing with some qualitative characteristics of property valuation. Elements such as construction standards, beauty, and movement patterns are difficult to measure in algorithms (Wei et al., 2022). In addition, variation in training data and lack of uniformity in data across different geographical locations results in variation in prediction. These gaps have been addressed by machine learning by including techniques that adapt the models to change constantly and create new predictions depending on new data (Penumuru, Muthuswamy, and Karumbu, 2020). Machine learning theory takes basic concepts of computer science and statistics to develop robust algorithms that can parse large amounts of data. It uses mathematical models that provide logarithmic convergence meaning that regardless of the amount of data fed into the model, distractions are minimised. This computational resilience enables the effective scalability of frameworks for real estate applications and guarantees that the ML algorithms are robust under large-varying data environments (Penumuru, Muthuswamy, and Karumbu, 2020).

Besides valuation, machine learning applications include predictive maintenance, resource utilisation, and investment pattern analysis. The above capabilities assist real estate firms to eliminate possibilities of human mistakes, work faster and even increasing efficiency. However, there is increasing pressure to optimise these algorithms for accuracy, while also being able to understand and explain these predictions to users who will then depend on these models to make important decisions. As a result of the use of enhanced computation and socio-economic information, machine learning remains a progressive tool in the real estate industry.

2.2.7 Strategic Property Management and AI

Strategic Property Management (SPM) is defined as the process of aligning real estate assets with an organisation's long-term strategic objectives (Nunnington and Haynes, 2011). It encompasses investment planning, space optimisation, and technology integration aimed at enhancing operational and financial performance. In currnet study, SPM refers to the alignment of real estate assets and property operations with an organisation's long-term strategic goals. Rather than focusing solely on facility upkeep or tenant services, SPM includes high-level planning regarding acquisition, investment, and asset utilisation in ways that maximise financial performance and support organisational competitiveness (Nunnington and Haynes, 2011). In emerging markets, this strategic lens is particularly relevant given the volatility of demand, regulatory uncertainty, and the rising value of urban property (Oladokun and Oni, 2016).

In the UAE, the fast-paced evolution of the real estate sector demands the integration of AI tools into property management to support strategic goals. The pricing model introduced by Del Giudice et al. (2020), for instance, enables short- and mid-term forecasting with increased accuracy, helping firms adjust strategies in response to shifting demand and vacancy rates. Similarly, property recommendation systems, CRM models, and AVMs support data-driven decisions in tenant engagement, valuation, and customer relationship management, all of which fall under the scope of SPM when executed with a strategic orientation. CRM systems are particularly relevant since they enhance the long-term relationships between the firms and customers, and enhance customer loyalty and satisfaction (Shiu et al., 2019). Another important innovation is an Automated Valuation Model (AVM) that is designed to reflect the value of the property based on data obtained from market analysis and characteristics of the dwelling with the use of machine learning algorithms. Altogether these AI-enabled systems mitigate major problems like

incompetence of the property management firms, wrong perceptions about the real estate industry and scarcity of properties. When implemented jointly, these technologies are beneficial for property management firms because they increase operational efficiency, provide more accurate valuations of the properties, and address emerging market conditions.

2.3 Empirical Review

2.3.1 AI Trends in transforming the real-estate sector

The adoption of AI in real estate has not been as rapid as in other areas like healthcare, e-commerce, and information security. According to Sing et al. (2022), this delay is associated with the cultural differences, resistance to changes, company ownership, and data sharing. Nevertheless, in recent months, there have been indicators of a shift towards a more positive attitude towards AI and data-sharing culture, which were motivated by the promise of artificial intelligence (AI) to revolutionise the real estate industry, also known as Property Technology (PropTech). PropTech refers to the application of information technology systems to enhance and automate real estate functions, such as purchasing, selling, renting, and managing the property (Bibri, 2021). It includes software and hardware solutions that streamline or revolutionise the manner in which individuals purchase, sell, lease, administer or invest in real estate. With a growing tendency of industry becoming more data-driven, tools (PropTech) are becoming necessary to enhance transparency, efficiency of operations and customer experience. Shaw (2020) notes that the industry has witnessed an increasing trend of data sharing whereby firms cooperate through sharing of related data to facilitate the transactions, hence improving cooperation. PropTech has been regarded as a pioneer in facilitating the digitalization of real estate.

Being a notion that involves AI-enhanced software and solutions to manage residential and commercial property, PropTech contains the problems related to information asymmetry and ineffective trade (Braesemann and Baum, 2020). PropTech applications can be used to make decisions based on an analysis of big data because it increases transparency and streamlines operations. As a case in point, Dealpath is a PropTech product that simplifies operations and promotes collaboration among teams, even in Commercial Real Estate (CRE) management (Conway, 2018). The other tools, like View the Space (VTS), assist with asset management and tenant leasing, enhancing transparency, allowing 3D visualisations, and making decisions (VTS,

2022a). Collectively, these platforms add value through data management, gap bridging between stakeholders and a competitive advantage.

However, the possibility of the use of AI and PropTech tools is not without some bottlenecks. Conway (2018) laments that although these technologies support quicker decisions and more transactions, this does not necessarily translate to bigger margins because of issues to do with lower operating intensity as well as increased offerings from rivals. Also, the advancement of AI technologies in real estate is not balanced across the global markets. Abidoye and Chan (2017) found that Nigerian property valuers were aware of the applicability of AI for property valuation however, implementation was constrained by inadequate regulatory endorsement and professional development. This underlines the necessity of the collective actions of professional organisations in support of AI deployment in the new markets. Machine learning (ML), IoT, and blockchain are among the new technologies that are already active in the continuous evolution of the real estate industry. For instance, Ullah et al. (2018) proposed nine disruptive technologies namely 3D scanning, robotics, and wearable devices that altogether revolutionise property management, financing and construction processes. This was their conclusion: while they improve operational performance, high costs, organisational resistance, and inadequate government funding can hinder adoption.

Smart real estate is a good example of how PropTech can apply IoT and AI to property management systems. According to Treleaven et al. (2021), digital transformation in the real estate business does not only focus on smart processes and data management but also the right use of data. This is in line with the current developments in the global real estate industry where companies such as VTS provide solutions for property search, tenant satisfaction and operational efficiency (VTS, 2022b). Another important development is the use of non-conventional data in property appraisal. According to Truong et al. (2020), various sources such as social networks, mobile telecommunications and citizen-generated information are similar to traditional measures, which provide more insights into property characteristics and market trends. For instance, the signal strength, and the locations with many gas stations or dining facilities provide more accurate property appraisals. They minimise human factors, improve the forecast of events and improve decision-making for property managers and investors.

However, challenges persist. Viriato (2019) carried out a qualitative and found that despite the positive impacts of AI and Machine learning in decision-making and enhancing operations within real estate firms, the high cost of implementing such AI and ML, and the small number of empirical studies in some areas remain critical drawbacks to generalizability. These findings suggest that the application of AI should be properly contextualised within the market of the region in question to obtain the best results. Thus, finally, it is necessary to underline that even though the real estate sector was one of the world's most cautious in terms of implementing new technologies into practical work, with the help of AI and PropTech solutions the industry gradually changing. These innovations range from optimising work processes to increasing property values, as well as creating better experiences for tenants, which are indicative of the movement towards a more rational and accountable real estate industry. However, issues like regulatory, cost and organisational remain key hurdles on the path to actualising AI's potential in real estate.

2.3.2 Barriers to the adoption of AI technology into the real estate sector

Although the implementation of new innovative solutions such as artificial intelligence (AI) has many advantages, the integration is mitigated by several factors (Nnaji and Karakhan, 2020). These barriers are across the technological, organisational and environmental factors which are often grouped under the TOE framework (Molinillo and Japutra 2017). Specifically, the TOE framework offers a systematic way of analysing and classifying the issues related to technology implementation. For instance, technology issues are solved by the technical staff, organisational issues are solved by the management team, and issues with the environment involve stakeholders from the outside.

Technological Barriers: Some of the common technological challenges include; poor infrastructure, insufficient knowledge on integration of the AI technologies with currently implemented systems and little market information on the application of AI technologies. For instance, Kim et al. (2018) pointed out the lack of legal support, low accuracy of property valuation, lack of knowledge of smart contracts, and many others. Likewise, Sinaeepourfard et al. (2018) also highlighted the challenges of building and operating standalone online platforms because of the integration of AI into conventional real estate processes. The inability to fully capture, store, and process the so-called 'big data' is still considered to be a major issue. Challenges that organisations face include data complexity, technical incompetence, and inadequate top

management commitment (Haneem et al., 2019). Sophisticated AI technologies require significant data for work while many organisations struggle to organize, gather, and apply such data. The main barriers to using data to address problems and make decisions involve increasing technological understanding and raising awareness about the need for technology education (Conway, 2018).

Organisational Barriers: This brings out the fact that organisational resistance to change continues to be a major challenge in the implementation of AI in the real estate industry. Liang and Qi (2017) noted that one of the major challenges that traditional organisations face is that they are rigid and hence cannot compete effectively with tech-savvy competitors who now characterise most markets. Similarly, Ullah and Sepasgozar (2020) pointed out that real estate agents lack the enthusiasm to adopt digital innovations by restricting the use of proper technologies. Solving these problems means changing the organisational culture and making managers and employees change their behaviour to ensure trust, information sharing and knowledge development (Ho et al., 2017). The use of digital technologies and encouraging stakeholders' cooperation are also important needs to be motivated. Stone et al. (2018) went further to explain that, due to a poor understanding of the advantages of AI and low motivation to make investments, resistance is sustained. Managers and other stakeholders should support experimentation to build acceptance and trust towards the digital transformation of organisations by integrating strategies with ICT-based solutions.

Environmental Barriers: External factors which are outside the organisation influence include regulatory constraints, limited government support, and customers' rights to privacy and security (Dwivedi et al., 2017). The lack of standard format and legal framework to regulate AI slows it up in areas where reputation and honesty are crucial – like real estate. Mora et al. (2018) argued that public reluctance to embrace AI technologies is due to issues of safety, which have to be solved by means of adequate methodologies of data protection and by following the basic principles of non-misleading communication. Moreover, there is no public pressure to adopt AI-based solutions, which increases the resistance of small businesses. Anthony et al. (2019) established that cognitive dissonance and mistrust concerning data outsourcing remain prominent challenges, especially in formalised markets, such as real estate. Solving these problems requires raising the level of awareness of specific potential advantages of AI technologies to increase user trust. Nonetheless, the TOE framework has been used sparingly in the context of the real estate industry while it has

been useful in analysing barriers in other sectors. Research like Umam et al. (2020) and Neupane et al. (2019) used TOE to solve challenges related to smart district services and to enhance the confidence of stakeholders in smart cities. Yet, its use for analysing AI barriers relevant to the UAE's real estate industry is somewhat restricted. Applying the TOE framework to actual studies in the real estate domain could help identify how firms overcome technological, organisational, and environmental barriers. For instance, information sharing technologies and social media are useful in communication, cost reduction and can increase productivity (Ghouri and Mani, 2019). Along the same line, where government incentives and a clear policy direction provide for AI promotion, as well as clearly outlined standards diminish environmental pressures, AI implementation is actively supported (Dwivedi et al., 2017).

The realisation of AI technologies in the real estate business faces technological, organisational and environmental constraints. The problems mentioned above should, therefore, be addressed systematically with the aid of frameworks such as TOE. With a digital push, culture, and improvement of collaboration alongside dealing with public fears of creativity, in terms of privacy and security, organisations can lead to more adoption and advancement of AI in the real estate market.

2.3.3 Beneficial impact of AI in the real estate sector

Real estate is acknowledged as one of the most profitable kinds of business, and one of the most important stages of its making is the decision on the price. Alfiyatin et al. (2017) examined the prediction analysis on house prices in Malang City, East Java, by applying PSO and regression models. The study also pointed out that these AI-enabled models facilitate the prediction models for the price in a very efficient way as compared to manual interference and it also pointed out that these were less time-consuming and less error-prone when dealing with huge volumes of datasets. Such processes, when automated through prediction modelling, allow the analysis of thousands of data from various sources and provide more accurate property values. This systematic process involves data pre-processing and selection, model development and deployment and finally helps to reduce the overpayment risks for buyers and also helps the investors to identify the possible risks in property buying.

Real estate valuation has benefited from the developments in artificial intelligence (AI), particularly machine learning (ML). Feature engineering refers to the process of selecting,

transforming, and creating relevant input variables (features) from raw data to improve the accuracy and performance of AI models (Zheng and Casari, 2018). In the context of real estate valuation, it involves transforming complex and diverse property-related inputs—such as number of rooms, amenities, location, and infrastructure quality—into structured variables that enable accurate predictions. For instance, Manjula et al. (2017) built prediction models using features like ambience, land coverage, and number of rooms, assigning weights to these to enhance price prediction accuracy. Such feature selection and transformation make models more robust and context-sensitive, especially when buyer-oriented variables (e.g., proximity to schools or parks) are incorporated. Manjula et al. (2017) proposed prediction models based on features such as ambience, number of rooms and land coverage and given weights to these variables to give better accuracy. This approach not only makes data transformation easier but also enhances the model accuracy so that appraisers can provide highly uniform and credible property valuations. The impact of the locality and other factors that do not relate to the property's appearance has also been researched. Kuvalekar et al. (2020) noted that infrastructure quality, crime rate, air quality and population density have a huge impact on housing prices. Monitoring these parameters separately is almost impossible, which requires the formation of integrated databases for these variables using ML algorithms. Features such as these are included in decision tree regression algorithms, for example, to ensure that the estimates given are accurate and inclusive of all details. Unlike other models, these algorithms include buyer-oriented variables, for instance, the distance to schools or other amenities, so that the valuations correspond to market conditions. Banerjee and Dutta (2017) and Phan (2018) used ML models to forecast trends in housing in various regions, with Melbourne, Australia as a case. These studies employed the information gathered from history, prior purchase price and regional factors to provide accurate estimations. The same was explained by Malpezzi (2003) in the example of how business prosperity in cities and neighbourhood characteristics affect the values of real estate, which confirmed the context sensitivity of ML models. Introducing socio-economic variables, ML allows real estate firms to consider various aspects and avoid distortion in valuations.

AI is not only helping achieve greater accuracy in the valuation process but also revolutionising the way that clients are served and business is done. The usage of artificial intelligence and machine learning in real estate broking are used to analyse the big unstructured data and provide accurate information on real estate values and market trends to the clients. Everywhere, from paint

colours to home price estimates, bots applying ML algorithms make services more personalised. Moreover, these tools shrink the median error of the price predictions, enabling firms to fine-tune their products and services and provide stakeholders with rich, actionable data. This review discusses the advantages of applying AI in the real estate industry, including utilisation in analytics, operation, and decision-making. Nonetheless, it is vital to conduct a discussion about the contextual factors in assessing the validity of the valuation models as stated by Vineeth et al These findings imply that it is critical to periodically assess the peculiarities of the contexts in which the valuation models are applied to match the current market conditions. Harnessing data analytics and predictive methods remains an ongoing trend in the innovation of a more transparent, efficient and, client centricized real estate industry through the incorporation of AI.

2.3.4 Practical Solutions for the Real Estate Issues

The challenges that the UAE real estate industry encounters are different from the rest of the world, which makes the industry struggle to achieve the best level of operational efficiency and transparency. These include ineffective property management strategies, improper estimation methods and the low-level adoption of new technologies. New AI solutions provide practical and suitable approaches to overcome these issues to help firms transform their operations and enhance their decisions. Traditional practices are being changed by technology through the use of AI-powered property inspection tools. Traditionally, inspections have been time-consuming and highly dependent on the inspector who uses photographs and manual notation. They often fail to identify these important defects, and in the long run, landlords and tenants end up in a disagreement. Su et al. (2021) have explained that AI-driven mobile applications that have pre-set templates and real-time synchronised features can discharge these imperfections. These tools are crucial as they allow other tools and scripts to operate more accurately by providing standardised documentation methods and thus decrease the opportunities for legal issues.

Tenant management is yet another field where AI has made a lot of changes. Manual systems that use emails and telephonic communication cause congestion in matters like rent collection, maintenance, and dispute-solving. These tasks are done by AI in tenant portals, which offer tenants the ability to access self-service options and receive updates in real-time. They also incorporate the financial data, tenant satisfaction surveys, and work order routing all in single platforms making them solve administrative issues comprehensively while at the same time enhancing

customer experiences (Nasreen and Ruming, 2022; Härmand, 2021). Several marketing technologies including Virtual Reality (VR) and Augmented Reality (AR) have transformed the way real estate companies present properties. In the UAE, where markets are competitive and property owners need to come up with more unique ways of marketing their property, VR enables prospective buyers to tour properties virtually thus eliminating the inconveniences of physically moving from one place to another to view the properties. AR supports marketing communication by developing engaging booklets that allow users to visualise the planned projects (Liu et al., 2021). Besides, these technologies not only simplify the search for properties but also improve the buyer's confidence as they get specific information about the property they are interested in (Jati, 2021).

AI techniques have also played a role in changing the ways that property valuations are conducted. Approaches such as hedonic pricing, spatial econometric, and neural network models involve a large number of factors which include place, infrastructure, and facilities to generate accurate values. As much as these models provide accuracy and attempt to minimize human error, it is noteworthy that specialists have warned against outright dependence on these models, stressing the need to blend their precision with real human input on matters of the market and societal/economic pertinence (Ray, 2019; Aristodemou and Tietze, 2018). Such work advancement is essential to the UAE real estate sector, particularly in allowing international investment and stability in the market. Another area where AI finds good use is in the applications of predictive maintenance. AI systems work on IoT-generated data to drive efficiency in resource utilisation, and cost control, and to make processes sustainable. Härmand (2021) noted that all of these technologies are perfectly in line with the UAE's bigger picture of energy conservation and environmental protection. Predictive maintenance does more than reduce downtime and improve tenant satisfaction, it addresses some of the biggest challenges in the real estate industry.

Last but not least, one of the time-consuming manual tasks, namely the management of Certificates of Insurance (COIs) has been made easier with the help of web-based AI applications. Such tools track compliance, remind users when certain licences are expiring soon, and interface with tenant portals to submit documents. Marquez et al. (2022) noted how such innovations streamline processes by cutting the number of administrative tasks necessary, and at the same time meeting the regulatory requirements to continue to advance the modernisation of UAE real estate practises.

Through the implementation of AI technologies, the UAE real estate sector is best positioned to address the issues in inspections, tenant management, marketing, valuation, and maintenance. These advancements are in line with the study's objectives which are to use AI to enhance operational efficiency, operations' transparency and sustainability to enhance compliance to global standards and attract foreign investment.

2.3.5 A Focus on the Customers

Effective systems management is required by real estate firms to ensure enhanced security and control of information systems that hold data about the customers. Systems management includes ensuring improvements in the accuracy of the information, redundancy, and process time (Munawar et al., 2020). A major improvement in this domain can be brought about by implementing AI programs in property management. AI applications including speech support and recognition through natural language processing, analysis of customer data in large amounts through machine learning, customer self-service, and chatbots to support customer interactions with the company have improved the efficiency of customer services management in property management firms (Barkham et al., 2022). By effectively deploying AI capabilities, these firms can determine the most appropriate time to acquire or sell a specific property, estimate rental or sale prices of property units in the present time or for the future, and provide the customers with most updated information and services they require to deal with issues concerning the property in their possession. With the huge amounts of customer data at their disposal, real estate firms can segment their potential and existing customers by considering behavioural, psychological, financial, and social profiles to customise their services and suggest property alternatives as per the specific needs and wants of each customer segment. Furthermore, policies related to real estate and property management in the UAE require each sector to be structured. With the increasing demand for applying digitalisation in every business as well as the residential provisions, real estate also requires the use of disruptive AI technologies to provide smart solutions to the customers to ensure they get the maximum value from the property services providers (Del Giudice et al., 2020). Property management firms have the opportunity to develop and implement an appropriate systems framework that helps them fulfil their business needs and use efficient applications and infrastructure to achieve related objectives. For instance, by implementing the geographic information system (GIS) technology based on e-business competencies, real estate firms can leverage spatial property information management, which is concerned with updated

user information and property information (Li et al., 2019). Among these AI applications, chatbots powered by natural language processing (NLP) have emerged as one of the most effective tools for customer-focused operations in real estate. They provide 24/7 support, automate responses to frequently asked questions, and enable real-time interactions that reduce staff workload and improve customer experience. According to Barkham et al. (2022), chatbot systems can handle up to 80% of standard customer queries in property management, significantly reducing service time and increasing client satisfaction. In the UAE, where tenants and buyers often require multilingual, instant support, NLP-based AI tools help firms meet these expectations cost-effectively. Their ability to personalise interactions and instantly access databases of property details makes them particularly suitable for the fast-paced and competitive real estate environment. In this context, the contribution of AI techniques including machine learning, artificial neural networks, and Bayesian networks (to handle uncertainty in decision-making) is substantial to improve systems management in the real estate sector.

2.3.6 Resource Management Optimisation

Proper management of property assets as one of the key organisational resources is one of the key factors of effective work in the field of real estate. AI application in the management of resources has the potential to revolutionise the real estate industry by improving efficiency and encouraging appropriate practices. The property resources are as important as the financial, human and informational resources and the use of creativity and innovation through artificial intelligence technologies has become vital in this regard (Dong et al., 2018). AI technologies provide various forms of resource utilisation that can suit various aspects of real estate operations. For example, property resource management targets the enhancement of income streams from property resources while at the same time maintaining the property resources portfolio value. Zhang (2021) adopted big-data simulations to analyse financial risks or land venture risks and provide predictive patterns of resource allocation. Likewise, smart real estate management embraces technology application, sustainability, and consumers oriented practices to manage resources systematically.

In environmental resource optimisation, Yu et al. (2021) provided a model of a hybridised intelligent framework that integrates AI recycling systems. Such systems facilitate waste minimisation, collection, recycling and reusing conforming to sustainable environmental development plans. That is why all the outlined innovations contribute to the use of AI in

increasing environmental responsibility within the sphere of actual estate. A particular method called Fuzzy logic is useful in the management of resources. Fuzzy logic is defined as a computational method used to process uncertain information similar to the human way of functioning. Fuzzy logic cannot be defined and operate with simply the 'True or False' terms as is the case with binary logic (Majumder and Biswas, 2022). The application of fuzzy logic in the real estate business can improve the decision-making process of the numerous parameters involved in the decision-making process in real estate such as energy consumption in smart buildings or risks during land development.

In the same way, AI is also important to coordinate and handle different resources typical in real estate. For instance, Majumder and Biswas (2022) showed how AI can enhance human resources management a crucial sector that is rarely discussed in the real estate context. In the COVID-19 crisis, AI-supported collaborations, virtual hiring and personnel management showed flexibility and continued to function during crises. These tools help firms to match organisational human capital with organisational strategic requirements thereby increasing efficiency and flexibility. Although AI technologies have proved effective in improving resource management the real estate sector has yet to discover how these tools can be successfully implemented. Recent research suggests that organisations must develop large-scale strategies that encompass property, environment and human resource management with AI. Such an approach would not have only improved the operating efficiency but also contributed to the creation of sustainable value for real estate firms

2.3.7 Risk Mitigation through Automated Property Management System

Property management relates to optimising the income from a specific property and protecting it from wastage or deterioration by efficiently managing available controlling, coordinating, and directing skills, leading to the development of an efficient system. AI provides the required assistance to property management firms to allocate resources and gain maximum returns from rental or sale services (Okpala et al., 2020). The scenario method (that considers assumed uncertainties and visible risks to plan for a potential future) provides the essential support to investigate pitfalls, principles, and practices of scenario building to offer techniques that investigate management, investment, and property development decisions besides policy formulations for efficient use of the property. AI can boost risk mitigation in real estate

organisations by providing them with the ability to identify risky behaviours and evaluate unstructured data (Izumi et al., 2019). AI-based algorithms help in determining behavioural patterns concerning related incidents that happened in the past and consider them to be the indicators of risks. In this regard, however, the use of intense analysis processes is required for insurers and financial institutions. Notably, the implementation of AI in property management to manage risks is associated with increased costs incurred despite the use of cloud-native services. It implies that using specialised AI services can be very expensive. Other services based on AI including obfuscation, tokenisation, transit security, and encryption are also required by companies that transform their operations to be managed online using cloud services, to ensure data security in property organisations (Yigitcanlar et al., 2020). AI-integrated risk management systems to enhance organisational efficiency incorporate data classification, fraud detection, risk reduction, and threat analysis and management. Specifically, AI-empowered property management systems combine the capabilities of machine learning technology and a hedonic price model to determine how property prices vary. The impact of economic recession on property values can be assessed by analysing the rent or sale dynamics of residential, commercial, or industrial property (Izumi et al., 2019). Applied regression analysis and timely proprietary data can be used effectively to indicate estimated prices of property in the aforesaid context.

2.3.8 Efficient AI-based Models in Property Management

The real estate industry in the UAE still lags in developing technological innovations and requires enhancing its technological curve. The neural network modelling explained patterns in data to reflect on the formation of property submarkets. In this regard, two neural network techniques including self-organising maps and learning vector quantities are crucial due to their classification ability. The study made by Ullah et al. (2019) introduced the technology acceptance model to represent the requirements of real estate stakeholders. Furthermore, a fuzzy clustering approach can be used to develop an autoregressive model, which can be implemented to forecast sale price indices of residential property (Vatansever et al., 2020). Besides, Shim and Hwang (2018) proposed the geographically and temporally weighted autoregressive model based on the kernel, which helps study housing prices. It combines vector machine regression principles with a model having spatially and temporally varying coefficients. Additionally, property price index forecasting is influenced by artificial intelligence and the impact can be measured by using a support vector machine model, autoregressive integrated moving average (ARIMA), and artificial

neural network (ANN), as explained by Abidoye et al. (2019). Another efficient model to assess the capabilities of financial interoperability associated with new customers in property management is the property model linked with shared equity housing based on community land trust. Research (Moro et al., 2020) also indicates that a combined model for property sales forecasting can be developed by using time series information and carrying out modelling based on ANNs, exponential softening, and Box-Jenkins. Notably, a fuzzy logic model to be used as a fundamental system for creating a hierarchical adjustment can be used effectively to investigate the investment risks in property management to ensure regional development sustainably. To summarise, it is inevitable to determine the appropriate digital technology for property management and assess the capability to accept technology to carry out efficient strategic AI implementation planning for the required improvement of the UAE's real estate industry. It is also critical for the success of the industry to instil technology management as an integral part of the UAE's real estate sector by benefiting from AI to reduce the risks related to external social, environmental, economic, and political factors.

Based on the theories and empirical studies reviewed in Sections 2.2 and 2.3, the key constructs that emerge—such as property valuation accuracy, customer experience, strategic management, and AI-enabled operational efficiency—form the foundation of this study's conceptual framework. These constructs directly relate to the research aim and objectives outlined in Chapter 1 and offer a structured pathway to address the core research questions. The following conceptual framework integrates these insights to guide the study's analytical lens.

2.4 Conceptual Framework

This study's conceptual framework synthesises the theories, concepts, and empirical patterns discussed in the previous sections to enable a systematic analysis of AI adoption in the UAE real estate industry. These concepts and ideas connect fundamental constructs, theoretical approaches, and research queries to allow for a crucial and exigent examination of the AI transformation. The proposed framework is relevant to both the academic literature and the UAE real estate industry since it is based on how AI solves problems, improves clients' satisfaction, and fits sustainability objectives. Thus, the study synthesises multiple elements, such as research objectives, theories, and concepts, including safety and comfort. This synthesis does not only catalogue the components and relationships between these elements but also analyses the dynamics of these relationships to

adequately support the study's foundation. By mapping theoretical constructs with empirical concerns, the framework fills theoretical and practical gaps in prior research and offers practical insight into how and why AI influences real estate processes.

2.4.1 Guiding research questions and objectives

The research questions that this study concerns itself with pertain to the areas of real estate that stand to benefit from the use of AI in the industry and the processes that enhance in terms of cost, effectiveness, and client satisfaction. These questions raise questions on the impact of AI technologies, as the independent variables on the dependent variables including operation improvement, customer satisfaction, and sustainability. For instance, the study looks at how big data and AI-integrated property management systems reduce decision-making cycles. Also, the research aims to explore how much of these benefits are passed to the end-users to improve their satisfaction and trust in the real estate sector. In line with these questions, the research objectives focus on defining certain fields that have benefited from the application of AI technologies, including the valuation of properties, client management, and sustainable activities. The research also aims at establishing how these technologies help the real estate firms to operate at par with the international standards besides helping them to operate in the markets and also to maintain competitive advantages. The following objectives are essential in capturing how AI enhances innovation and solves problems peculiar to the UAE real estate sector.

2.4.2. AI Role in Enhancing Competitiveness and Profitability in the Real Estate Industry

AI is revolutionizing competitiveness and profitability of the UAE's real estate industry through automation, better property appraisal, and improved customer relations. The adoption of AI brings effectiveness and efficiency to the market and operations; however, it faces integration issues, data issues, and issues on regulation. Today, analytics, RPA, and CRM are considered the key enablers of competitive advantage, but scholars state that human capital is still indispensable for decision-making (Kabaivanov and Markovska, 2021). AI helps in increasing competitiveness through automation of processes and increasing the productivity especially in the areas of document review, property appraisal, and legal issues. Ownership verification, contract evaluation, and due diligence activities are some of the tasks that are made easier and more secure through the use of AI in document analysis (Power, 2004). Besides, there are also other forms of valuation models like the automated valuation models (AVM) that use data to generate real-time property price

forecasts, thus eliminating human error and enhancing investment precision (Zhou et al., 2018). But some authors claim that AI valuations should be complemented with the conventional approaches to appraisal, especially when socio-economic factors affect the property prices in an unstable manner (Naz et al., 2022).

Another area that AI helps to build competitiveness in UAE's digital-first real estate market is customer engagement. This is because AI-powered CRM systems, chatbots, and other predictive analytical tools help firms to personalize their marketing approaches, respond faster, and increase the customer loyalty level (Huang and Rust, 2021). It is beneficial to the real estate firms as AI virtual assistants are capable of studying customers' preferences and thus enhancing the services and increasing the conversion rate (Areo, 2024). However, some scholars have pointed out that for real estate sales, customers need to trust the salesperson, and this can only be achieved through face-to-face interaction, meaning that there should be a combination of AI and human intervention (Schraagen and van Diggelen, 2021).

From a profitability point of view, AI increases the value by cutting wastage and maximizing the return on investment. Artificial intelligence helps investors to make decisions about rental yields, trends, and vacancy rates, which is helpful for decision making (Ullah et al., 2021). Artificial intelligence tools in the market help to enhance the accuracy of pricing strategies and predict profitable investment avenues (Lambourne, 2021). However, some scholars posit that despite the benefits of AI in forecasting the economy and its volatility or shocks need to be monitored by human beings when making investment decisions (Salama et al., 2024).

AI also reduces the expenses on administration, such as on the management of tenants, tracking of leases, compliance, and facility maintenance. Through the use of AI in property management systems, property owners are able to enhance efficiency in rent collection, schedules for maintenance and communication with the renters and all this has proven to lower the operational costs (Alfiyatin et al., 2017). In addition, AI enhances legal and regulatory compliance by reviewing contracts and identifying compliance issues, thereby conforming to the evolving laws of UAE in properties (Kabaivanov and Markovska, 2021). However, there is a positive impact of AI in compliance, the application of AI involves constant changes in line with the legal requirements which poses a challenge as it incurs additional expenses to the real estate firms (Devapitchai et al., 2024). However, there are limitations that include integration issues, regulatory

issues, and data biases in the UAE real estate market where AI's competitiveness and profitability have advanced remarkably. The argument of whether AI should be used to make decisions or whether the role should be handled by human beings implies that the most effective approach to competitiveness and long-term ROI is to integrate AI automation with human supervision (Kabaivanov and Markovska, 2021).

2.4.3 AI-Driven Enhancements in Safety and Comfort for Property Management Practitioners and Construction Professional

The significance of AI in improving safety and comfort is recognised by property management professionals and construction industry specialists in the UAE (Kineber et al., 2023). Nevertheless, the implementation of AI solutions is designed to provide maintenance, security, and environmental control where the challenges include industry type, infrastructure, standard requirements or adaptation of the team members (Ajayi et al., 2018).

In context of property management practitioners, AI improves safety through the prediction of HVAC failure, leakages in plumbing systems and structural flaws that are likely to occur in the future (Yang et al., 2018). This is cost effective as it minimizes situations where there may be sudden need for repair, thus saving the tenants' time, and also environmentally friendly, thus in compliance with Dubai's green agenda (Riadh, 2022). Nevertheless, practitioners who are in charge of older buildings find it difficult to incorporate AI into the existing building systems, and as such, some of them prefer conventional maintenance schedules (Bouabdallaoui et al., 2021). Facial recognition, anomaly detection using AI in IoT security enhance real time threat monitoring (Benduch, 2023). However, issues of data privacy laws and algorithmic fairness make it compulsory for property managers to incorporate security of AI with supervision by human beings (Kuppan et al., 2024). Thus, from the construction sector point of view, AI optimizes the safety of the working environment by detecting potential risks, for example, weakness in construction structures or lack of compliance to safety measures among the workers (Tambe et al., 2019). Drones and IoT sensors help in site inspections and risk analysis to avoid incidence of accidents and legal issues (Wolniak and Stecuła, 2024). However, the use of AI in safety management poses some risks such as the failure of the system or inaccurate risk assessment, which makes on-site safety managers important (Majumder, 2022).

For instance, the comfort of the building is enhanced by using artificial intelligence based HVAC and lighting systems for tenants and at the same time, energy costs are cut down (Yang et al., 2018). However, it can reduce the tenant's control; therefore, there must be a balance between efficiency and user preference (Tejani, 2024). Construction professionals, however, pay attention to AI for acoustic design and intelligent insulation to improve the comfort of urban residential buildings especially those in high rise buildings (Bidollahkhani and Kunkel, 2024).

In conclusion, AI has the potential to greatly improve the safety and convenience for property management practitioners and construction professionals; however, certain issues related to the specifics of the sector can only be solved with a combination of AI and human intervention (Kineber et al., 2023).

2.4.4 Theoretical framework and tacit theoretical perspectives

This study integrates Actor-Network Theory (ANT), Behavioural Theory, and Sociomateriality as theoretical foundations for analysing the phenomenon of AI adoption in the real estate industry. These are not only valid but rather crucial views for the comprehension of the interactions between the human and technological actors in the formation of the operational activity and the decision-making. ANT focuses on the networks of human and non-human actors involved in particular socio-material contexts of work including AI systems in organisations. This perspective allows a critical assessment of how AI technologies engage with real estate practitioners, customers and facilities to produce results. As van Rijmenam and Logue highlight in 2021, ANT describes how the agency within a network is distributed hierarchically and how human and technological actors of the network are taken into consideration. For instance, when engaging clients through human-like chatbots, ANT sheds light on how clients interact with such artificial intelligence applications to enhance or dampen satisfaction and organisational productivity.

On the contrary, Behavioural Theory deals with how an organisation learns and adapts, especially in the event of technological change. In their study, Lemley et al. (2017) note that organisations engaging in strategic management of technologies do not only act in reaction to pressures from the environment but also seek new chances for change and differentiation. This perspective can well be applied with regards to the UAE real estate sector because of its challenges such as lack of willingness to adopt AI and skill gaps. Behavioural Theory enables one to look into how organisations overcome these challenges using proactive adaptation, skills acquisition and

organisational culture transformation. The sociomateriality perspective focuses on the interaction between the social and material actors in the development of organisational practises. This theoretical perspective is important for making sense of how AI technologies impact real estate by reorganising work processes, redistributing tasks, and augmenting the decision-making process. Murray et al. (2020) posit that sociomateriality is critical in AI because it focuses on the reciprocal shaping of people and technology in organisations' routines and standards. In the real estate sector, it outlines how AI-driven widgets and predictive analytics are incorporated into the current paradigm by emphasizing dashboards.

Related to this, Institutional Theory enriches the conceptual framework and its analysis of AI adoption in the real estate sector by considering the socio-organisational aspects of technology use. In their view, Hinings et al. (2018) argue that institutional theory makes it possible to understand how organisations implement AI technologies in regulatory, cultural, and economic arrangements. This theory brings up issues of legitimacy, Compliance, and Standardisation as a determinant of the adoption process. For instance, in the UAE, where institutional contexts are still developing and increasingly adapting to digital transformation, institutional theory points to how firms should bring AI into line with national sustainability and international norms. AI has been noted by Stiglitz (2018) to lead to efficiency improvement of production processes and at the same time arouse ethical concerns thus requiring collective agreement on their use. Sociomateriality also deals with the ethical perspective when it comes to AI alternatives, a peculiar interest in data protection, openness, and involvement. On this account, this perspective analyses the interaction of social and technological elements, thus affording an understanding of how the management of efficiency elements should be done in a manner that will meet the ethical standards required for the systems. For example, modern AI-based tenant portals should not only help to optimise routine work, but they should also protect the personal data of tenants, by the provisions of data protection legislation (Kok et al., 2017).

To facilitate better understanding and to highlight the connections between the components of the conceptual framework, Figure 2.1 illustrates the said framework. This diagram represents the connections between concepts (safety and comfort), paradigms (ANT, BT, sociomateriality, and institutional theory), and uses (predictive maintenance, automated valuation, and tenant portals). The visualisation shows how these parts work together to serve the goals and questions of the

study, providing a holistic view of AI's potential to revolutionise the UAE real estate industry. The interconnected components in Figure 2.1 are used to guide the interpretation of the study's results and map them to theoretical and practical implications.

2.4.5 Core Constructs and their relation to Theoretical Perspectives

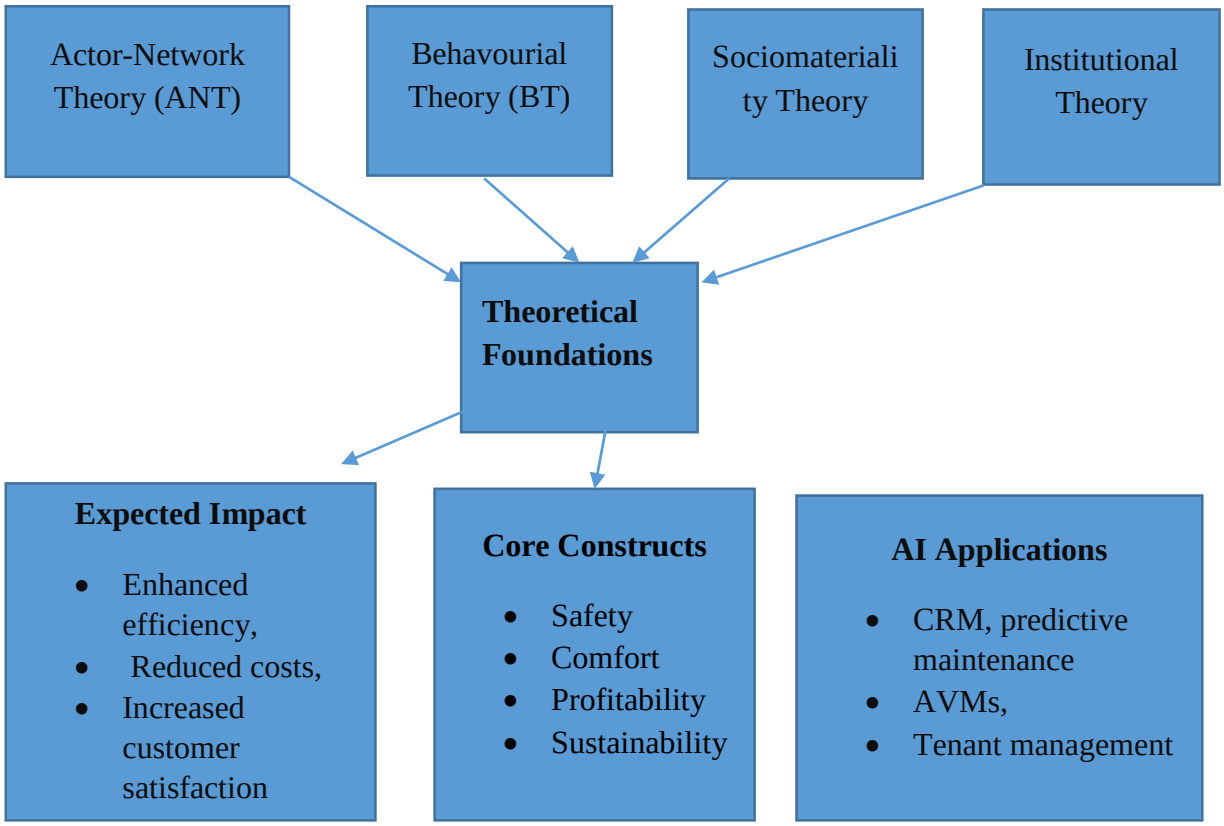


Figure 2.1: Conceptual Framework, Source: Made By Author

The use of the theoretical framework, which includes Actor-Network Theory (ANT), Behavioural Theory (BT), Sociomateriality, and Institutional Theory gives a strong standpoint on the evaluation of AI adoption within the UAE real estate industry. These theories altogether describe how AI redefines safety, comfort, profitability, and sustainability so that technological changes fit the market demands, legal requirements, and organizational necessities.

Safety is another concept that has been discussed under both ANT and Sociomateriality, which focuses on the relations between human and non-human in real estate. Technological advancements such as artificial intelligence in maintenance, smart security and compliance help

in identifying risks, avoiding failures and managing compliance issues to improve safety in operations. According to Härmand (2021), it is important to note that the use of AI safety systems is consistent with sustainability goals in terms of energy consumption and risk management. Moreover, according to the Institutional Theory, AI plays a part in the firm's compliance with the international property standards and the legal requirements of the UAE. Comfort is discussed under the Behavioural Theory that deals with how applications of Artificial Intelligence respond to the needs of the consumers and improve the experiences of the users. Smart home systems powered by artificial intelligence, climate control systems, and self-service tenant applications enhance tenant satisfaction due to their effective response to the needs of the residents (Nasreen and Ruming, 2022). These technologies are not only beneficial in the aspect of comfort but also in minimizing manual work and inefficiencies in services.

The framework also captures the use of profitability and sustainability by AI. AVMs based on artificial intelligence help to minimize biases and maintain stability in the market, as well as to determine the fair price of properties. Tenant management systems with the incorporation of artificial intelligence improve the process of collecting rent, maintenance, and handling of complaints hence improving the operations. They also help in resource optimization, energy consumption and investment, which are all factors that help in achieving long-term profitability and sustainability. Figure 2.1 summarizes how CRM system, predictive maintenance, AVM system, and tenant management platforms work with the aforementioned constructs to increase efficiency, reduce costs, and enhance customers' satisfaction. Thus, the framework for the UAE extends the global literature on AI in real estate from property valuation and market analytics and also covers the aspects of safety, comfort, and sustainability which are important for the UAE. In addition, this conceptual framework not only integrates the theoretical perspective and the empirical studies but also contributes to the further research on the AI change in real estate. It provides a connection between the theoretical and the practical framework which will be useful to both researchers and practitioners who want to implement AI in the context of the UAE's real estate industry.

2.5 Research contexts

In the context of rapid development and urban growth, the impact of technology on the real estate sector has remained a distinct subject of research. Some recent research studies (Sène et al., 2021;

Tian et al., 2021) that have focused their inquiry on the context of COVID-19 stated that the pandemic disrupted the economic order of several countries and brought the operations of the real estate market to a standstill. Broadly, the studies determined that stable operations of real estate sectors are chiefly reliant on the stability of natural and quasi-natural conditions. The empirical results of Tian, Peng and Zhang (2021) showed that digital management of the pricing system in real estate can not only enhance urban resilience but also reduce the adverse effect of any disaster or calamity on asset prices. Similarly, the study determined that the recovery of urban asset prices can also be accelerated to a greater extent if technological solutions are duly integrated. This obliges the incorporation of AI technologies for revolutionising the real estate sector. Furthermore, another practical context that corresponds to this research is the customer-centric management of the property. AI technologies and innovative solutions have tremendously improved the control of better security and information systems which has been enabled through system management. Another added advantage of incorporating AI technologies in the real estate sector is the accuracy of data (Kok et al., 2017). The accuracy of data directly results in improved process time and the prevention of redundancy. The incorporation of technologies has also paved the way for the development and implementation of new policies in every sector, and the real estate sector is no exception. The study by Ullah et al. (2018) ascertained the role of disruptive technologies in the identification of the barriers, usage and drivers of the technology adopted in smart real estate. The research outcomes denoted that since technology is a key element of smartness, the usage of innovative technological solutions should be highly prevalent in smart cities and the real estate industry. Along with this, the advancement in technologies is ever-increasing which renders the real estate sector essentially sustainable and smart due to the increasing sociocultural acceptability and innovative nature of the technologies. For a large number of investors, firms and organisations in the real estate sector, customer-focused management of the property has become highly preferable as the study by Sanderson and Read (2019) found that the perceptions of residents about property management improved when they realised its focus on the well-being of customers. According to this study, there is a higher likelihood that the residents will renew their leases and their willingness to recommend the property to other prospective sellers will also increase. Studies have also suggested that there is a relationship between the financial performance of real estate assets that produce income and customer service which also supports the significance of customer-focused management of the property. This is supported by the underpinning that companies and

firms in the real estate sector can differentiate themselves from their peers and rivals, primarily based on delivering high-quality customer service. However, Read et al. (2016) stated that this can prove difficult due to the intense price competition in the real estate sector, specifically for property management services. The study by Read and Carswell (2019) also maintained that investors in the real estate sector appear to comprehend property management and effective customer service as a product rather than a differentiated means or service which can add real value to the real estate portfolios.

In addition, the rising cost of building materials, supply chain issues, squeezing margins and low levels of human capital have also resulted in an increasingly challenging environment in the real estate sector. There is also a need to continue business operations while addressing decarbonisation and environmental concerns. Simultaneously, the need to adopt varying fiscal policies that frequently come into play also emerges as a consideration. Therefore, the adoption of AI technologies and new digital tools is necessary for improving the effectiveness and efficiency of the processes. This is because, in the real estate sector, digital transformation is continuing to gain pace as the expectations and concerns of potential buyers and property values are fluctuating. Thus, those companies and firms in the real estate sector will be sought by prospective buyers and appraisers who can provide digital experiences which are exceptional and are essentially built around the centricity of the customer or client base.

Technological management in the real estate sector for mitigation of prevailing risks is another dominant practical context with which this research engages. The adoption of AI technologies in the real estate sector has the potential to direct, coordinate and control all the efforts and skills that are available towards the maximisation of the generation of profits from the real estate sector along with the simultaneous maintenance and upkeep of the sector, collectively. Thus, future property development, decisions regarding management, investment and policy formulation of land use can be transformed using AI-driven technological solutions.

For better investments in the future, sustainability is a crucial component that is presently being included in all industries. The detrimental impact on the built environment is lessened by the real estate industry's growing incorporation of sustainability, which includes green buildings that minimise carbon dioxide emissions and operational costs, among other things. In the real estate industry, sustainability is a big problem that calls for cooperation from all parties. Sustainability

would need organisational transformation in terms of the performance and operation of the organisation's social, environmental, and economic aspects, from a real estate viewpoint.

2.6. Summary of Literature Review

Theoretical Foundations Table

Table 2.1: Theoretical Foundations Table

Reference	Title of Publication	Range of Theories	Relevance to the Study	Practical Application
Renigier-Biłozor et al. (2019)	Automated valuation model based on fuzzy and rough set theory for real estate market with insufficient source data	Property Valuation and Data Quality Theories	Examines the impact of AI in improving the valuation process by reducing information asymmetry and increasing transparency in pricing.	AI-driven Automated Valuation Models (AVMs) using hedonic pricing and big data for real-time property pricing.
Ullah et al. (2021)	Modelling users' perception of the online real estate platforms in a digitally disruptive environment: An integrated KANO-SISQual approach	Property Forecast Accuracy Theory	Discusses AI's role in improving real estate forecasts through data-driven modelling, reducing human bias in valuation, and enhancing market predictions.	AI-powered predictive analytics for real estate investors to forecast future property values based on economic trends.
Viriato (2019)	AI and machine learning in real estate investment	Neural Networks and Machine Learning	Explains how AI-driven neural networks can process vast amounts of data, improving real estate pricing, customer segmentation, and property investment strategies.	AI-powered property price forecasting, demand prediction, and personalized real estate recommendations.
Shaw (2020)	AI and Customer Segmentation in Real Estate	Machine Learning and Data Clustering Theories	Examines how AI-based segmentation improves property recommendations and enhances customer targeting by analyzing behavioral data.	AI-driven CRM systems to tailor property listings to customer preferences, leading to higher conversion rates.

Marcondes et al. (2018)	Chatbot theory	Chatbot Theory	Explores how AI-driven chatbots enhance real estate customer service, providing instant responses and reducing human dependency in client interactions.	AI-powered virtual assistants for real estate inquiries, appointment scheduling, and lead generation.
Wei et al. (2022)	The research development of hedonic price model-based real estate appraisal in the era of big data	Hedonic Pricing and Regression Models	Explores how AI and deep learning improve the robustness and interpretability of real estate pricing models.	AI-driven pricing algorithms that analyze economic trends, customer preferences, and property attributes for real-time valuation.
Otchere et al. (2021)	Application of supervised machine learning paradigms in the prediction of petroleum reservoir properties: Comparative analysis of ANN and SVM models	AI Predictive Analytics and Big Data	Discusses how AI models integrate alternative data sources, such as social media sentiment and mobile data, to enhance real estate investment strategies.	AI-based risk analysis platforms for real estate investors incorporating social trends and economic indicators.
Truong et al. (2020)	Housing price prediction via improved machine learning techniques	Big Data and AI Integration Theories	Examines how AI improves real estate analytics by incorporating unconventional data sources such as mobility patterns and online reviews.	AI-powered valuation models integrating social media sentiment analysis and consumer behavior trends.
Ullah and Sepasgozar (2020)	Key factors influencing purchase or rent decisions in smart real estate investments: A system dynamics approach using online forum thread data	Technological, Organizational, and Environmental (TOE) Framework	Identifies barriers to AI adoption, including high costs, resistance to change, and lack of expertise in real estate firms.	AI training programs, digital transformation strategies, and policy recommendations for smooth AI adoption.
Abidoye and Chan (2017)	Barriers to AI in Emerging Markets	AI and Digital Transformation in Real Estate	Examines regulatory and professional challenges limiting AI implementation in the real estate sector.	AI compliance frameworks to ensure legal and ethical adoption in real estate firms.

Shiu et al. (2019)	Fuzzy multicriteria decision-making tools for selecting a professional property management company	AI and Business Process Optimization	Explores how AI-driven property management systems improve operational efficiency, reduce waste, and enhance customer service.	AI-powered automated valuation models (AVMs) and CRM solutions for real estate companies.

Empirical Literature Review

Table 2.2. Empirical Literature Review

Reference	Title of Publication	Range of Theories	Relevance to the Study	Practical Application
Treleaven et al. (2021)	Real estate data marketplace	AI and Digital Transformation in Real Estate	Highlights how AI-powered PropTech enhances transparency, decision-making, and operational efficiency in real estate.	AI-driven platforms for data analytics, automated valuation models (AVMs), and smart property management.
Ullah et al. (2018)	A systematic review of smart real estate technology: Drivers of, and barriers to, the use of digital disruptive technologies and online platforms	Machine Learning and Disruptive Innovation Theories	Examines how AI-driven technologies like 3D scanning, robotics, and wearable devices impact property valuation and forecasting.	AI-based risk analysis for investment, automated real estate valuation, and predictive maintenance.
Hausler et al. (2018)	News-based sentiment analysis in real estate: a machine learning approach	Market Volatility and Predictive Analytics	Highlights the role of AI in handling economic shocks and improving real estate investment forecasting.	AI-powered forecasting tools for property price fluctuations, investment risk assessment, and financial modeling.
Manjula et al. (2017)	Real estate value prediction using multivariate regression models	Hedonic Pricing and Machine Learning Theories	Highlights how feature engineering (ambience, infrastructure, etc.) improves AI-driven property valuation accuracy.	AI-powered decision tree models for property valuation incorporating various real estate characteristics.
Kuvalekar et al. (2020)	House Price Forecasting Using Machine Learning	Real Estate Pricing and Market Trends	Examines the impact of socio-economic factors (infrastructure, crime rate, air quality) on property valuation.	AI-driven models integrating neighborhood data for more accurate property pricing.
Banerjee and Dutta (2017)	Predicting the housing price direction using machine learning techniques	Predictive Analytics and Market Trends	Uses AI and historical data to forecast real estate market trends and predict housing demand.	AI-powered real estate investment analytics for long-term market trend predictions.

Zhang (2021)	Big data simulation for financial risk assessment of real estate bubble based on embedded system and artificial intelligence algorithm	AI and Financial Risk Management	Demonstrates how AI-powered simulations improve financial risk assessment in real estate investments.	AI-driven investment risk assessment tools that analyze financial patterns and land use trends.
Yu et al. (2021)	Environmental planning based on reduce, reuse, recycle and recover using artificial intelligence	AI and Sustainable Real Estate Management	Examines AI applications in environmental sustainability and resource allocation for property valuation.	AI-powered waste reduction, energy efficiency, and smart infrastructure planning tools.
Sing et al. (2022)	Boosted tree ensembles for artificial intelligence-based automated valuation models (AI-AVM)	AI Adoption and Resistance Theories	Discusses barriers to AI implementation, including cultural resistance, data-sharing concerns, and lack of digital transformation.	AI-powered PropTech solutions facilitating data-sharing and digital transformation in real estate.
Su et al. (2021)	A BIM and machine learning integration framework for automated property valuation	AI-Powered Image Recognition	Highlights AI's role in property inspections, reducing human error and improving documentation accuracy.	AI-powered real estate inspection tools using image recognition to assess structural integrity.
Marquez et al. (2022)	A Mixed-Methods Assessment of Residential Housing Tenants' Concerns about Property Habitability and the Implementation of Habitability Laws in Southern Nevada	AI and Regulatory Compliance in Real Estate	Highlights how AI-powered compliance tracking systems improve adherence to legal standards.	AI-powered compliance tracking systems for lease agreements, tenant documentation, and licensing.
Liu et al. (2021)	Integrating building information model and augmented reality for drone-based building inspection.	AI and VR/AR Marketing Theories	Examines how AI-driven VR and AR enhance property viewings and decision-making.	AI-powered virtual property tours, augmented reality marketing, and interactive property showings.

2.6 Literature Gap

The impact of technology on the real estate industry has been a unique area of focus, especially in the contexts of fast-growing urban centres. Literature including that by Sène et al. (2021) and Tian et al. (2021) shows that disruptions including the COVID-19 pandemic froze real estate market activities worldwide, illustrating the need for innovative technologies. Narang (2022) defines disruptive technologies as those that disrupt industries by changing standards and creating opportunities for innovation while adapting disruptive technologies in conventional sectors including real estate is rather limited. The modern world depends on such technologies for competitive existence and businesses, especially those handling billions of global investments such as the real estate industry, are severely behind in their implementation. According to Ullah et al. (2018), the use of IT in real estate operations is not very advanced as in other industries where sophisticated applications are used. Some of the largest markets for real estate investment have channelled significant funds towards technology adoption; however, the industry is still five years behind realising the full value of technology.

Based on the fact that AI is a disruptive technology, it has the capability of solving existing problems in the real estate industry. As the analysis of Treleaven et al. (2021) and Ullah et al. (2021a) shows, centralised and accurate data are crucial for property valuation. However, obstacles including information incoherence, restricted data availability, and system/silo/siloed systems slow the process. This research aims to establish the role that AI technologies play in improving efficiency, increasing the reliability of valuations, and minimising risks within the UAE's real estate industry. As such, the research focuses on the application of AI technologies to meet a major gap in the literature on how these technologies will reshape the sector.

The other gap relates to customer-oriented property management. Sanderson and Read (2019) noted that customer perceptions are enhanced when the property management is focused on the clients, although price pressures and lack of unique services make this a challenge. The study also suggests within AI tools property management firms can increase clients' satisfaction through such solutions as tenant portals and a predictive maintenance system. Consistent with the research of Ullah, et al. (2021), implementing AI for customer-oriented strategies increases the company's functional capability and may help make sustainable changes. However, there is a dearth of systematic knowledge of how these benefits could be achieved especially within markets such as the UAE.

Some AI applications in real estate are as follows: how AI can help real estate to reduce the impact of disruptions on asset prices are available in studies such as Tian et al. (2021). These studies indicate that the digital management system can improve the resilience of cities and also facilitate the process of asset retrieval after a disaster has happened. However, the existing literature does not provide sufficient information on the possibilities of AI-based innovations to address the conditions of the UAE real estate market at a larger scale. This study aims to address this gap by examining the following applications of AI in CRE: Automated Valuation Models, and Tenant Management Systems. Other factors that make real estate AI adoption even more complicated are the barriers to AI adoption. According to the study by Ullah et al. (2021b), technological, organisational, and environmental enablers have been recognised as high cost, resistance to change, and inadequate technical know-how. Eradicating these barriers therefore is very relevant to digital transformation. For instance, the use of natural language processing and machine learning in property management would greatly improve the decision-making process and reduce risks according to Munawar et al. (2020). However, the literature lacks an understanding of the region-specific barriers and enablers that this study seeks to investigate in the UAE.

Previous research has tended to examine related technologies in general, while areas related to the application of AI in real estate are still underdeveloped. For instance, whereas McKinsey (2018) talks about global trends in real estate technology, the UAE market is not well captured. Works like Kok et al. (2017) also connect the benefits of AI to data quality and process optimisation and meet customer needs but fail to elaborate on the differences and disparities across the regions. This research fills these gaps by evaluating the parts of the UAE real estate market that receive the most value from AI, evaluating the technology's benefits, and evaluating the benefits of the technology from the client's point of view.

Lastly, as pointed out by Felli et al. (2018), dissatisfaction among the real estate consumer base is high, and roughly half of the consumers regret their purchase or rental decision mainly because of the absence of reliable information. In this research, attention is paid to how AI can meet such concerns with precise and all-encompassing data and decision-making tools. Thus, affirmatively positioning AI as the force for change the research aims to contribute to the theoretical and practical knowledge, as well as provide recommendations for the UAE real estate stakeholders.

2.7 Chapter Summary

Artificial intelligence offers enormous capabilities to empower machines with human intelligence by using algorithms and programs to address practical problems in different fields of work. Coupled with big data analytics, AI enables users to switch to a data-driven world where they can carry out the required actions with enhanced speed and accuracy with the help of intelligent machines. By enabling digital systems and devices to acquire, process, and synthesise information in a human-simulated way, AI enhances the outcomes of human efforts in every field of work including education, healthcare, information systems, business, trade, defence, and industry. Real estate organisations have also started adopting AI as the means for transforming their traditional property management and other operations into digital formats. The resulting performance of such real-estate firms has increased significantly due to enhanced strategic decision-making and expedited operational and financial transactions through efficient data pipelines and powerful algorithms. By using relevant AI applications, professionals in the AI industry are capable of calculating the values of properties, evaluating debt levels, and identifying market trends. Besides, the buying behaviours of clients can be identified and interpreted by using the capabilities of big data analytics. Significantly, AI in real estate companies engage in efficient use of financial, physical, intellectual, and other resources to enhance the efficiency of the business. By implementing powerful information processing systems, real estate companies can carry out their activities including rental property management, construction, sale, and others efficiently.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methods used in this study, the reasons for their use, and the research philosophy that informed the study. The chosen research philosophy is explained first, and then the general concept of research design and the data collection and analysis procedures are described in detail. The chapter also uses the research onion by Saunders et al., (2015) which acted as a guide on how to design the methodology. The research onion framework was used to effectively review the research philosophies, approaches and strategies available so that the most appropriate one could be adopted to respond to the research objectives. This framework also embodied the connection between the research questions, objectives and methodological approach, hence enhancing the authenticity of the study. Each and every methodological choice is justified in association with how it will resonate with the objective of the study. Besides, ethical issues of the research have been addressed in this chapter to demonstrate responsibility of the researcher in undertaking the study. The final part of the chapter gives a summary of the methodological framework regarding its applicability to the research objectives.

3.2 Research Philosophy

Research philosophy defines the philosophical approaches selected that complement the nature of the overall study, the project scope of the research and beliefs on the research. It constitutes a background to describe the research approach along with the research strategy and the data collection procedures. Tamminen and Poucher (2020) define research philosophy as beliefs concerning the methods of gathering and analysing data based on which the solution to a research problem is conceptualised. In this study, three key philosophical paradigms, ontology, epistemology, and axiology, will direct the study. They are mainstream notions behind educational and social studies (Varpio and MacLeod, 2020). In the philosophy of research, axiology is the study of values, and in that case, how the researchers address phenomena of morality and quality evaluation during research selection, applications and interpretation (Heron, 1996). It is concerned with what counts as valuable such as the effects of these values on the process of inquiry such as bias, the dignity of participants, and the social utility. On one hand, epistemology is associated with knowledge and understanding and therefore poses the question of the challenge in AI adoption being either real or socially real (Yulianto, 2021). The paradigm guides the way the

researcher understands the nature of the research problem, or rather the organisational and the operational changes that AI provokes within the real estate sector in this case.

Epistemology is devoted to the method of knowing and constitutes a conceptual foundation towards the analysis of the effect of AI on the practice of property management (Goldman et al., 2018). It presupposes deciding how such reliable knowledge may be achieved in order to analyze the role of AI to the stakeholders in the real estate sector in UAE. An axiology (study of value) defines how the conducted research evaluates the practical and social significance of the AI employment in the real estate sphere (Heron, 1996; Tojimatovich and Saydaliyevich, 2021). Based on axiology, research can be considered as a value-laden process because the research has to capture both the social importance and the ethics of the research (Heron, 1996; Tojimatovich and Saydaliyevich, 2021). Axiology in this research is indicated by the insistence of the researcher on addressing the real worth of AI (in reference to real estate) to the stakeholders, especially on customer satisfaction and organisational excellence. In the current study, axiology will be applied to place a tangible value of the implementation of AI in the goals of the organisation such as improving customer satisfaction among others. Philosophy of research has been further divided into four schools of thought that include positivism, interpretivism, pragmatism and realism. The paradigms give different perspectives on looking at the world and the generation of knowledge; the paradigms therefore forms a foundation of selection of the appropriate philosophy to this research.

3.2.2 Interpretivism

Under interpretation, reality is, however, construed and socially constructed as opposed to positivism. In this philosophy, the capacity of those involved in developing insight into the phenomena by considering the viewpoints of participants related to their live experiences makes the philosophy ideal to be used in qualitative research (Ryan, 2018). Interpretivism will enable the researcher to know the subjective perspective of the participants toward AI and change process, dynamics of the stakeholder relationship, and organisational environment in the real estate sector in the UAE. Due to this kind of epistemology, this philosophy gives the complicated depiction of the possibility and the issues related to the AI.

3.2.5 Justification of the selected Research Philosophy

The philosophy that shall be applied to the interpretation of the research will be interpretive since it fits the nature of the research as qualitative and the perceptions of the stakeholders of the UAE real estate industry. Interpretivisim is a robust case study in the constructionist realities. Such philosophy fits this study since it is qualitative and its focus is on the perceptions of the stakeholders. Unlike positivism where the data and analysis are numbers and empirical, interpretivism recognises social factors, organisational culture and personal impression to gain a better understanding of the effects of AI on the real estate sector and its practices and results.

The research objectives of this study are to establish the areas in the real estate sector that can benefit from the use of AI, to discuss the implementation challenges of AI, and to discuss how AI can be used to improve client satisfaction and operational efficiency; hence the adopted research philosophy of the study is the interpretivism. Socio-culturally oriented, Interpretivism offers the necessary methodological freedom to engage with these complex goals in terms of the processes through which stakeholder perceptions are formed and influenced by their contexts. This approach enables the researchers to capture the socio-cultural factors, economic conditions, and organisational factors that affect the UAE's real estate sector in adopting AI.

The choice of interpretivism is also informed by the nature of data collection employed in the study, where actual interviews with real estate professionals and stakeholders used semi-structured interviews. These methods enable participants to show what may be an individual perspective because it is valuable in capturing unique patterns and deviations from the norm. This active data-gathering process is supported by Interpretivism in a way that pays attention to the subjective experiences of participants and has their input featured in the findings. As Su et al. (2021) have pointed out, the strength of interpretivism is its flexibility in addressing new themes identified during data collection, which is why it is suitable for the exploratory research of the present study. Due to the focus on interpretivism, this research captures the essence of AI which is not only a technological issue but also an organisational and client-centred issue. This philosophy allows the researcher to capture different perspectives and contexts when analysing the research problem since the philosophy allows for a more comprehensive approach. It is more important for this depth of understanding to be used to provide recommendations which are fit for purpose in the UAE real estate industry.

Although positivism may seem applicable because of the technology orientation of AI, the approach of focusing on objective measures is insufficient for capturing the complexity of the stakeholder experience. In the same way, realism, which concerns external systemic relationships, does not explain the socially constructed elements of AI use in this regard. Pragmatism while being useful and applied can hardly provide sufficient depth to analyse the subtle socio-organisational processes that are the focus of this research. Interpretivism, therefore, appears as the most suitable paradigm for researching the sociotechnical affordances of AI in the UAE's real estate industry. This philosophy also deals with the comment concerning the importance of being more precise and clear in the working of philosophical argumentation. It links the research approach to the purpose of the study and the choice of data collection techniques to minimise incongruity. As a result, the justification links critical analysis, on the one hand, and a strong salience of interpretivism for the study of AI adoption, on the other hand, with the overall research questions, objectives, and scope of the investigation. This research approach re-emphasises the usefulness of interpretivism in developing a rich understanding of the issues and prospects of AI in real estate. Axiology complements the interpretivist stance by reinforcing the role of researcher values and participant context in co-constructing knowledge.

3.3 Research Approach

A Research approach defines the step-by-step plan for a study, including decisions on how to gather, analyse and interpret data. Armat et al. (2018) classify research approaches into three primary categories: which are deductive, inductive and abductive. Both approaches represent two different patterns of reasoning that define the process of creating a research question. The deductive approach of early-sought theories in a given population and compared them with observed hypotheses. This approach is known to be logical in structure and consequently allows researchers to verify existing theories. Eriksson and Kovalainen (2015) have pointed out the usefulness of the case study method in hypothesis testing where the findings are generalisable. However, deductive reasoning is not very effective for exploratory research as the insight is prescribed.

However, the inductive approach is a bottom-up approach to come up with theories after making observations. This approach is more advantageous in qualitative research the researcher intends to gain context analysis and thematic discussion (Mohamad et al., 2022). Due to its ability to establish

new knowledge from data, inductive reasoning is highly useful in research exploring emergent patterns, which are characteristic of postmodern context.

3.3.3 Justification of the selected Research Approach

This research uses the inductive research method since it is appropriate for the research objectives and the type of research. This is in contrast to deductive reasoning where a set hypothesis has to be proven or disconfirmed; in this study of AI adoption within the UAE real estate sector, inductive reasoning proofs out new patterns and relationships. This approach is particularly appropriate for examining the various dimensions of the research problem, including the social-organisational issues and technological potential of AI implementation.

It is therefore necessary to use inductive reasoning while dealing with the objectives of the study, which include as follows; establishing the advantages of AI in real estate, analysing the challenges likely to be encountered in its implementation, and evaluating its effectiveness in enhancing client satisfaction. Ruane (2016) notes that inductiveness is the process of developing theories out of facts instead of developing hypotheses out of existing theories. Such an approach proved helpful to the researcher in responding to the fluidity of qualitative research to produce a broad range of views and contextual factors. The research utilised an inductive analysis approach, which enabled the collection and analysis of data to follow the identified patterns as opposed to the formation of hypotheses. This can be attributed to the fact that the research adopts the qualitative research approach, which is exploratory and flexible in nature. However, Wang and Li (2019) argued that inductive reasoning is ideal for real estate analysis relevant to AI since it allows for constructing a systematic but flexible theory building from the data. Furthermore, inductive reasoning helped to develop comprehensive data into themes which allowed the researcher to make reasonable conclusions. According to Pellegrino and Glaser (2021), this approach brings more rigour to qualitative research by making connection between findings and objectives more apparent. For example, the thematic analysis conducted in this study uncovered the following important observations regarding the UAE's real estate industry: the evaluation of properties; client interaction; and business performance, which collectively provided an extensive outlook on the applicability of AI in the country's real estate market. Consequently, the inductive approach was adopted because it provides the opportunity to investigate unexplored facets of AI implementation

and develop contextually appropriate and theory-based theories. This choice satisfies the feedback on criticality and relevance to make the research process to be in line with the study goals.

3.4 Research Strategy

Research strategy is a plan which defines the approach to the execution of a study, including the choice of techniques, instruments and methods for data collection and processing. Thus, Biggam (2021) has pointed out that a research strategy defines how the researcher gets to the goals of the study. This research utilises the case study approach to examine the impact of AI in shaping the real estate industry in the UAE such as Al Zaeem commercial brokers. The fact that this strategy is based on the analysis of selected real estate companies allows for a detailed assessment of AI opportunities, including its adoption in managing properties, assessing their value, and serving customers. Therefore, the case study strategy is most appropriate in research that seeks to establish an understanding of issues in real-life settings. Stacey (2019) defined case studies as research strategies that aimed at understanding phenomena in their contexts, which is useful when studying AI implementation. This strategy allows for the simultaneous analysis of the research phenomenon and the answers to questions of causality, mutual dependence and influence of the context.

In light of this, the use of a case study made it possible to closely examine how AI has been adopted within Al Zaeem Commercial Brokers, a real estate firm in the UAE. The case study strategy provided practical recommendations on how AI is likely to transform operations within a real estate firm by analysing its practices and challenges. The case study analysis enabled a deeper understanding of real-world AI adoption challenges within the chosen firm.

3.5 Research Method

This study adopts a mono-method qualitative approach, well-suited to exploring complex human behaviours, organisational practices, and socio-cultural influences. Qualitative research enables in-depth understanding of stakeholder experiences, aligning with the interpretivist philosophy underpinning this study. Guest et al. (2020) emphasise that such methods are effective for capturing nuanced perspectives and supporting emergent theme analysis.

The qualitative approach allowed the researcher to gather rich insights from real estate professionals regarding AI adoption, taking into account contextual factors such as organisational culture, regulation, and market dynamics. Data was collected through semi-structured interviews,

which allowed for flexible, context-sensitive probing while maintaining consistency with the research objectives. As Busetto et al. (2020) note, this method is effective for eliciting detailed, place-specific responses.

The study used thematic analysis, following Braun and Clarke's (2006) framework to systematically identify patterns in the data and connect them to participants' perspectives. This analytical method supports the construction of meaningful themes directly grounded in the data, offering strong alignment with the research questions.

To address common limitations of qualitative research—such as subjectivity and limited generalisability (Mohajan, 2018; Smith, 2018)—rigorous strategies were applied. Member checking was used to validate interpretations by allowing participants to review initial findings, while triangulation ensured consistency by comparing insights across multiple data sources (Birt et al., 2016). These methods enhanced credibility and helped minimise researcher bias. As Marlina et al. (2025) explain, member checking is particularly effective within an interpretivist framework, where reality is viewed as socially constructed.

A purely qualitative design was chosen over quantitative or mixed-methods alternatives due to its stronger alignment with the research aims. While quantitative methods may reveal statistical correlations, they often fail to capture the subjective and situational factors critical to understanding AI integration in real estate. Similarly, mixed-methods approaches, although integrative, were not feasible within the scope of this project. The selected method enabled a focused exploration of how AI impacts UAE real estate operations, providing actionable insights for practice and theory development.

3.6 Research Design

An explanatory research design was selected to understand the relationship between technological adoption, organisational processes, and client satisfaction. Explanatory research is well suited to answering "how" and "why" questions (Yin, 2018), allowing for a systematic examination of the relationships between AI implementation, organisational operations, and client satisfaction. It also helps to explore complex, ill-defined problems, which are common in emerging technology fields (Subedi, 2016). This design is particularly appropriate for examining the technological, organisational, and cultural factors influencing AI integration within UAE property markets. By

moving beyond surface-level observations, the explanatory design provides a deeper understanding of AI's practical effects on property management and sector-wide innovation.

To support this goal, the study employs qualitative data collection, specifically semi-structured interviews with industry stakeholders. This method allows participants to elaborate on their experiences and insights in a flexible yet focused way. According to Bowen et al. (2017), such an approach is useful in uncovering causal links and aligning narratives with real-world processes. It is also effective for bridging theory-practice gaps in rapidly evolving sectors like real estate (Köhler et al., 2022). Moreover, explanatory designs are suitable for research involving iterative data collection and analysis, especially when themes emerge progressively. Subedi (2016) noted that this approach is ideal for studying new and evolving phenomena such as AI, where continuous refinement of findings is essential. The present study uses this flexibility to capture how AI is currently being applied in areas like property appraisal, customer relationship management (CRM), and predictive maintenance.

In summary, the explanatory research design aligns with the study's objectives and enables a comprehensive, real-world analysis of AI adoption in UAE real estate. By grounding theoretical insights in stakeholder experiences, the approach provides actionable findings that can inform future academic research and industry practice.

3.7 Sampling

Sampling is a critical factor in any qualitative research since it defines the range and reliability of conclusions made about the study participants. Shaheen and Pradhan (2019) stated that sampling is perhaps the most crucial activity in qualitative research to ensure that the researcher has access to insider view and multi-facetted contexts pertinent to understanding the research phenomenon. Sampling also helps researchers to cheque the validity of some analytical methods and to investigate differences in people's and cultural values, beliefs, and experiences (Shaw et al., 2019). Their importance cannot be overemphasised since sampling methods are at the core of almost every research study in an effort to produce accurate results.

Sampling in qualitative research is mostly based on nonprobability sampling in which the main goal is not to produce generalisations but obtain as much depth and density if the data as possible. Elfenbein and Schwarze (2020) pointed out that the sampling process helps to locate particular

elements within a system that can give a true representation of the overall system. Therefore, the sampling technique adopted in this research corresponds to the interpretivist paradigm to select participants who can offer a nuanced understanding of how AI is applied to the UAE's real estate market, particularly within Al Zaeem Commercial Brokers.

3.7.1 Types of Sampling Techniques

There are many approaches for sampling in qualitative research depending with the field type and study goals. Although other techniques like snowball and convenience sampling exist, they were not appropriate for this study and are therefore not discussed further. While helpful in reaching out to difficult to sample populations, this approach was not as useful here because the population of interest—real estate professionals with AI implementation knowledge—is a relatively easy population to obtain access to given the nature of the current study. Moreover, since researchers have limited information on the distribution of the participants and their similarity, snowball sampling might reduce the representativeness of the sample size. The last one, also not a probability sampling technique, is the convenience sampling where the researcher includes those participants who are easy to reach. This method is cheap, saves time and is appropriate for pilot studies; however, the method may be affected by sampling error and is not population based (Johnson et al., 2020). Even though convenience sampling would take less time in data collection it lacks the ability to provide valid results hence not appropriate for this study. Jeong et al. (2019) proved that convenience sampling is generally unsuitable for exploratory research that requires elaborate analysis and interpretation, as it is the case with the current study.

3.7.2 Chosen Sampling Technique

Purposive sampling was selected as the most appropriate technique for this study due to its alignment with the qualitative research objectives and the need to access participants with specific knowledge of AI adoption in real estate. As defined by Creswell and Poth (2018), purposive sampling is a non-probability method where participants are intentionally chosen based on relevant characteristics. This approach is particularly suited to research requiring deep, context-specific insights. Following Patton (2002), purposive sampling allows for targeting information-rich cases and maximising learning from limited resources.

Participant Selection and Screening

In line with the above, participants were selected from Al Zaeem Commercial Brokers who had practical experience with AI implementation. Roles included property managers, IT consultants, developers, and operations heads each with over 7 years of experience. A formal screening process was followed to ensure ethical compliance and methodological rigour. First, permission to access participants was secured through an approval letter from a senior gatekeeper at Al Zaeem. The inclusion criteria— (1) current involvement in AI-related real estate activities, (2) strategic or decision-making authority, and (3) capacity for reflective engagement—were shared with the gatekeeper, who then provided a list of suitable participants based on these conditions. Following this, the researcher independently contacted each prospective participant by email, sharing the Participant Information Sheet (PIS) and consent form. Only those who provided informed consent were invited for interviews. This two-step process ensured that participant selection was purposeful, ethically sound, and aligned with the interpretivist approach. A total of 15 professionals were interviewed. Sampling was iterative, continuing until data saturation was reached (Fowler and Lapp, 2019), meaning no substantially new insights were emerging.

Limitations and Ethical Mitigation

As with all non-probability methods, purposive sampling has limitations. It depends on participant availability, and the findings cannot be statistically generalised (Yadav et al., 2019). To mitigate potential bias, participants with conflicts of interest were excluded, and interview questions were designed to encourage open, reflective responses. Despite its limitations, this sampling strategy yielded in-depth, credible insights into AI integration in the UAE real estate sector.

3.7.3 Participant's Profile and Demographic

Fifteen participants from different departments including Sales, Leasing, IT, Finance and Project Management were selected. The diversity in this representation allowed the researcher to see the whole picture of the implementation of AI in the sector at the operational functions part. The selected participants had from 7 to 16 years' experience, so they were experienced in traditional practises and AI driven transformations. Real names were not used in order to ensure anonymity and confidentiality and the participant identifiers were coded. An overview of participant designations and experience level is presented in Table 3.1 below.

Table 3.1: Participant's Information and Details

Participant Codes	Designation	Years of Experience
F1	Sales Manager/Off-plan Department	15
F2	Sales Manager/Secondary Department	16
F3	Leasing Manager	7
F4	IT Manager	8
F5	Finance Officer	10
F6	HSE Officer	8
F7	Business Relation Manager	8
F8	Business Relations Assistant Manager	9
F9	Operation Manager	10
F10	Projects Manager	12
F11	Engineer	15
F12	Engineer	10
F13	Project Manager	12
F14	Procurements Manager	7
F15	Maintenance Manager	7

Gatekeepers from within Al Zaeem Commercial Brokers—specifically senior departmental staff—played a key role in supporting participant recruitment. This internal assistance ensured a well-balanced representation of stakeholders with operational, technical, and managerial experience in AI adoption. Rather than being "allowed," participants were enabled and encouraged to contribute their insights voluntarily. This helped the researcher access those with direct involvement in AI-related projects. All participants provided informed consent in accordance with the ethical guidelines of the University of Lancashire. To maintain data integrity and confidentiality, all interview data was securely stored on University of Lancashire's OneDrive network. Table 3.1 provides a detailed overview of the participants' professional profiles.

3.8 Data Collection Method

Data collection is a crucial part of achieving valid and reliable research outcomes. In qualitative research, selecting methods that support in-depth understanding of participants' perspectives is essential. For this study, the objective was to understand how AI is adopted in the UAE real estate sector through insights from experienced stakeholders. After evaluating multiple qualitative data

collection options, semi-structured interviews were selected as the most appropriate method for this research. This decision was guided by the method's ability to offer both structure and flexibility, allowing participants to elaborate on their experiences while keeping the focus aligned with the study objectives.

Semi-structured interviews are well suited to the interpretivist paradigm of this study, which seeks to capture the socially constructed meanings behind stakeholder perceptions (Zimmerman, 2021). They allow researchers to explore topics in-depth, adjust follow-up questions as needed, and engage participants in a way that reveals nuanced and context-specific insights. As Creswell and Hirose (2019) highlight, semi-structured interviews are ideal for capturing high-quality qualitative data on complex and evolving topics like AI adoption. They provide a rich basis for thematic analysis by enabling the identification of patterns across participant responses. In this study, semi-structured interviews supported the research objectives by generating detailed information about (1) areas of real estate where AI is being used, (2) challenges and limitations faced during AI integration, and (3) perceived effects on operational performance and client satisfaction.

This approach also ensured ethical integrity. Participants were provided anonymity, and the format encouraged open, reflective responses. The depth of the discussions contributed to capturing multiple dimensions of AI implementation relevant to real-world practice in the UAE real estate context.

3.9 Data Analysis Method

Semi-structured interview data were analysed using thematic analysis, a method that involves the identification, organisation and interpretation of patterns within data (Braun and Clarke, 2006). Thematic analysis is particularly known for its versatility and ease of use, this makes it possible for the researcher to provide a rich analysis of the qualitative data (Castleberry and Nolen, 2018). This way of working enables the extraction of commonalities within the participants' responses because the analysis is based on recurring patterns (Belotto, 2018). It also attaches importance to the conceptual analysis, which makes it appropriate for studying organisational processes such as the implementation of AI in the UAE real estate industry.

Coding in thematic analysis is important when it comes to the process of data fragmentation into segments that are labelled with descriptive or interpretive tags (Williams and Moser, 2019). These

codes are basic for emerging patterns and themes to answer the research questions as Kiger and Varpio (2020) highlighted. In this way, the researcher reviewed the data to analyse patterns that would help identify the themes and ensure that they corresponded to the coded answers (Braun and Clarke, 2021). Closely following the framework provided by Braun and Clarke (2006), thematic analysis was conducted in six steps.

- First of all, the researcher engaged with the data, rereading the transcripts to get acquainted with the answers of the participants (Scharp and Sanders, 2019). Marginal notes were made to emphasise important points, which helped to define initial codes. This first phase helped to confirm the scope and richness of the data, in response to the comments made about the investigation of boundaries. The process helped the researcher to understand how the participants' narrations fit into the goals of the study.
- The second step involved the process of coding to name features of the data pertinent to the research questions (Braun et al., 2022). These codes helped to identify and categorise the data, which helped to organise the material for further analysis (Perannagari and Chakrabarti, 2019). For example, there were general patterns including 'resistance to AI', and 'cultural challenges' mentioned by participants in their transcripts, which is consistent with organisational life being a network, as pointed out in the feedback.
- In the third step, the process of coding was continued and the codes were grouped into themes, which are presented as larger meaning patterns (Kiger and Varpio, 2020). Themes were created to cover insights that are relevant to the adoption of AI, including 'automation of work', and 'implementation challenges'. The process of identifying themes was cyclical to achieve the best fit and relevance to the data (Braun and Clarke, 2021). Some of the respondents' feedback involved the interconnection of certain themes like 'organisational resistance' and 'cultural inertia,' that are inevitable aspects of organisational life explaining the interconnectivity of the themes (Castleberry and Nolen, 2018).
- The fourth process involved familiarisation with themes to use them to capture the coded data and the overall dataset as recommended by Braun et al. (2022). This recursive process enabled the researcher to redefine boundaries and exclude the irrelevant codes from the themes while keeping the core of the themes close to the participants' views (Williams and Moser, 2019). In the course of this step, the researcher asked if themes are adequately

anchored on data and if they operate in a coordinated way to respond to the research questions (Scharp and Sanders, 2019).

- In the fifth step, the themes were identified and labelled and the boundaries and purposes of this study were outlined (Kiger and Varpio, 2020). This process entailed determining how each theme helped in the response to the research questions. For instance, the theme 'efficiency through automation' was operationalised as being about time and errors, but not about structures.
- The sixth and final activity within the analysis process entailed the process of writing the analysis where the themes were described with exemplar data extracts informing the researcher's interpretations (Braun and Clarke, 2021). The researcher made sure that themes were not ambitious to avoid complaints of overemphasised themes as recommended. For example, instead of categorising themes as 'compelling', the analysis was based on how they addressed the objectives of the study (Castleberry and Nolen, 2018).

Thematic analysis was used as the primary method of analysing qualitative data, under the framework provided by Braun and Clarke's (2021) steps. This approach was chosen because it can be easily adopted in the identification, categorisation, and analysis of patterns in qualitative data. The thematic analysis process consisted of several stages, including data familiarisation, code generation, theme identification, theme refinement, theme definition and naming, and final analysis development (Braun et al., 2022). They were all done with utmost care and precision to meet the research intents of the study relating to research questions and objectives.

In the coding stage, the collected data from the interviews with the participants was divided into segments with significant information. The codes were initially kept general to include as many views as possible, and then were narrowed down to specific themes that would correspond to the goals of the study (Scharp and Sanders, 2019). The iterative process of thematic analysis was useful in making sure that the themes were not too general or too specific, in order to ensure a proper representation of the data. Also, thematic analysis was useful in ensuring theoretical relevance of the work where data collected from the study was related with other existing theories within the literature. Moreover, the interpretivist angle ensured that themes were not solely derived from the data but also grounded in prior literature on organisational change and technology

integration (Belotto, 2018). To increase credibility, member checking, peer debriefing, and the clear documentation of theme development were applied in the analysis process (Braun et al., 2022). In this way, thematic analysis offered a rigorous yet adaptable method for analysing qualitative data while maintaining the methodological integrity of the study and providing insights into AI adoption in the UAE real estate industry.

3.10 Ethical Considerations

Ethical considerations are crucial in research so that their rights are protected, and where they are involved, the study exercises academic and research ethical standards. In this study, a high level of ethical practises was maintained during data collection and data analysis processes. Ethics approval was obtained from University of Lancashire Ethics, Integrity and Governance Unit (see Appendix A: Ethics Approval). The participants then signed consent forms that outlined the study's objectives, risks, benefits, and participants' rights in the study (see Appendix C: Consent Form Template). It allowed the participants to decide themselves whether they wanted to be involved and the presence of the principal researcher's contact details also allowed participants to ask questions or report any concerns they might have at any time (Morley et al., 2020). These rights were clearly stated beginning with the informed consent form to disappear from the study at any time without reason. This made it possible to achieve the main objectives of this study by guaranteeing that participation was voluntary, and that the research respected the principles of autonomy in academic research. The consent forms also outlined how the researcher would ensure the anonymity and confidentiality of all participants to help them place their trust in the research process (Bond and Mitchels, 2021).

The research complied with high measures of privacy and confidentiality. To preserve anonymity, participant information was coded using non-identifiable role titles and numeric labels (F1–F15). No department, initials, or combinations of role and years of experience that could risk identification were included. Coding helped in such a way that it was impossible to identify the participant responses, thus protecting their anonymity as required (Melaku, 2019). All data collected was saved in the University's OneDrive network which meets the institution's ethical standards. This made the data secure from any raw access and kept in the right format and order as required by an institution or the laws. Upon the completion of this study, the data will be disposed of in a manner that will meet the ethical requirements of data disposal as suggested by

Brownscombe et al., (2019). Even, the treatment of information was highly secretive since this was viewed as critical to the firm's competitive advantage.

To enhance the security of participants' information, the researcher made sure that all the data gathered in the research was only viewed and analysed by the researcher. This approach ensured the participants honoured the research process and also showed the researchers' adherence to ethical practices regarding data (Burkholder et al., 2019). Egalitarian reasoning, where the benefits are maximised while the risks to participants are minimised, was the guiding ethic of the study. Some of them include; Fear, anxiety, shame, embarrassment, invasion of privacy and time wastage, all of which, were spelt out in the consent forms. To minimise these risks secure storage of data, anonymisation by coding and arranging interview schedules in a way that suited the participants was used (Burkholder et al., 2019). To encourage participation, subjects were told that their responses would be beneficial in the analysis of AI adoption in the UAE real estate industry as well as contribute to the extant literature on digitalisation. This brought out the advantages of participation to emphasise that the researcher and participants have a common purpose for doing the study.

The study also protected participants from coercion to reveal information they did not wish to reveal. Setting high standards of ethical practice by avoiding inflicting harm on participants is considered as fulfilling the non-maleficence ethical imperative by the researcher. There was adherence to the ethical standards of the University of Lancashire. The study used an ethical approval method to ensure that all procedures followed in data collection complied with institutional standards. All the data storage was located on the OneDrive network of the university, which complied with the data protection and confidentiality of the university. This made sure that the study followed both organisational and general academic ethical standards (Castleberry and Nolen, 2018). In this study, coding was more effective and accurate in handling participant data as compared to pseudonymisation. This way, the data analysis was made much easier while at the same time respecting the rights to anonymity and privacy of the subjects. In the same way, the continual and clear use of these methods also laid down the researcher's awareness and compliance with the ethical standards in qualitative research. Overall, this study complied with the highest levels of ethical practice in terms of informed consent, privacy, confidentiality, beneficence and

institutional requirements. This way the research avoided possible risks and safeguarded participants' information rights making the process credible and trustworthy.

3.11 Chapter Summary

This chapter outlined the research design and methods adopted in alignment with the study's objectives. Guided by the research onion framework, the study adopted an interpretivist philosophy, suitable for exploring stakeholder perspectives on AI adoption in the UAE real estate sector. An inductive approach was used to allow theory to emerge from qualitative insights, particularly suited to the exploratory nature of the topic. The case study strategy, focused on Al Zaeem Commercial Brokers, offered an in-depth understanding of the operational and organisational impact of AI, while the qualitative mono-method using semi-structured interviews enabled the collection of rich, contextual data. Participants were purposively sampled based on relevant experience and involvement in AI-related tasks. Data were analysed using thematic analysis, allowing patterns and insights to be systematically drawn from participant responses. Ethical considerations—including informed consent, confidentiality, and institutional compliance—were strictly observed throughout the research process. Overall, this chapter justified and detailed each methodological choice, ensuring that the research design was rigorous, context-appropriate, and capable of producing valid and meaningful findings.

CHAPTER 4 DATA ANALYSIS

1.1. Chapter Introduction

This chapter covers the topics of exploring the collected research data, familiarising, interpreting and analysing the data that has been collected during the data collection phase. Semi-structured interviews were employed as a data collection tool, the participants were asked several questions regarding their perception and practice of using AI in their daily operations. The collected data was in qualitative format such as transcripts including questions asked by the researcher and the responses of the participants aligned and validated from meeting recordings. The researcher began collecting data on 14th December 2023 and completed the process of data collection on 7th March 2024. All the interviews were audio recorded as the participants provided the consent to do so, the live transcription function in Microsoft (MS) Teams was enabled which allowed downloading the interview script in documented form for further processing. Qualitative data analysis refers to researching and analysing non-numerical data to find out what the participants think, feel, and have ideas about a specific subject of interest (Javadi and Zarea, 2016). A qualitative thematic analysis has been applied to collected interview data to understand practical applications of Artificial AI rooted in participants' experience working in the UAE real estate sector. All the steps and processes followed during the thematic analysis of the data are discussed in detail. Among the data, the themes that have been extracted from research participants are included in the Findings section. Finally, the chapter concludes with a summary.

The thematic analysis used in the present study was used as the basis for the coding of patterns and concepts obtained from the interviews. As with Naeem et al., (2023) and Kasirye (2021), this study sought to achieve both a level of analysis and a measure of concept definition. Naeem et al. (2023) showed that thematic analysis does not only entail identifying and counting the codes but also constructing a conceptual framework by categorising the codes into themes. Their contribution was significant in illustrating that inductive coding can be logically generalised into conceptualization. This principle guided the process of reviewing and developing major categories in this study. Moreover, Kasirye (2021) pointed out that both inductive and deductive approaches should be used during the process of theme refinement to come up with more insights and ensure rigour. His way of combining first and second order codes that he used in his study probably influenced the way how the results of this study were categorised into meaningful themes. Based

on these precedents, the following sections outline the thematic findings of the current study, grouped into four categories. These are summarised patterns of responses given by participants and serve as the framework for the interpretive analysis of findings as outlined below.

1.2. Data Familiarisation

The data familiarisation phase involved acquainting oneself with the data so that a thorough understanding of the data collected was developed. The interviews took about 30–35 minutes and were done via Microsoft Teams. Transcripts were generated from the live transcription feature, downloaded and stored securely on the University of Lancashire's ethical guidelines OneDrive network in accordance. After this, the original files were permanently deleted from Microsoft Teams to promote the security and confidentiality of the data and comply with GDPR and institutional regulations.

Transcripts were reviewed and cross-checked to correct any technical or transcription errors (e.g., misheard words or punctuation) generated by the automated system. No changes were made to participants' intended meaning or expressions. The familiarisation phase required the researcher to read and re-read the transcripts multiple times, to become more engaged with the content and to develop a feel for what was going on in the data. The most important was to ensure the credibility of the data collected. Participant responses were treated as authentic reflections of their experiences; no assumptions were made about the truthfulness or accuracy of their accounts. As noted by Kasirye (2021), interviewer bias may occur if the phrasing or tone of questions influences participant responses. To avoid this, care was taken to phrase questions objectively and allow participants to express their own perspectives. To address this, the researcher constructed interview questions that were open and non-directive asking the participants to express their views without any interference.

The familiarisation phase revealed that the first data collected did not offer enough depth about the participants' experiences, expectations and challenges around implementing AI in the real estate sector. As a result, interviews follow-up was conducted to obtain richer insights into the risks and challenges faced in the adoption of AI, specific changes in operations, and the measures taken to improve customer satisfaction. Finally, participants were encouraged to offer suggestions for

improvement and to offer reflections on which aspects of their operations had been most impacted post-AI implementation.

Data familiarisation was iterative and it allowed the researcher to go back to the transcripts, refine insights, cheque that the data was rich and complete. The data being continuously engaged led to the identification of important themes and patterns which were important for subsequent analysis. Aligning with the best research practices in qualitative research, this iterative process involves reflection and refinement of analysis with data across an iterative process (Nowell et al., 2017). In sum, data familiarisation was the critical foundation on which subsequent coding and thematic analysis were built. The reliability and validity of the qualitative findings were strengthened through thorough data review, follow-up for deeper insights and a focus on neutral interpretation. The approach taken helped to achieve conceptual clarity to ensure that the collected data represented participants' experiences and perspectives concerning AI in the real estate sector.

Throughout the familiarisation phase, the focus remained on preserving participant voice and meaning. All data was handled without any subjective judgement about accuracy or veracity, in line with qualitative research ethics.

1.3. Initial Codes

The idea of coding information is to break down the data into smaller, more meaningful units so that the researcher can systematically search for patterns and connections (Nowell et al., 2017). After completing the initial data analysis, the researcher focused on keywords, meanings, and links between data items to develop emerging themes. In qualitative research, coding involves assigning labels to data extracts, each with unique boundaries to avoid ambiguity and repetition (Sundler et al., 2019). The coding process in this study was structured to ensure transparency, consistency, and alignment with the research questions and objectives. It relied on an iterative review of transcripts to enhance analytical rigour and validity. As Creswell and Poth (2018) argue, coding is more than just categorisation—it is an analytical tool that supports the construction of a meaningful narrative about the research phenomenon.

In this study, codes were manually developed from recurring patterns in participant responses, enabling a highly interpretive yet consistent approach. The researcher adopted an immersive and reflexive stance throughout the process (Bryman, 2016). Trustworthiness was strengthened

through bias evaluation using best practices such as peer debriefing and member checking (Birt et al., 2016). Triangulation with literature and cross-verification of participant statements helped ensure the credibility of interpretations. Any inconsistencies were examined critically and cross-checked against multiple data sources for contextual validation (Lincoln and Guba, 1985).

All interview transcripts and recordings were securely stored within the University of Lancashire OneDrive, in accordance with institutional ethical guidelines. Access was limited to the researcher, protecting the confidentiality and integrity of the data. Data will be securely retained for the required duration under the University's ethics protocols and destroyed according to official data management procedures. The decision to use manual coding was made in order to gain a nuanced and contextually rich understanding of the data. This approach allowed the researcher to interpret subtle meanings that may be lost through automated tools. The iterative coding process involved several rounds of transcript review and refinement to ensure that the final codes closely reflected the study objectives. These codes served as the foundation for theme development in subsequent stages of analysis.

To improve transparency and maintain narrative coherence, a sample of coded participant responses has been included in Appendix D. This table illustrates how raw data was organised and interpreted to support theme generation. It serves as a representative extract rather than an exhaustive dataset. Phrases such as "compliance with legal and regulatory requirements" were coded as "legal compliance" to ensure consistency. Contextual relevance guided decisions on which aspects of the data were most aligned with the study objectives. As Byrne (2022) notes, qualitative coding is a systematic yet interpretive process that requires researchers to identify patterns within and across datasets without allowing personal bias to dominate. The researcher maintained neutrality throughout the analysis and allowed the data to guide coding decisions. Thematic clustering was continually refined to capture the complexity of the dataset. As Braun and Clarke (2021) suggest, this iterative refinement supports the organisation of data into meaningful categories that directly respond to research questions. Several cycles of coding were performed to reduce redundancy and increase coherence.

To further guard against bias, coded segments were consistently referred back to their original transcripts and aligned with emerging literature. No responses were dismissed as invalid; instead, any outlier responses were analysed within the broader context of the dataset (Lincoln and Guba,

1985). Throughout the process, the researcher used visual cues (e.g., colour highlights) during personal analysis to differentiate between positive and negative themes—such as improvements to efficiency or instances of system failure. These tools aided in identifying both the opportunities and limitations associated with AI adoption in the UAE real estate sector.

Ultimately, the structured and reflective coding process enabled the development of deeper insights and ensured a systematic progression toward meaningful, thematically organised findings.

1.4. Identification of Themes

The third step was to analyse the gathered or coded data to find out if there were any themes of concern. The identification of the theme, just as it is an interpretive and active process, resulted from grouping codes. Themes analysis cannot be lifted out of the transcripts directly (Naeem, et al., 2023). Instead, the researcher makes themes by combining, analysing, graphically mapping, and even comparing how codes are related to each other (Naeem, et al., 2023). Thus, in this phase, these codes were identified by analysing the keywords which were directly taken from the quotes (Naeem, et al., 2023). Determining which codes apply to data is another difficult thing, to address this issue, the researcher gained insights from recent studies (Naeem, et al., 2023) on employing thematic analysis. Themes are generally wider than codes, and very often, several codes are joined together to form a single theme. In this stage, initial themes were developed by grouping the codes into a single category and interpreting the data for what is say. Table 4.1 is included below which shows how the codes were grouped into initial themes. For instance, the codes ‘legal compliance, ‘minimising risks’, and ‘regulatory compliance’ were grouped to form initial theme ‘Compliance’. Similarly, the codes related to the identification of legal risks, security risks and financial risks were grouped to form the initial theme of “Risk Assessment”.

Table 4.1: Initial Themes retrieved from data

Codes	**Sub-Themes**	**Main Themes**
Legal compliance, minimising legal risks regulatory compliance, legal processes	Compliance	**Theme 1: Areas Impacted by AI Technology Adoption in Real Estate**

Identification of legal risks and contract analysis. Identification of security risks, Network Analysis Identifications of financial risks, Transaction analysis	Risk Assessment	
Pricing strategy Market conditions analysis Pricing models, Market indicators analysis Pricing strategies, Market positioning analysis	Market Analysis and Strategy	
Informed decision-making Predictive analysis Forecasting Predictive analysis, forecasting, informed decision-making Market forecasting, investment decision-making	Predictive Analysis and Forecasting	
missed predictions and oversights of AI Missed alerts Misjudgement Reducing overreliance on technology False alerts, false-positives	Technology Overreliance	
Lack of quality data for reliable AI insights Processing large data inaccurately Availability of quality and reliable data	Data Quality Concerns	
Efficient management of employees Automation and efficiency Service efficiency	Operational Efficiency	**Theme 2: Potential Benefits and Concerns of AI Technology Adoption in Real Estate**
Value-added customer services AI-powered customer-centric communication Increase in Client satisfaction due to better service quality	Customer-centricity	
Cost-effective Cost-effective and sustainable Cost-saving AI tools	Cost-effectiveness	
Bias and unfair Bias and inaccurate sorting Inaccurate and outdated insights	Inaccuracy and Bias	
Failure to address real-time issues Failure in real-time and ‘sudden change’ scenario	Failure in Real-time	

Adaptability to real-time data and sudden changes is missing		
Automated and efficient workflows Automated and streamlined financial processes Automated communication	Automation	**Theme 3: AI-based Cost Optimisation and Efficiency in Real Estate Processes Despite Complexity**
AI automated processes reduce costs. Property viewing-related costs are reduced Administrative and labour-related cost reduction	Cost-Reduction	
Innovative technologies for new business models Innovative technologies to differentiate in the market Integrated Innovation for transparency and security	Innovative Technologies	
Insights about investment opportunities Timely response to queries Decreasing response time improves timeliness	Timeliness	
Complex interface Complex functionality, interpretability and interface Complex AI insights	Complexity	
Customer data-based targeted marketing. Personalised recommendations to customers round the clock Personalised customer services with robust data analytics	Personalised Client Services	**Theme 4: Client Satisfaction via Personalised AI Support with Realisation of Human Oversight**
Customer-friendly Chatbot AI troubleshooting and Support Better communication with clients, 24-hour customer support with AI chatbots	Enhanced Client Communication and Support	
Inaccurate AI chatbot interactions AI limitations in handling complex client requests False positives and human intervention	Importance of Human Oversight	

A visual representation of the emerging codes and sub-themes ensures that the analysis is robust and correctly captures the entire essence of the qualitative data. A conceptual model of the sub-

themes identified in the previous phase helped in refining theme development and facilitated the development of final themes (Figure 4.1).

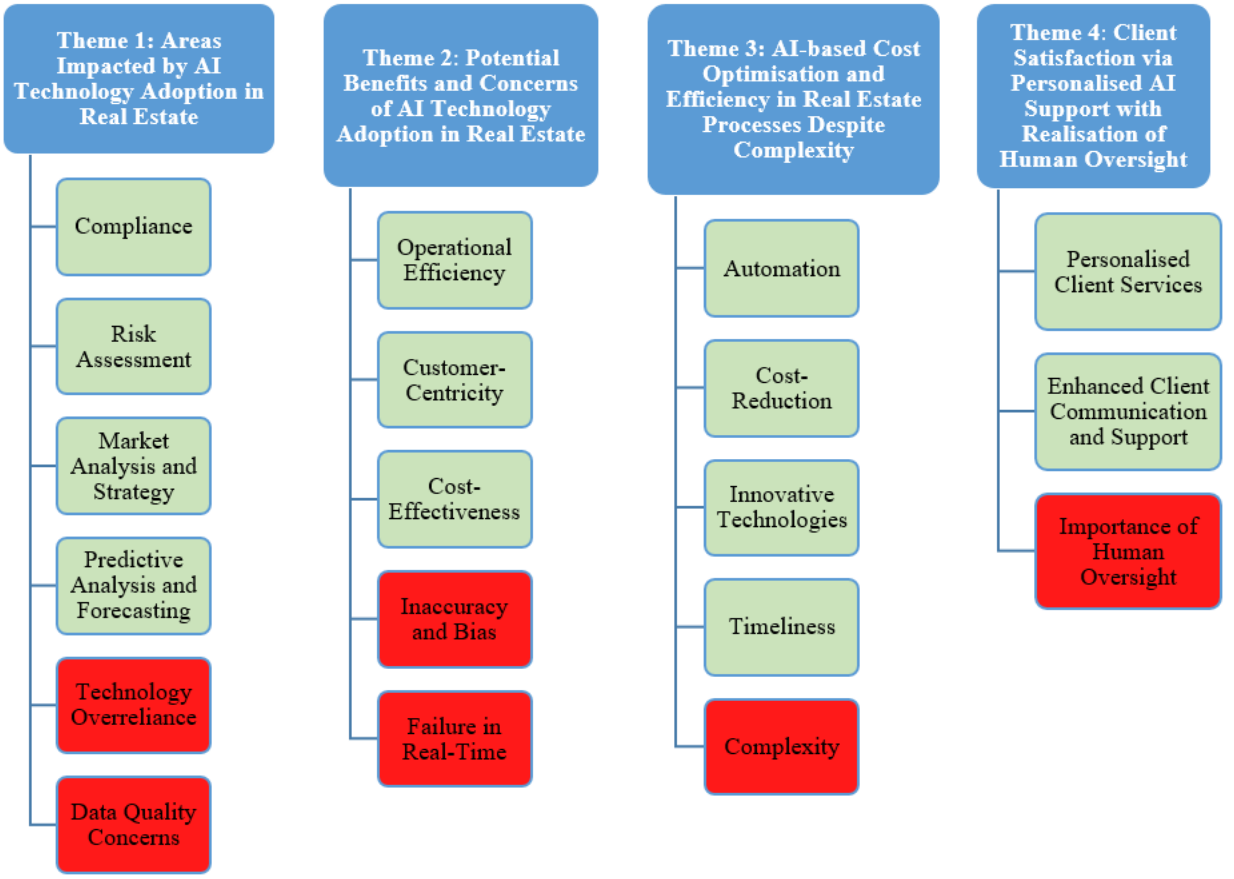


Figure 4.1: Conceptual Thematic Modelling (Self-made)

1.5. Review Potential Themes

The themes highlighted in this study are all coherent and significant patterns in participants' experience and perception of AI in the real estate industry. These thematic categories depict both the general trends of the sector and the dynamic of the organisations that have been identified in the interview data. According to Mullings (2005) in qualitative analysis, it is important that the themes are not necessarily the researcher interpretation of what participants are saying but are the actual experiences as expressed by them. In all the themes discussed, some consistencies were observed in terms of operation advantages, technological limitations, cultural influences, and perceived impacts — all of which are linked to the research goals. Several themes also show good levels of distinctiveness and low levels of interconnection, which helps in analysis and is in

concordance with the principles of thematic rigour put forward by Nowell et al. (2017). In addition to the research questions, some of the themes pointed towards larger issues and potential for further research. These additional areas – including virtual service delivery application of AI and blockchain – explain the importance of being open to emerging discoveries in exploratory business research. According to Bostrom (2019), such insights can be helpful for knowledge advancement if they are separated from the primary categories.

Figure 4.1 shows a mapping of the main and sub-themes of the study. This figure contributes to the multi-dimensional view of the organisational, operational, and customer perspectives of the real estate industry in relation to AI, where enablers and challenges are interrelated.

1.6. Defining and Naming Themes

The resulting table from the thematic coding process is presented below as Table 4.2, showing the progression from sub-themes to broader analytical themes. In response to reviewer feedback and to enhance analytical clarity, a third column has been added to outline the interpretive rationale behind the grouping of sub-themes under each analytical theme.

This refined structure demonstrates how individual codes and insights were synthesised during the thematic analysis phase. Rather than merely presenting descriptive categories, this version illustrates the analytical reasoning applied during the theme development process. Each sub-theme reflects patterns found across multiple participant responses, while the main themes represent higher-level constructs that align with the research questions and conceptual framework of the study. The rationale column provides brief justifications for how the sub-themes contribute to or exemplify the analytical theme — helping to trace the logical progression from raw data to meaningful interpretation.

Table 4.2: Development of Analytical Themes from Thematic Coding

Sub-Themes	Analytical Themes	Rationale/ Interpretive Link
Compliance	***Theme 1: Areas Impacted by AI Technology Adoption in Real Estate***	Reflects how AI enhances regulatory compliance, impacting legal and operational domains.
Risk Assessment		AI aids in identifying and mitigating legal, financial, and security risks, demonstrating organisational impact.

Market Analysis and Strategy		Data-driven insights inform strategic planning, a core operational transformation due to AI.
Predictive Analysis and Forecasting		AI enables foresight into market shifts and client behaviour — transforming decision-making.
Technology Overreliance		Overdependence on AI introduces operational vulnerability — a side-effect of AI's deep integration.
Data Quality Concerns		Quality of input data critically affects AI outputs — influencing organisational trust in AI use.
Operational Efficiency	***Theme 2: Potential Benefits and Concerns of AI Technology Adoption in Real Estate***	AI automates repetitive tasks, improving workflow and resource use.
Customer-centricity		AI enables personalisation and faster service delivery — aligning with user expectations.
Cost-effectiveness		Automation and optimisation reduce operational costs.
Inaccuracy and Bias		Highlights ethical concerns where AI decisions may be flawed or skewed.
Failure in Real-time		Refers to AI's performance limitations when responding to dynamic, real-world events.
Automation	***Theme 3: AI-based Cost Optimisation and Efficiency in Real Estate Processes Despite Complexity***	Refers to routine task automation that increases efficiency and reduces errors.
Cost-Reduction		Related to measurable savings from using AI-driven tools in property and tenant management.
Innovative Technologies		Inclusion of blockchain, AR/VR, and IoT reflects how AI integrates with other disruptive tools.
Timeliness		Faster processing and response times are crucial for operational competitiveness.
Complexity		Challenges arise when systems become too intricate for users to manage without support.
Personalised Client Services	***Theme 4: Client Satisfaction via Personalised AI Support with Realisation of Human Oversight***	AI enables real-time property recommendations and personalised interactions.
Enhanced Client Communication and Support		Chatbots and virtual assistants provide 24/7 support, improving service quality.

Importance of Human Oversight		AI limitations necessitate human review, especially in complex or sensitive cases.

1.7. Presenting the Results

4.7.1 Theme 1: Areas Impacted by AI Technology Adoption in Real Estate

One of the themes retrieved from the data, Theme 1 delves into the illustration of the multi-dimensional nature of AI integration in the real estate industry that can be seen in various ways, starting from compliance and risk management to market data analytics and communication enhancement. The participants' insights show that AI is not just a tool, but a transformative force that is changing the way traditional practices work, and making the industry more efficient, innovative, and valuable.

The participants' responses are important as they represent actual views of the AI's impact on varying subsectors of the real estate industry. For example, Participant F15 points out the critical aspect of AI in support of the correct implementation of the legal and regulated requirements as stated,

> *"AI systems can ensure compliance with legal and regulatory requirements in real estate transactions, minimising the risk of legal disputes and penalties."*

In the same vein, the participant, Participant F3 discusses the significance of AI-driven pricing models on the returns that can be maximised for clients and investors, saying.

> *"AI-driven pricing models adjust property prices based on supply and demand dynamics, market conditions, and other relevant factors, enabling investors to optimise returns and negotiate favourable deals."*

Thus, one of the findings that emerge in the analysis is that the role of AI in the decision-making cycle in real estate is more transformational. AI used as machine learning-powered prediction models backed by data analytics can bring real estate professionals valuable information about market trends, investment opportunities, and clients' wishes. This way, they can make decisions that are based on facts and they can avoid making mistakes. This will, in turn, help them to increase their profits, reduce the risks, and achieve sustainable growth. In the words of Participant F14,

"AI-powered predictive models forecast future property prices, rental yields, and market dynamics, helping investors anticipate opportunities for profit and make informed investment decisions."

Upon prompting to share the risks and issues the participants had witnessed in their professional experience, it revealed that AI adoption and its use are not without issues or risks. The analysis reveals that the majority of participants considered the unpredictability, secretive functionality of AI algorithms, privacy risks and inaccuracy. For instance, Participant F15 who works as a maintenance manager highlighted the issue of false positives, stating that,

"In our predictive maintenance system, what happens is that it turns what is not a problem into a critical problem as sensed from our sensors. This could increase the amount of time and resources needed to solve the same problem, the certain methods need to be reviewed and confirmed by human personnel."

Overall, the leading edge of AI is a tool that allows for standardisation and streamlining of processes in real estate companies and even increases operation efficiency. Not only does automation of tasks like appraising properties, market analysis, and customer conversation speed up the processes of the transaction, but also releases real estate professionals' much-needed time and resources to develop important activities that add value to their customers and partners. Overall, Theme 1 draws a link between AI technology adoption in the real estate sector and its role as a transformative force that helps to innovate, improve efficiency, and value creation in the industry from a multidimensional point of view. The above findings in the form of direct responses of the participants highlight the deep effect of AI on the transformation of traditional practices, the improvement of the decision-making process, and the provision of better customer services in the ever-changing real estate industry. Moreover, AI-driven inventions like chatbots, virtual assistants and personalised recommendation systems improve the customers' experience and engagement in the real estate sector. The provision of 24/7 support, personalised assistance, and customised property suggestions by AI-based solutions ensure corresponding wants and preferences of people are being committed thereby enabling the development of trust, loyalty, and satisfaction. But the AI implementation and daily use have also revealed risks or issues that participants shared stressing the importance of considering both the positive and negative aspects of the technology for real estate operations.

4.7.1.2 Discussion of Theme 1: Areas Impacted by AI Technology Adoption in Real Estate Findings

One of the main findings in Theme 1 suggests that's AI brings powerful changes to how organisations manage their compliance and risk systems This study results show AI technology helps real estate companies improve their compliance and risk management operations. According to participant F15 AI helps companies follow legal rules and avoid legal actions with reduced penalties. Previous research proves that AI systems help automate compliance work and review regulatory requirements (Abidoye and Chan, 2017). This is also confirmed by Ullah et al. (2019) who stated that AI detects risks during operations to deliver better reporting results and protect systems effectively. AI systems can spot risks within financial transactions and legal contracts through its natural language processing technology according to F11. This research echoes Conway (2018) who proves AI systems find risks better and more reliably than humans do. AI algorithm unpredictability produced incorrect results as shown in Participant F15's case. According to Ullah et al. (2021) organisations should limit their trust in AI unless proper human supervision exists.

Another finding of this theme is that AI technology helps businesses decode market data and devise better strategies for success. The research participants explained how AI tools help with market research and business planning. F3 noted that participants use AI systems to set property prices automatically while monitoring present market trends. This finding aligns with Wei et al. (2022) in which the authors explained the impact of the machine learning models in enhancing the accuracy of property valuations based on the economic factors, properties characteristics, and customer preferences. AI technology gives real estate professionals precise market predictions which Participant F14 shows through their comment about AI models that forecast property value and rental returns. Zahrt et al. (2019) support the findings that AI improves the accuracy of market prediction. In their study, Zahrt et al. (2019) established that the use of AI in forecasting models in real estate enhances the reliability of the forecast by adapting to changes in the economic, political and technological factors. Likewise, Siniak et al. (2020) confirms that predictive analytics helps investors spot good deals and reduce financial risks. Research by Abidoye and Chan (2017) shows data reliability needs solid governance to work properly but analysis confirm these challenges.

Additionally, the use of AI helps companies make better choices while focusing their activities on customers. Most participants saw AI as an important tool to boost both decision-making and customer-focused work. Through AI tools real estate professionals gain insights from data which helps them choose better strategies to make more money while avoiding risks according to Participant F14. This is supported by Bellman (2018) who stated that, AI integrated property search and valuation use large data sets, hence more structured. Ullah et al. (2019) confirm AI can merge different data sources to help companies make better decisions. Lastly, it is found that customer-specific applications based on AI help customers connect more deeply and feel better served. The respondents F3 and F7 confirm AI helps build better customer connections by developing personalized solutions Participant feedback about data security risks and bias proves that AI adoption faces ethical problems at current businesses. This supports the findings of Ullah and Sepasgozar (2020) regarding the factors that hinder the adoption of AI in real estate such as organisational resistance, lack of internal expertise, and high implementation costs which result in increased human supervision during the implementation of AI.

The present research discovered that AI could make operations run more effectively. Participant F15 explained that AI systems now complete regular tasks like evaluating properties and checking documents. This observation aligns with what was found by Härmand (2021) highlighting that AI based predictive systems identify operational risks and aid in preventing failues through continuous evaluations and risk monitoring. Similarly, Abidoye and Chan (2017) proved exactly what F15 observed when they investigated how AI improves workflow operations. Robotic process automation systems help boost performance according to Treleaven et al. (2021). Even with their advantages participants remained uncertain about AI system performance in practical applications. Participant F15 confirmed that sudden maintenance parameter fluctuations require ongoing system calibration and human attention to maintain AI system reliability. Ullah et al. (2021) show that human engagement needs to offset automation to prevent system failures.

Overall, previous research shows AI adoption faces difficulties due to poor data quality problems unclear algorithms and excessive dependence on AI systems. For instance, Naeem et al. (2023) suggested organisations should update their AI systems repeatedly and train stakeholders to improve both system performance and user confidence. Research needs to investigate how AI works better with blockchain technology and augmented reality systems to create open systems

and better user experiences. Siniak et al. (2020) argued that linking AI with new technology creates fresh business models to boost innovation in real estate. The above findings and discussion demonstrate AI's role in multiple aspects of real estate including compliance, risk control, market strategy development and business process optimisation. The research shows clear advantages that AI brings but also shows why organisations need to use technology alongside human leadership to solve problems. The real estate sector needs to solve these problems before it can fully use AI to generate value and improve business operations.

4.7.2 Theme 2: Potential Benefits of AI Technology Adoption in Real Estate

Theme 2 presents the key insights of industry insiders on the consequences of integrating Artificial Intelligence (AI) into real estate, a discussion focusing on how AI is affecting this field. Participant F10 expresses,

> *"AI systems analyse market forecasting macroeconomic indicators, demographic trends, and other factors to forecast future demand for real estate in specific markets, guiding investment decisions."*

This shows the extent to which AI can simplify the choosing process by providing convenient tools. Participant F11 asserted that,

> *"AI-powered NLP (Natural Language Processing) algorithms can analyse real estate documents, contracts, and legal agreements, extracting relevant information and identifying potential risks"*

This is a case in point of the way AI can improve customer services by mitigating risks and using necessary information to ensure accuracy.

Participant F3, a Leasing Manager, explains how AI is capable of taking these routine tasks by the heel and turning them into useful suggestions asserting that,

> *"AI-powered systems can analyse feedback and performance data to identify areas for improvement and optimise service delivery, ensuring that real estate companies stay competitive and continue to offer value-added services to clients."*

Hence, the experts have all these pieces of the puzzle and this enables them to fine-tune strategies and exploit profitable goods and services. Participant F10, a Projects Manager, is one of the supporters of the use of AI in personalisation, the participant says,

> *"AI systems analyse market forecasting macroeconomic indicators, demographic trends, and other factors to forecast future demand for real estate in specific markets, guiding investment decisions."*

This demonstrates effectively AI's ability to forge strong bonds and build relationships between clients and employers.

Participant F14, a Procurements manager, brings up AI's role in decision making stating that,

> *"Real estate platforms facilitate collaboration and information sharing among clients, agents, brokers, and other stakeholders, enabling them to access relevant data and insights to make informed decisions."*

This, in turn, demonstrates AI's reliability in terms of increasing revenues and reducing risks. Participant F15, a Maintenance Manager, confirmed AI's impact on enhancing efficiency conditions as he argued,

> *"Real estate professionals undergo continuous training and education to stay updated on the latest technologies, market trends, and best practices, enabling them to offer customised solutions and services to clients effectively."*

This emphasises the prototype of AI as an informer and the provider of better services. Opposing, Participant F7, a Business Relation Manager, illustrates the importance of AI in the field of compliance,

> "*Improved compliance ensures compliance with regulations and industry standards by automating processes such as contract management, document verification, and regulatory reporting.”*

Therefore, this reveals that the AI is capable of reinforcing integrity and community trust. Among the participants, the possible integration of AI in real estate is interpreted as a tool that can be used to witness more advanced and unique outputs. Through the use of AI-driven insights, firms can

face market challenges, personalise customer experiences, and streamline operational efficiency. AI's core in beginning the real estate landscape, shaping sustainable growth as well as the culture of innovations within the industry is highlighted in this support.

4.7.2.1 Discussion of Theme 2: Potential Benefits and Concerns of AI Technology Adoption in Real Estate Findings

Using AI brings important benefits to real estate operations by helping market predictions and customer service while keeping companies compliant. Research participants showed that AI systems can scan market data to find investment options and run services better which helps companies make smarter choices and work faster. The data confirms what research shows about how AI changes real estate operations and helps companies develop advantages over competitors (Abidoye and Chan, 2017).

The system helps real estate companies predict market trends by looking at economic and population changes to see what will happen next. Otchere et al. (2021) supports the findings on data-driven investment decisions. They discovered that the use of AI in investment decision-making includes conventional information and other sources like social media and economic signals. According to Participant F10 AI provides users data-based information to help them make better investment choices. According to Abidoye et al. (2019) AI analysis tools enhance market understanding by finding new market patterns and possibilities. Through advanced AI systems businesses can recognize market trends early and take appropriate action which lowers both uncertainty and risk exposure according to Ho et al. (2021). When risk management tasks become automated through AI technology they provide valuable benefits. F11's data shows that AI systems with NLP capabilities help firms analyse contracts more accurately to avoid risks in legal agreements. According to Ullah et al. (2019) AI boosts compliance checks and detects potential risks in business operations. Through automated risk assessment AI systems boost operational efficiency and reduce mistakes while delivering precise operational results according to Treleaven et al. (2021). Participants highlight that AI systems help them view performance data to find ways they can improve operations. Through AI technology Participant F3 showed that real estate firms can improve their service delivery and stay ahead in their market while also adding value to client experiences. Research proves this point through Ullah and Sepasgozar's (2020) findings that AI-based systems make property management work easier by handling communications with tenants

and scheduling repairs along with preparing financial reports. The system helps companies save costs while freeing their team members to make better decisions and serve clients better.

Companies use AI technology most importantly to personalize their services for customers. The real estate industry gains better customer relationships from AI because it provides custom suggestions and face-to-face digital interactions according to F10. According to Ullah et al. (2018) AI systems for managing customer relationships use big data analytics to create personalized services that help clients stay happy and loyal. Firms find better ways to serve their customers while gaining a stronger market position against competitors in this busy real estate sector. Moreover, AI helps companies meet all necessary regulations by improving their business operations. Participant F7 explained how automation of compliance tools increases document reliability while boosting community confidence. According to Abidoye and Chan (2017) real-time monitoring tools with AI technologies help businesses meet both industry standards and regulatory requirements. An automated compliance system takes away manual work and produces better documented proof at every stage.

The present research shows both advantages and difficulties when real estate uses artificial intelligence systems. Participants explained they find AI difficult to work with and need to learn new processes regularly. Real estate experts need ongoing education to learn new technology systems and industry standards according to Participant 15. According to Treleaven et al. (2021), research supports the idea that companies need to invest in their employees to make the most of artificial intelligence technology. Organisations that do not solve these AI implementation challenges will not reach their potential with AI technology and will encounter worker opposition. The research participants discovered AI systems can produce biased results while making decisions. Despite their ability to make things faster and more precise AI systems can generate wrong outcomes because training data or algorithmic restrictions contain biases. According to Abidoye and Chan (2017) AI systems should not replace human review because they need human experts to keep the results effective.

The research shows that AI systems improve communication between real estate stakeholders and increase information sharing among them. According to Participant F14 AI technology makes it possible to share insights between client's agents and brokers which leads to better decision making. Research published by Ullah et al. in 2021 shows that AI platforms aggregate data in one

location to make it easier for all stakeholders to communicate and work together. When stakeholders collaborate with AI systems they achieve faster transaction results and deliver better services to clients. AI technology will develop more advanced features by using machine learning systems alongside Blockchain and Internet of Things applications. Truong et al. (2020) is in line with the current study findings that suggest that AI improves market forecasting. Truong et al. (2020) find that additional data of mobility pattern and social sentiment enhance the efficacy of AI in properties market prediction. Other research indicates these technologies working together with AI make data safer and more accurate while developing intelligent property management systems (Ullah and Sepasgozar, 2020). Real estate companies need to stay ahead by embracing new technology developments to stay competitive in their industry. AI technology shows its ability to improve real estate operations by better-predicting markets while increasing efficiency and enhancing customer service under regulated conditions. The study findings and data match's research studies that show AI will transform the way real estate works. The full benefits of artificial intelligence remain untapped because of system problems and training needs plus bias issues require fixing. Real estate firms can make better use of artificial intelligence when they combine automated systems with human personnel and invest in staff training plus new technology.

4.7.3 Theme 3: AI-based Cost Optimisation and Efficiency in Real Estate Processes despite Complexity

The application of AI in the processes of real estate has significantly improved effectiveness, rationality and profitability, significantly changing the existing picture of the industry. This theme focuses on the gain brought by AI when it comes to several aspects of the real estate business such as compliance, risk management, communication processes and data management for decision-making.

Among the advantages of implementing AI and its influence on real estate specifics seen in the examples of the changes made to real estate operations, one can indicate the contribution to the increase in regulatory and legal compliance. For instance, Participant F10 highlighted,

> *"AI models ensure compliance with regulatory requirements such as Truth in Lending Act, Home Mortgage Disclosure Act, and Fair Lending laws by automating compliance checks, monitoring, and reporting processes."*

This automation eliminates the probability of various human mistakes and thereby lowers the incidence of legal complications and fines. Besides this, the advanced AI-powered portfolio management applications automatically examine the investor's portfolio to find diversification options, enhance the corresponding asset placement, and ensure the maximal risk/return ratio. A project manager, Participant F10 emphasised,

> *"AI-driven portfolio management tools analyse investment portfolios to identify diversification opportunities, optimise asset allocation, and maximise risk-adjusted returns for investors".*

This capability helps the real estate firms to do away with wrongful investment decisions hence reducing the financial loss.

Moreover, AI-derived solutions, for instance, blockchain technology and augmented reality are revolutionising the real estate market by creating new venture paradigms, offering higher levels of openness in transactions, and improving stakeholders' satisfaction.

> *"AI-driven innovations such as blockchain, IoT, and augmented reality are revolutionising the real estate industry, enabling new business models, improving transparency, and enhancing the overall customer experience (Participant F15)".*

These are some of the technologies that enable efficient and secure property sales thereby increasing the level of satisfaction among clients. In addition, a few participants also highlighted the use of technologies like geospatial analytical tools for preserving customer satisfaction. For instance, Participant F14 who is a procurements Manager shared that,

> *"For proper customer satisfaction, we have also incorporated geospatial analysis into our procurement and supply chain processes. For example, in one of the urban development projects we have recently worked on, these tools allowed us to find suitable suppliers based on their location and market conditions. It was therefore made certain that value was obtained in the shortest time possible and delivered to our clients on time thus cutting on costs".*

This aligned with another participant's perception, stating,

> *“Geospatial analysis tools combine location data with demographic and market information to identify investment opportunities, assess property values, and analyse neighbourhood trends.”*

However, one of the participants highlighted the importance of using various methods for client satisfaction,

> *“While we have implemented geospatial analysis and other tools to obtain comprehensive demographic data and market analysis, we make sure that customers are updated, their concerns and heard and catered to timely. We provide them with detailed neighbourhood trends and patterns and our analysis of it to help them make informed decisions (Participant F13).”*

In response to the follow-up question about specific risks associated with AI-oriented digital applications, Participant F14 revealed several concerns that were first-hand witnessed.

> *"A notable drawback that I have noticed regarding the use of AI-based applications in procurement is the challenge of converging such systems with the general buyer destination. In their most recent project, the team had some difficulties in how to make sure the AI systems can freely use the historical procurement data. Further, issues of insecurity were raised since such structures often involve handling financial details."*

This finds meaning on the backdrop that ‘more research needs to be done to understand the integration challenges to realise the benefits of AI in real estate.

Therefore, the use of AI technology in the execution of real estate processes has brought positive changes in compliance automation, risk management, communication and information analysis. All these improvements lead to making the processes cheaper from the point of vision of different real estate firms and clients, more efficient, and optimised. Ideas from the probe questions serve to elaborate the advancement and application of AI in industry and also the dynamism involved thus, the need to adapt and innovate.

4.7.3.1 Discussion of Theme 3: AI-based Cost Optimisation and Efficiency in Real Estate Processes Despite Complexity Findings

This study proves that AI technology helps companies reduce expenses and run operations better in their real estate processes. Users see AI as a tool to simplify business systems and lower costs while making services work better even with adoption challenges. Research studies show AI transforms real estate businesses according to Abidoye et al. (2021) and Ullah and Sepasgozar (2020). The current research reveals practical details about how AI works in real business settings and shows what challenges industry workers encounter. By using AI tools to automate daily tasks the industry reduces work expenses and prevents errors in operations. The study results support Ullah et al. (2019) research that showed AI automation makes operations more efficient by eliminating unnecessary steps. This research shows that applying AI technology to real estate management tools improves how resources are used which produces substantial cost reductions. In line with the present research, Del Giudice et al. (2020) claim that the use of AI increases cost-effectiveness. They also proved in the sense that effective pricing algorithms using AI change property price levels in real time to maximize its revenues and resources adoptions.

Real estate companies use AI to bring blockchain, IoT and augmented reality technologies which make property transactions more transparent and run faster. Participants showed how geospatial analysis and predictive modelling helps find market patterns and investment possibilities according to Baldominos et al. (2018). The present research shows that integrating AI brings system challenges which require seamless connections between different programs and seamless blending of new technology with existing setups. Booyse and Scheepers (2024) show that technical issues and employee resistance make it hard for companies to use AI.

The study shows that AI tools help real estate operations run faster by letting teams make decisions faster and improve their workflows. According to Shiu et al. (2019), there is support for the current study in terms of process automation. Shiu et al. (2019) also concluded that AI in property management improves operational effectiveness since it eliminates bureaucracy and increases transparency of processes. Real estate businesses can process market data instantly thanks to AI platforms which let them make faster decisions for their clients and adapt to industry changes. According to Gharahighehi et al. (2021), AI systems enhance both how quickly and precisely organisations make decisions. The new study's participants explained that predictive tools help firms spot market changes early so they can adjust their strategy to run their operations more

effectively and bring in higher profits. Their research shows that AI tools can deliver customized customer experiences even though fitting them with existing workflows proves difficult. The current study found that AI supports customer-centric business by giving personal property advice and automated services. This is in agreement with Viriato (2019) who used an example of how AI neural networks improve pricing precision, customers' classification and property suggestions based on deep learning and data pattern analysis. This also aligns with what Ali and Anwar (2021) discovered but their study continues to face difficulties in validating the trustworthy outputs that AI systems produce. The research by Berente et al. (2021) uncovered data precision problems and AI system bias risks. The present results show AI improves customer service but organisations need to verify AI results regularly to make sure they deliver results effectively.

Participants noticed AI provides excellent efficiency but they worry companies put too much faith in technology and struggle to handle its advanced functionalities. Ullah and Sepasgozar's 2020 research with real estate professionals revealed system interoperability and data integration problems with AI adoption. This research supports current discussions by showing AI should work alongside human experts not replace them. Participants supported using AI as a helper tool instead of an independent decision-maker because of shared views with Morley et al. (2020) on requiring human supervision for AI systems. The research shows how AI helps real estate operations save costs and run better while explaining why organisations struggle to use AI technology in practice. This research provides useful findings by listening to industry leaders who have learned how to use AI effectively and overcome its difficulties. Real estate companies need to plan strategically how they use AI to solve operational difficulties while protecting data reliability to achieve maximum benefit from AI in saving costs and enhancing operations.

4.7.4 Theme 4: Client Satisfaction via Personalised AI Support with Realisation of Human Oversight

AI technology adoption in the real estate industry has touched it as far as client satisfaction is concerned through valuable services customized to each client, better communication and round clock support. AI lets companies use these tools to create certain marketing campaigns, targeted directly to meet the customer needs and preferences. Participant F5 stated,

> *"AI enables real estate businesses to create targeted marketing campaigns based on customer data, improving lead generation and conversion rates."*

This capability enables real estate firms to generate data driven insights to quickly locate and serve potential clients with customized property options to improve efficiency and customer engagement.

What's more, AI-powered systems make personalised recommendations to customers at any time of the day. Participant F2 highlighted the importance of AI in enhancing customer interactions by stating,

> *"Enhance customer experience-based chatbots and virtual assistants provide round-the-clock customer support, answering queries, scheduling viewings, and providing personalized recommendations, improving customer satisfaction."*

This continuous support gives clients the opportunity to get immediate help and thus a smooth interacting Search process. In addition, AI systems have increasingly incorporated robust data analytics into their system, adding to client relationships by creating custom experiences. Participant F7 noted,

> "*We are considering… robust data analytics. That would certainly lead to deeper information about client's preferences and anticipations about the services. Using this we would be better at offering effective and personalized services to all of our clients strengthening customer relations."*

The real estate agents now interact with clients using AI powered chatbot solutions. They are chatbots that allow agents to have smooth engagement, and it allows capturing leads and an interactive property search experience. Participant F10 observed,

> *"AI-powered chatbot solutions for real estate websites enable agents to engage with visitors, capture leads, and provide interactive property search experiences through conversational interfaces."*

These technologies improve the overall client journey by giving fast responses and valuable insights, when regions are searched. In real world cases, we've also seen that AI chat bots are extremely effective at tackling and assisting with troubleshooting. One practical example was shared by Participant F4:

> *"This one time a customer shared his experience with our chatbot which addressed his concerns late at night and his queries about software were catered to. The customer was able to employ troubleshooting methods given by the AI and resolve the issue."*

That's the case of how AI helps clients get their questions answered swiftly and effectively, thereby increasing satisfaction and trust of the company. Moreover, Participant F2 added,

> *"AI-driven chatbots at our website are dedicated to answering the queries and concerns of our clients 24 hours. This area has enhanced our lead conversion rate; this is because the customers get all the information from the bots even after working hours resulting in fast sales."*

Uninterrupted support contributes greatly to higher client retention, and business success. Despite all its advantages, using AI-powered customer support mechanisms also creates some problems that need to be addressed — it's a human thing. Participant F1 pointed out,

> *"This one time we received feedback of inaccurate listings we immediately took action to address this issue. By following these kinds of measures we have witnessed the satisfaction of our clients and retained their trust in our services."*

Furthermore, AI chatbots may struggle with handling complex client requests, as pointed out by Participant F8,

> *"Another time, the AI chatbot was unable to understand the complex requests of our VIP client and that was really embarrassing for me because they personally contacted me about this issue."*

That is why this put emphasis on the role that human intervention undertakes when AI systems do not understand the subtle and complex client needs. One problem with AI adoption in real estate is the problem of false positives causing an unnecessary concern and resource allocation. Participant F15 discussed,

> *"For instance, in our predictive maintenance system, what happens is that it turns what really is not a problem into a critical problem as sensed from our sensors. This could*

increase the amount of time and resources needed to solve the same problem, the certain methods need to be reviewed and confirmed by human personnel."

That implies how vital human intervention is to verify and relate the accuracy of AI produced insights. Finally, while AI driven solutions have completely reshaped the way in which clients are satisfied, through personalized marketing, better communication and real-time support, humans are still needed to resolve AI's limitations and complex client needs. Real estate firms can achieve this by finding a medium that can strike a balance between the AI efficiency and the human expertise so the firm can be able to provide real seamless, reliable and customer focused services that are in keeping with the changing client's expectations.

4.7.4.1 Discussion of Theme 4: Client Satisfaction via Personalised AI Support with Realisation of Human Oversight Findings

The findings with respect to Theme 4, which are about client satisfaction through personalised AI support with human oversight, are consistent with existing literature on AI adoption in real estate. Real estate businesses have been able to adopt AI technologies to deliver client centric services which includes personalised experiences, better communication and maintaining compliance with customer expectations. Data analytics through AI has been found to help businesses to make sense of their customer preferences and behavior patterns by using targeted marketing campaigns. In fact, Abidoye and Chan (2017) found that AI driven analytics can help real estate firms understand consumer trends and can thus help them to tailor their marketing efforts efficiently. The results of the present study are consistent with this, AI allowing for targeted marketing campaigns based on customer data resulting in increased lead generation and conversion rates. Shaw (2020) supports the assertion that customers are more satisfied with products and services that are personalised through the use of artificial intelligence. Shaw (2020) argued that AI customer segmentation tools apply behaviourial and transactional data to enhance leads conversion since it offers relevant property suggestions.

Another area where AI helps the customers is pertaining to personal recommendations and services. In AlBahsh and Hosseinian-Far (2021), the authors point out the significance of big data analytics to provide customised services and hence real estate clients are served with the appropriate solutions that meet their needs. This is consistent with the study findings that data analytics are robust means to further explore the client preferences and provide more targeted and

personalised service offerings. There has been a lot written on how the use of AI powered chatbots can help improve client communication and support. This concurs with Marcondes et al. (2018) argument that the use of AI chatbots in customer service is efficient. They demonstrated that with the use of AI chatbots, communication is made easy, appointment making, and leads follow-up is made easier through the use of automation. Likewise, Aristodemou and Tietze (2018) studies highlight how AI chatbots ensure that clients are able to interact seamlessly, they have 24 hours support and they can address any client inquiry promptly. These are the benefits confirmed by the findings of this study, with participants reporting that having AI driven virtual assistants available to schedule viewings and provide personalised recommendations, has led to better customer satisfaction.

In spite of the many benefits that have been documented in literature of using AI in client interactions, there are challenges such as inaccurate AI chatbot interactions and the inability to complete complex client requests. In Amann et al. (2020), they emphasise that the lack of understanding of the nuances of human interaction can cause the customer dissatisfied and require human intervention. Also in line with the current study, Raval (2020) argued that AI chatbots, especially in real estate, face challenges in handling customers elaborate queries and might need intervention from human beings to ensure quality services. In Berente et al. (2021), authors argue that while AI can significantly increase efficiency, AI generated findings can't be used outright without human intervention to check and validate them and possibly clean them of potential inaccuracies. This perspective is corroborated by the present study, in which participants highlight the need for human intervention to correct false positives and make AI driven decisions as accurate as possible. Also, the integration of AI in real estate processes has born the development of new business models based on the improvement of customer satisfaction by means of technology. Barkham et al. (2022) examine how AI driven platforms are transparent and efficient in transactions leading to improved levels of trust and satisfaction in client. The current study's findings echo this one, as AI technologies like Blockchain and geospatial analytics have been used to enhance service delivery and customer experience.

Finally, the Theme 4 findings determine that with the adoption of AI in real estate, it has increased client satisfaction with personalised services, good communication and efficient service delivery. But one of the limited capabilities of the AI is that it has to balance with some degree of human

oversight in order to actually optimise the client experience and solve challenges. This study draws insights that are consistent with the existing literature, and the implications support that the strategic use of AI can lead to sustainable customer centric benefits in the real estate sector.

1.8. Discussion: Alignment and Divergence with Literature

This discussion synthesises the findings across the four analytical themes to assess how well the results align with or diverge from existing literature. The goal is to critically examine the extent to which this study confirms, extends, or contradicts previous research on AI adoption in the real estate sector.

4.8.1 Alignment with Existing Literature

The findings show significant alignment with established literature in several key areas:

- **AI Enhancing Compliance and Risk Management**: As shown in Theme 1, participants acknowledged that AI improves compliance processes, legal accuracy, and risk detection. This supports the findings of Abidoye and Chan (2017) and Ullah et al. (2019), who concluded that AI tools streamline contract analysis and regulatory checks, enhancing governance across sectors.
- **Operational and Cost Efficiency**: Theme 3 highlighted that AI automates repetitive tasks, reduces human error, and supports real-time decision-making — outcomes echoed in Del Giudice et al. (2020) and Shiu et al. (2019). These efficiencies were particularly valued in property valuation, predictive maintenance, and procurement workflows.
- **Predictive Analytics and Market Insight**: As confirmed by participants and aligned with Wei et al. (2022) and Otchere et al. (2021), AI's forecasting capabilities aid investment strategy and pricing accuracy. AI’s capacity to integrate demographic and market signals supports data-driven investment planning.
- **Customer-Centric Solutions and Personalisation**: Participants’ emphasis on improved customer experiences, enabled by AI chatbots, targeted marketing, and automated communication (Theme 4), is consistent with Shaw (2020), Aristodemou and Tietze (2018), and Marcondes et al. (2018). These studies similarly found that AI fosters better engagement and satisfaction through personalised, always-available support.

4.8.2 Areas of Divergence or Original Contribution

Despite these alignments, the study also uncovered new dimensions or tensions that extend beyond prior research:

- **Complexity and Limitations in Real-world Implementation**: Several participants reported operational challenges in integrating AI tools with legacy systems (e.g., procurement platforms). While existing studies promote AI as a seamless enabler, these findings echo Booyse and Scheepers (2024), indicating that integration is often more complex than theoretical models suggest.
- **False Positives and Overreliance Risks**: While AI is designed to improve reliability, multiple participants cited issues like false alerts in predictive maintenance or customer request misclassification. These practical limitations are less prominent in literature but are significant in real-world deployment — suggesting that excessive reliance on AI without human oversight remains risky, a concern mirrored in Berente et al. (2021).
- **Cultural and Organisational Resistance**: The UAE context highlighted resistance to AI tools due to perceived job threats, complexity, or lack of training — confirming Ullah and Sepasgozar's (2020) observations about internal barriers. However, this study contributes deeper insight into how such resistance manifests in a specific, fast-growing real estate market.
- **Ethical and Interpretive Ambiguity**: While literature acknowledges AI bias, participants specifically flagged incidents where chatbots misunderstood VIP clients, or predictive tools provided misleading insights. These real-world examples expand on concerns discussed in Raval (2020) and Amann et al. (2020), who emphasised the importance of interpretability in AI-human interaction.
- **Emerging Value of Hybrid Approaches**: A consistent insight across all themes is that AI works best when combined with human expertise. This convergence — rather than substitution — aligns with Morley et al. (2020), but the participants in this study illustrate this balance with practical case examples from the field, offering applied perspectives not yet fully captured in academic studies.

4.8.3 Contribution to Practice and Future Research

By highlighting both consistencies with and departures from existing literature, this study makes three key contributions:

1. It affirms the value of AI in compliance, forecasting, and client engagement in the real estate sector.
2. It offers grounded insights into implementation barriers and ethical concerns not widely discussed in prior studies.
3. It positions hybrid human–AI collaboration as a pragmatic model for responsible adoption.

These findings open new avenues for future research, including studies on AI governance, sector-specific integration strategies, and cross-cultural technology acceptance in emerging markets.

4.8.4. Operational Efficiency and Financial Benefits of AI at Al Zaeem Commercial Brokers

In the real estate industry, efficiency in operations is essential in ensuring competitiveness and profitability. The introduction of Artificial Intelligence (AI) in Al Zaeem Commercial Brokers has caused a tremendous enhancement of all operational processes, enabling to streamline the processes, speed up the decision-making process, and manage resources more effectively. AI-based solutions, like automated valuation models (AVMs), predictive analytics, and customer relationship management (CRM) systems, have assisted the company in streamlining its different operations, including property valuation, customer engagement and compliance management (Jigyasu, 2021; Renigier-Biłozor et al., 2021).

Nevertheless, in addition to the benefits of operational improvements, AI has a direct impact on the financial performance of the firm. Such technological solutions have brought tangible financial gains, namely, cost savings, increase in revenues, and enhanced return on investment (ROI), which are critical to the long-term sustainability and profitability of real estate business in the UAE (Viriato, 2019; Lambourne, 2021).

4.8.4.1. Cost Reduction

With the help of AI, Al Zaeem Commercial Brokers will be able to automatize and optimise numerous of its manual processes, which will lead to a high level of cost savings. To illustrate, the company can use automated valuation models (AVMs) and machine learning algorithms to evaluate the value of properties in a fast and accurate manner without having to heavily rely on manual labour. This saves time wasted in property appraisals and expenses incurred when employing more personnel to perform this activity (Treleaven et al., 2021).

The AI-based CRM systems also contribute to simplifying the customer service processes by decreasing the size of the customer support team and improving quality and speed of interaction with customers at the same time (Del Giudice et al., 2020). Moreover, the predictive functionalities of AI can enable the company to actively plan its resources in order to optimise staffing, lower maintenance expenses, and avoid operational wastefulness. Through AI, the company has managed to save significant amounts of money on administrative overheads, property maintenance, and customer service processes (Ullah et al., 2021).

4.8.4.2. Revenue Enhancement

Another key area that AI has worked in favour of Al Zaeem Commercial Brokers is in boosting revenue through enhanced market intelligence and decision making. Being able to work with large volumes of data in different formats, AI can help the firm to gain a more insightful insight into market trends, property values, and customer preferences (McGrath et al., 2019). This enables more accurate pricing policies and more specific marketing campaigns resulting in a high conversion rate and a high number of sales (Shalwa, 2024).

To illustrate, AI-based market trend analysis systems can be used to forecast future property prices, allowing the company to make a wise decision regarding investment prospects and pricing policies. The ability to know the emerging trend and customer needs more precisely allows Al Zaeem Commercial Brokers to exploit the profitable market segments and boost its revenue streams. AI can also be used to implement dynamic pricing models, which will enable the company to change the price of the property dynamically according to the changes in demand, thereby maximising the potential revenue (Treleaven et al., 2021).

Moreover, AI-based systems that automatize the leasing and rental procedures aid in streamlining the operations, minimise the vacancies, and boost the rental revenue. With the help of predictive analytics, the company can find future tenants more effectively, which will result in quicker lease agreements and less downtime between tenancies (Lisowski, 2022).

4.8.4.3. Improved Return on Investment (ROI)

The impact on enhanced returns on investment (ROI) is one of the greatest financial gains of AI to Al Zaeem Commercial Brokers. The capability of AI to process data and forecast market behaviour assists the company in making superior investment choices leading to increased returns. Using AI to evaluate property value, analyse market risk, and predict trends, Al Zaeem Commercial Brokers will be able to invest in high-potential properties that have the highest returns (Pinter et al., 2020).

Moreover, the effectiveness of AI in streamlining operations and cost reduction leads to profitability as a whole. The more the operational processes are automated and optimised, the more the firm can do with less to attain improved margins and ROI. This is also because AI predictive capabilities in asset management enable the firm to see the opportunity of managing property cost-effectively and reducing risk, which ultimately leads to better profitability of the firm in the long run of managing the real estate it has invested in (Kabaivanov and Markovska, 2021).

To sum up, AI not only contributes to operational efficiency at Al Zaeem Commercial Brokers but also provides considerable financial returns in terms of cost reduction, improved revenue generation, and improved ROI. These financial benefits will probably be even more substantial as the company proceeds to adopt AI technology, which will guarantee its future profitability in the competitive real estate business in the UAE (Dakrory, 2023; Abubakar and Alshammari, 2023).

1.9. Chapter Conclusion

The findings of this study have been analysed in this chapter in a comprehensive manner based on the four themes that were derived from the study. This research has explored AI technology adoption in the real estate space and has shown the technology's influence throughout many operational domains including compliance and risk assessment, customer satisfaction, and process efficiency. The analysis showed that AI helps enhance compliance with regulatory frameworks,

increases operational efficiency and accuracy of market analysis and forecasting. Nevertheless, data quality concerns, technology overreliance and the requirement for human oversight continue to be the critical challenges of a successful implementation. However, the discussion of AI based cost optimisation and efficiency highlighted the avenue for cutting operational expenses and speeding up process time, while the real estate processes were complex. The study also showed that AI driven innovations offer personalised client services in order to improve customer satisfaction through recommendations and round the clock support. However, the concerns about inaccuracies on AI chatbot interaction and the lack of proficiency of the AI in addressing sophisticated client requests, are apparent and proved that integrating AI and human supervision in a smart way is needed.

Overall, the results from this chapter support the potential employability of AI into real estate operations while acknowledging the persistent challenges that are critical risks that require strategic intervention. With these insights as a foundation, the following chapter explores the practical implications of the findings and makes recommendations for industry stakeholders. In chapter 5, I will present a synthesis of the study and conclude based on the objectives of the research, and offer actionable recommendations to optimise the adoption of AI in the real estate sector.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Chapter Introduction

As Artificial Intelligence (AI) is quickly being adopted by different industries, a thorough knowledge of the complexity of adopting and incorporating AI into the real estate sector is necessary. This chapter outlines a range of objectives of a broad nature aimed at providing a framework for a detailed analysis of this important subject area. It examines how AI has modified longstanding practises and defined the operational framework to evaluate the influence and the possibility of such technology on the UAE real estate sector.

The integration of AI is primarily about the perspectives of industry professionals, practitioners and key stakeholders of the UAE real estate sector. The goal is to evaluate how aware and knowledgeable about some of the AI applications such as analytical forecasting, virtual property tours, chatbots and data-driven decision-making and to find out how these technologies impact industry efficiency, accuracy and customer satisfaction. Advancements driven by AI have the potential to change the commercial real estate landscape and the way business is conducted, fundamentally. This study also investigates the readiness and capacity of the sector to adopt AI technologies, as well as any challenges and concerns that could have arisen in this transformation. This study analyses the insights and experiences of experts in the real estate industry to help draw value perspectives on the implications of AI for the real estate market operations, customer engagement and the broader real estate market in the UAE.

This study presents recommendations, which provide practical guidance and strategic approaches to implementing AI in the UAE's real estate industry. The insights and knowledge developed in the course of the research process stand as the basis for these recommendations. The proposals go beyond showing process improvements and emphasise the moral considerations and regulatory frameworks needed to be considered to initiate proper and sustainable integration of AI technologies into the industry. Being an evolving industry in the UAE, the real estate sector is best served by a proactive approach to fully exploit AI's potential while maintaining the integrity of the sector and building trust with stakeholders. The information contained in this chapter will serve as a foundation for a future where AI and the real estate industry live hand in hand, yielding better services and greater value for all parties.

5.2 Conclusion

The research aimed, “to evaluate the role of artificial intelligence (AI) in the real estate industry of the UAE” for which the research developed four objectives including the identification of the areas in real estate sectors that have benefitted from AI technology adoption. The second objective was “to explore and discuss the potential benefits that real estate sectors can yield from the adoption of AI technology”. The third objective was, “to elucidate the process in the real estate sector has become efficient, cost-effective, and timely with AI technology adoption” while the fourth objective was, “to identify AI technology adoption benefits that are transferred to real estate clients for better satisfaction rates.” For the attainment of these objectives, the study adopted interpretivism research philosophy and used qualitative research method. The data was collected using semi-structured interviews and a purposive sampling technique was used to select real estate agents as the sample population. To extract results from the data and draw conclusions, the thematic analysis method was used. Based on thematic analysis, a total of four themes were extracted from the data.

The first theme helped address the first research objective and answered the question of how different areas of the real estate sector have benefited from the adoption of AI technologies. The first theme concluded that there is a range of areas in real estate that have benefited from the applications of AI technologies. For example, AI played a significant role in improving the different areas of real estate including sales, tax assessment, portfolio management, borrowing and lending, and REIT valuations. Data science can provide an instant indication of the value of property which has saved significant resources and time for the portfolio management both for the lenders and investors. Automated appraisals can help insurance companies, banks and other institutional lenders and investors with instant and accurate evaluation of the assets on the balance sheet, necessitating the need for a lengthy and expensive annual revaluation process. The instant assessment of market value is useful in times of volatility in the real estate market (Ullah et al., 2021a). Data science has helped instant assessment of assets holding commercial value for new models of investment.

Verification of documentation is an important aspect of the real estate industry when selling or buying property on loans. Selling is the area in which AI delivers significant advantages to real estate agents, as AI automatically perform documentation verification functions such as checking

property values, debt levels, personal information of the homeowner, and even home renovations. Detection of errors in paperwork is an important area of the real estate industry that benefits from AI technologies, as AI automation performs this role easily, AI has reduced the need to contact people directly and provided a solution to the real estate agents in the area of investigations related to the property and its owner. Further, the real estate industry has benefitted from AI in a way that helps anticipate future rental or sales prices more accurately so the chances of loss are less. Making accurate decisions is dependent on the information available to real estate agents, AI or big data analytics enables companies in the sector to collect, process, clear and analyse the massive amount of data to improve the decision-making quality. The automation of manual tasks is one of the major benefits of AI in real estate. Robotic process automation (RPA) and advanced AI systems could automate a wide range of tasks like making property reports, maintaining land records, extracting licenses, litigating paperwork, and more. Where documents need to be inspected for signatures, verifications, seals, and authenticity is an important consideration. The documents can be examined by AI applications in real estate for things such as missing fields and missing signatures. The time-consuming process of reading through every document is reduced (Power, 2004). Automating such tasks makes real estate transactions easier. Similar to other recommender systems you've used, AI-powered search and suggestion engines operate similarly.

Further, managing good relationships with customers is a critical aspect of the real estate industry and mastery in this area is crucial for real estate agents to be successful in the industry. Different AI programs such as Customer Relationship Management (CRM) software play an important role in managing these relations by automating repetitive tasks and allowing real estate agents to focus on other important areas. Moreover, it is found from the analysis that the use of Natural Language Processing has enhanced the text summarisation of the data resulting in reducing the reading time and increasing information updates that led the companies towards sending accurate and intended messages to their customers. Knowledge sharing and collaborative working are critical areas in the real estate industry that play an important role in the success of real estate agents. AI technologies such as document management software (DMS) benefitted this area of real estate positively as this software by improving the collaboration between stakeholders such as project planners, vendors, and contractors helps in the rapid dissemination of information. This information sharing not only enhances the rapid sharing of information but also improves the effective decision-making processes. The decision-making process is more transparent and the

chances of errors are lower. AI through the fast information sharing process improved the responsiveness of real estate agents to the changes in the market.

The first theme helped conclude the existing benefits of AI that the UAE real estate industry is experiencing, but the second theme reflected the potential benefits that AI can deliver to the UAE's real estate industry. The study outcomes found that AI can help real estate companies in risk assessment, security management, and accurate decision-making. The data analysis revealed that the application of machine learning and artificial intelligence can help leverage previously collected data to obtain actionable insights. It is found from the analysis that real estate companies still face challenges in accurately and consistently following up with every listing or sale promptly. The potential benefit of AI systems such as automated property management systems can help find the latest listing that can assist real estate operations efficiently. The research outcomes also highlighted the use of AI for automating social media platforms for automated marketing. One of the major potential benefits of AI for the real estate industry is that real estate brokers, developers, and builders can automate the trigger points within their operations with the use of real estate automation technology. The study also found that chatbots powered by AI can be used to improve customer service and engagement across many digital platforms, including Facebook Messenger, WhatsApp and Telegram. Nevertheless, to reap these potential benefits, companies must tackle Cybersecurity, data privacy and infrastructure compatibility challenges to avoid using AI as it should be used, safely and ethically.

The data sensors in building systems are the AI technologies that help in real-time adjustments to lighting, temperatures, and similar controls. It has helped in driving predictive analytics to make informed decisions regarding replacements and maintenance of the systems, while check-on possible repair and structural damage can be attained by robots. However, all these services require the property owners to invest in cyber security to access the automation systems and protect the data. Older buildings need to take advantage of new technologies for some infrastructure updating. Furthermore, the real estate industry has also introduced multiple data science or artificial intelligence functions which has proven itself to demonstrate significant value in the UAE market recently. Data science has provided deeper insight into current market trends and patterns in commercial real estate which is more complicated compared to real estate. Analysis and forecast have opened new opportunities in real estate investing. The data-driven methods are being used to

invest. Data science has incorporated massive amounts of data from various data sources within forecasting techniques (Ullah et al., 2021b). These systems have made it easier to analyse the trends, seasonal variations and other patterns to make more appropriate estimates about property investments.

Considering traffic, rental income, occupancy, investment return, and ratings have determined the viability of distinct locations. Since investors need to invest in residential and commercial properties, they need to understand their customer's needs. Therefore, data science holds immense significance in this regard (Sharma et al., 2020). Data science can help make better decisions by incorporating factors like demand for shopping malls, primary rivals, nearby housing necessities, parent's need for schools and affordability. Additionally, it is imperative to keep a closer look at the position of competitors while monitoring the real estate sector as well as its activities. Data analysis helps understand the performance of competitors. Data science has significantly helped identify the strengths or weaknesses of the competitors, therefore gaining a competitive advantage over them. No properties can ever be identical; no two properties can ever be identical. Every property has unique features which means the value of property changes with time. Therefore, it becomes quite difficult to manage property in submarkets. Data analytics and artificial intelligence are widely being used across different industries for understanding human behaviour in a better way. It has become one of the most important tools for developers of business. The analysis of customer segments by using Artificial Intelligence can assist the developers in reaching tight channel partners and liaising better deals and offers for the customers. The outcomes unveiled the potential benefits of AI systems to real estate agents so that they can create a planned and structured environment. AI can be used to analyse if the decisions are accurate and facilitate the businesses in reaching the intended goals. AI technologies help analyse if the business is on the right track. This theme helped address the second objective of this research by reflecting on the potential AI benefits for the real estate sector.

The third theme explains AI's role in making real estate processes cost-effective, timely, and efficient. The data analysis unveiled the facts that big data and even virtual reality play a significant role in identifying prospective clients and help to analyse the potential homes for buying and selling examining the property data makes the operations more efficient as it reduces the chances of error and enhances the accuracy of making correct decisions. The research outcomes unveiled

that from the perspective of buyers, AI made operations more cost-effective and timely. For example, previously, real estate agents or buyers used to search for homes manually, but AI applications made this process easy. AI algorithms allow buyers to search for their preferred places and homes online and select the most perfect one that not only saves their time but their money as well. The data analysis found that AI-like property search applications such as chatbots, property tours, and transaction automation are becoming increasingly commonplace, as is sophisticated consumer relationship management for the sake of lead nurturing and improved customer targeting. Taking into account the significance of money, the increased knowledge of the capabilities of machine learning and artificial intelligence (AI) has contributed to improved risk management investment and more accurate market forecasts that result in more efficient operations that are not only time-efficient but cost-effective as well.

Artificial Intelligence (AI) within data science has assisted in price indices and the concept of investing. The property price indices can forecast trends from huge information sets and analyse price insights. The statistical methods have provided logical insights into the historical performances of the market. The high-quality data helped make wise decisions concerning high-quality data (Skrebeca et al., 2021). Lenders can make good deals based on real market data by considering that prices are up to the mark and the system is being updated. Artificial intelligence (AI) has been shown to have helped a great deal with home search, home purchase, and rental inquiries. Since the price of real estate can be influenced by several factors such as transportation options, neighbourhood quality and connectivity, buyers can make rational decisions about where to buy based on location. Since data science or artificial intelligence collects and analyses data from various sources, it aids in understanding consumer behaviour and preferences to market their choices more compellingly and creatively. Visualisations, 3D rendering, Facebook or Google ads, visual staging, and listings help attract audiences a great deal.

It has been realised that Building information modelling (BIM) is assisting the construction sector in making significant cost reductions, which has already started to happen. The whole project team participates in this process, and everyone provides all of the data that pertains to the project. This includes both graphical and non-graphical models of the project, which are used to link the 3D model with the BIM. These 3D models offer the users the knowledge of what material is used, how much it will cost, who produced it, and how much time it will take to complete it, in addition

to any other pertinent information that may be required. These AI initiatives contribute to the cost-saving and timely completion of the project by enhancing the operational efficiency of real estate companies. It has been found that AI applications make it easy for the real estate agents they evaluate the projects while investing huge amounts, automation helps them make efficient operational decisions leading companies towards more accurate, cost and time-saving decisions. This third theme helped address the third objective of this research.

The fourth theme discusses the AI benefits that have been transferred to the clients of the industry. The data analysis disclosed that one of the most crucial aspects is the communication that takes place between leasing agents and potential tenants, and AI-based chatbots can assist in automating this portion of the process more effectively. The chatbots will provide automatic responses to any inquiries made concerning the purchasing procedure or the available properties. They provide round-the-clock support to customers who contact them through their website. The development of models for natural language by artificial intelligence facilitates the participation of all parties engaged in real estate transactions, such as real estate agents and loan officers, by allowing for the rapid interpretation of a variety of queries and requests that arise during the process, which is also beneficial for real estate agents. It is realised that the ability of real estate brokers to more effectively adapt to shifts in the market has been facilitated by the proliferation of digital technology. The real estate agents have automated the company processes that were administrative and repetitive, which has led to a major improvement in efficiency. For instance, the calendar schedulers have assisted the real estate agents in more effectively setting up meetings, such as attending inspections and accompanying clients on walk-throughs.

It is found from the analysis that collecting personally identifiable information digitally, such as names, addresses, and payment details, is something that real estate firms can do. The information has been protected thanks in part to the solutions for customer relationship management. The increased efficiency of real estate transactions as a result of the widespread use of digitalisation has benefited both buyers and sellers of homes. The digitalisation of mortgage paperwork and the rise of online listing are just two examples of how technology has made it simpler for many parties to work together. The use of data analytics, which assists real estate agents in better comprehending the needs of their customers, enables these professionals to more efficiently use their time. AI-driven software responds to users immediately as they visit. They retain a record of every

personalised engagement and discussion based on the requirements and profile of the consumer. Because of this, the discussion process as well as the overall consumer involvement have both improved.

Nevertheless, property managers and landlords seeking to obtain maximum benefits from leasing property need to ensure that it does not stay vacant for longer periods, provide maintenance and control the regularity of tenant's payments and take care of several other tasks as well. Therefore, real estate management software has helped streamline and cover most of those actions in the real estate market (Kaganova et al, 2020). These processes save cost and time that is also transferred to the customers in terms of the most effective and quality services. Automation software has helped a great deal to save data related to maintenance requests and rental properties. Hence, it becomes easy for customers to have access to the rental properties and get their maintenance quickly. Furthermore, it has also helped in the automation of manual tasks such as sending notifications on upcoming payments and processing tickets or properties which would be vacant soon. It has helped the managers save their resources and time by improving their services and this benefits the customers.

Artificial intelligence has proven itself to provide excellent support to property dealers and customers as it can significantly help in data analysis within a short period to find the perfect option for customers. The whole process of matching customer choices has become less efficient, more economical, and less time-consuming. This practice has also helped real estate agents in their business expansion as they can offer efficient services (Herring, 2015). Since AI has the capability of saving information regarding real estate assets, it can keep complete track of all the projects within the database with all relevant information. Hence, a real estate agent does not need to call up a salesperson of a real estate firm to make enquiries. This fourth theme is beneficial for addressing the last objective of this research.

5.3 Theoretical Implications

The findings of this study contribute to the existing body of knowledge by offering valuable theoretical insights into the adoption and impact of AI technologies in the UAE real estate sector. The study is grounded in key theoretical frameworks, including Actor-Network Theory (ANT), Behavioral Theory, Sociomateriality, and Institutional Theory (Callon, 1986; DiMaggio and

Powell, 1983; Orlikowski and Scott, 2008; Venkatesh et al., 2003). These theories have collectively shaped the understanding of AI integration within the industry. This research extends these theories by providing empirical evidence on how AI technologies influence core constructs such as safety and comfort, and how these align with operational efficiencies and customer satisfaction in real estate.

From the perspective of Actor-Network Theory (ANT) (Callon, 1986), the findings demonstrate how AI technologies—such as predictive maintenance systems and automated valuation models—act as intermediaries that restructure interactions between human agents and technological networks. The results underscore the importance of AI in enhancing operational decision-making and risk assessment, supporting ANT's premise that technological actors influence and reshape industry dynamics. The study further validates ANT's relevance in explaining the symbiotic relationship between AI tools and human agents in real estate operations. Behavioral Theory provides critical insights into the human factors associated with AI adoption (Simon, 1955). The study findings highlight that while AI contributes to personalized customer services and operational efficiency, human oversight remains essential to address AI limitations, such as inaccurate chatbot interactions and false-positive risk assessments. This aligns with the behavioral perspective that emphasizes the role of cognitive biases, perception, and trust in technology adoption (Venkatesh et al., 2003). The findings suggest that AI adoption in real estate must be complemented by strategic behavioral interventions to enhance user acceptance and mitigate resistance.

The research also contributes to the Sociomateriality Theory, which explores the interplay between technology and social structures (Orlikowski, 2007). AI adoption in real estate introduces new workflows and relationships between stakeholders, agents, and clients. The study reveals that the sociomaterial dynamics are evolving, with AI-driven platforms enabling seamless interactions while requiring continuous human involvement to navigate complexities and ensure data-driven decisions align with client expectations. This underscores the notion that technology and human agency are deeply intertwined, reinforcing the sociomaterial perspective (Orlikowski and Scott, 2008). From an Institutional Theory viewpoint, the study provides evidence that AI adoption in real estate is shaped by regulatory frameworks, market norms, and industry expectations. The results highlight the need for compliance with data privacy regulations and ethical AI usage,

aligning with the theory's assertion that institutional pressures influence organisational decision-making (DiMaggio and Powell, 1983). The research findings emphasize that the successful adoption of AI in the UAE real estate sector requires adherence to industry standards while maintaining stakeholder trust and market credibility.

In tying back to the conceptual framework, the study has validated its proposed model by demonstrating how AI technologies impact the core constructs of safety and comfort, with practical applications spanning tenant portals, property management, and predictive maintenance. The findings support the conceptual framework by showing that AI not only enhances customer experiences but also necessitates human oversight to manage the complexities of technological applications in real estate transactions. The study further underscores the interconnectedness of the identified theoretical underpinnings, reinforcing the framework's applicability in guiding AI adoption strategies. Overall, this research contributes to the theoretical discourse by offering empirical validation of these theories and providing a nuanced understanding of the AI adoption process in real estate. It bridges the gap between theory and practice, offering a holistic perspective on how AI technologies can drive industry transformation while maintaining a balance between automation and human intervention.

5.4 Practical Implications

This study's findings offer important implications to help real estate organisations leverage the use of AI technologies in a way that aligns with human-centric challenges, especially from the perspective of Behavioral Theory. Part of the adoption of AI on a successful scale is organisational strategy around workforce readiness, customer engagement as well as ethical oversight. To create such a culture of acceptance and reduce resistance, organisations need to invest in making comprehensive training programs for employees so that they know how to work with the 'other side' who as humans won't always get it right. Agrawal et al. (2021) underscore that the use of AI calls for a trade-off between human expertise and technological competence, in order to optimise business operations.

One the key practical implications of AI is the development of AI human collaborative workflows, where AI facilitates human efforts through automation of routine tasks like data entry and document verification, and frees professionals to focus on higher value pursuits such as

management of client relationship and making strategic decisions. According to the studies by Ullah et al. (2021a), real estate firms should adopt AI powered customer relationship management (CRM) systems to personalize client interactions, and increase operational efficiency and decision making accuracy. Moreover, leadership engagement in AI implementation is important as progressive responsibility is hardwired into engaging leaders. If AI adoption is to be controlled, Morley et al. (2020) suggest that real estate organisations must have governance frameworks to oversee it: transparency in business models, and accountability in the way business is performed. Like all measures of information technology change, guidelines need to be laid down regarding how AI should be used within an organisation, in order to mitigate biases and to ensure that any AI drawn decisions match with organisational values and satisfy regulatory requirements.

Another effect is the establishment of individual customer experience via AI-backed analytics, which allows delving deeper into what the clients prefer and which market tendencies are prevailing. Technologies like predictive analytics and AI-powered chatbots that give real-time, personalised recommendations are used to boost customer engagement. According to Huang and Rust (2021), AI- empowered personalised solutions enhance customer satisfaction a lot by offering services that exactly match with users' particular needs. In addition, the real estate organisations should also take the initiative to support workforce development and change management by devising strategies of making connexion between job roles and AI integration. This entails such measures as skill development programmes, the establishment of a collaborative environment, and training the employees to work alongside AI systems to accomplish enterprise goals. Emphasising the focus on empowering employees and not replacing them (Berente et al, 2021), AI integration should be beneficial for the successful organisational change and long-term gains.

Additional to this, there are behavioral and psychological barriers of AI adoption that should be considered, namely, the employee is resistant to the new technologies. It's time for organisations to adopt behavioral change management techniques like transparent communication, user feedback loops, and showing how tangible benefits of AI are brought to the day to day operations. Braun and Clarke (2021) provide empirical support for the fact that the effective adoption of new technologies depends on employee perceptions and attitudes. Additionally, companies are increasingly using AI for real estate transactions, and the data which is so important to the use of AI is being so widely used, it must entail robust data security measures as well since private data

is traded more to find properties and houses and keep financial portfolios updated, and companies may be surrendering control of houses and property, both of which require safe and private data. It's time for organisations to embrace AI driven cybersecurity solutions which combine the advanced encryption and threat detection in real-time. Ullah et al. (2021b) research suggests that securing AI driven operations to create stakeholder trust and regulatory compliance is imperative. With these practical implications, real estate organisations can leverage the full potential of AI technologies through a people focused approach, regulatory alignment and strategic growth in the evolving UAE real estate market.

5.5 Recommendations

Artificial intelligence (AI) is advancing rapidly and offers significant value to the real estate sector by improving operational efficiency, enhancing customer service, and supporting data-driven decision-making.

- **Adopt AI Tools to Future-Proof Business Operations**
  Real estate firms should proactively implement AI tools to remain competitive in a digitally evolving market. AI should support—not replace—human expertise (Ullah and Sepasgozar, 2020). The study findings highlight that resistance to change can be overcome through internal upskilling. Firms should invest in structured professional development to equip staff with AI-relevant capabilities, without compromising personalised client service.
- **Integrate AI-Powered Virtual Assistants and Chatbots**
  AI chatbots should be integrated into client-facing systems to improve response speed and customer engagement. Study participants noted enhanced service experiences from systems capable of virtual property tours and personalised queries (Marcondes et al., 2018). Automating standard inquiries frees agents for high-value tasks such as deal negotiation and client relationship management.
- **Automate Administrative Processes Using RPA**
  to address operational inefficiencies highlighted in the study, organisations should implement Robotic Process Automation (RPA) to handle repetitive administrative tasks such as document processing and compliance verification. This allows human resources to focus on strategic functions and reduces the risk of error (Shiu et al., 2019).

- **Enhance CRM Capabilities with AI-Driven Systems**
  Firms should implement AI-powered CRM systems that integrate natural language processing and behavioural analytics to tailor communication and anticipate client needs. Chatbots should handle routine interactions while CRM analytics support segmentation and predictive outreach (Shaw, 2020; Marcondes et al., 2018). Implementation should begin with a pilot in one unit and scale based on outcomes. Staff must receive targeted training to interpret insights and ensure ethical, client-centric usage (Ullah and Sepasgozar, 2020).
- **Incorporate Smart Home Features into Developments**
  Property developers should adopt AI-enabled smart home systems as a competitive differentiator. These systems—highlighted by study participants as marketable features—can automate lighting, temperature, and security controls, appealing to tech-savvy buyers and enhancing property value.
- **Apply AI Analytics for Market and Investment Forecasting**
  Real estate professionals should adopt AI analytics tools to better track market dynamics, predict property demand, and identify profitable opportunities (Otchere et al., 2021). This enables firms to base investment decisions on data-driven insights—a priority noted during field interviews.
- **Deploy AI-Based Cybersecurity for Data Protection**
  Firms must implement AI-enhanced Cybersecurity systems capable of real-time threat detection, data encryption, and regulatory compliance tracking (Kaganova et al., 2020; Fisher et al., 2020). Secure systems contribute directly to improved client retention.
- **Implement AI Valuation Tools for Pricing Accuracy**
  AI-based valuation models should be introduced to improve pricing accuracy, using historical data and economic indicators. This reduces mispricing risks and improves investor confidence (Wei et al., 2022; Renigier-Bilozor et al., 2019).
- **Leverage AI for Sustainable Operations and Maintenance**
  Real estate firms should implement AI for energy management, predictive maintenance, and sustainable investment selection. This not only reduces operational costs but also aligns with global environmental targets (Ullah et al., 2021b; Aldahiri et al., 2021; Huy et al., 2021).

- **Adopt AI-Driven Marketing Platforms**
  Companies should use AI tools to segment audiences, tailor messaging, and monitor campaign effectiveness. This improves marketing ROI and aligns brand messaging with customer needs—a gap observed in current practices (Truong et al., 2020).
- **Offer AI-Enabled Virtual Property Tours**
  In response to demand for flexible property viewing, real estate agencies should deploy AI-based virtual tours. These allow buyers and tenants to remotely explore properties, expanding reach to international and remote clients.
- **Use AI to Support Legal and Regulatory Compliance**
  Firms should adopt AI tools that scan legal documents, identify risks, and automate compliance workflows. This ensures more efficient, proactive compliance management and reduces exposure to legal risk (Abidoye and Chan, 2017).
- **Integrate AI into Investment Platforms for Strategic Decisions**
  Real estate firms should use AI-enabled investment platforms and neural networks to assess risk and identify profitable opportunities. This supports a more systematic investment process and improves decision-making in dynamic market environments (Skrebeca et al., 2021; Viriato, 2019).
- **Deliver Personalised Property Recommendations with AI Engines**
  AI personalisation engines should be used to match properties to client preferences, budgets, and lifestyles. This enhances customer satisfaction and engagement (Fisher et al., 2020).
- **Partner with Tech and Policy Stakeholders to Lead Innovation**
  Firms should collaborate with AI developers, universities, and regulators to co-create innovative, real estate-specific AI solutions (Ullah et al., 2021a). Strategic partnerships enable early innovation access and help shape future policy and implementation standards.

When UAE real estate organisations apply these complete strategies, they will benefit from AI technologies that enhance services and ensure lasting business development. These recommendations directly reflect the practical insights and thematic findings developed through interviews with UAE-based real estate professionals.

5.6 Limitations and Future Recommendations

There are several limitations associated with the present research study. One of the main limitations is the research method employed, which is qualitative. Qualitative research methods provide rich, in-depth data but lack the statistical power of quantitative methods, which could make it difficult to generalize the findings to a larger population. It is suggested to use a quantitative method in future studies to gain a better understanding of the research problem and to achieve more reliable outcomes. Another limitation is the small sample size, which might not be representative of the entire population of the UAE and might not provide a comprehensive view of the topic. It is recommended to use a larger sample size in future studies to increase the generalisability of the findings. The use of semi-structured interviews as the method of data collection is another limitation. Interviews can be affected by bias and subjectivity, which can affect the accuracy and reliability of the data collected. It is suggested to use other methods of data collection, such as surveys or experiments, in future studies to gather more accurate and reliable data. Overall, it is important to take these limitations into account when interpreting the findings of the study and to consider them when planning future research on similar topics.

Building on the findings of this study, future research should consider a mixed-methods approach to triangulate qualitative insights with broader statistical patterns. Expanding the scope to include quantitative surveys across multiple real estate agencies in the UAE or GCC region would enhance generalisability. Moreover, client perspectives on AI adoption—particularly their comfort, trust, and behavioural response—remain underexplored and warrant dedicated investigation. Future studies could also examine the longitudinal impact of AI implementations on firm productivity and customer satisfaction over time. Finally, further research could explore the regulatory and ethical dimensions of AI deployment in real estate, particularly with regards to bias, transparency, and data privacy.

REFERENCES

Abidoye, R., Ma, J. and Lee, C.L., 2021. Barriers, drivers and prospects of the adoption of artificial intelligence property valuation methods in practice. *Pacific Rim Property Research Journal*, *27*(2), pp.89-106.

Abidoye, R.B. and Chan, A.P., 2017. Valuers' receptiveness to the application of artificial intelligence in property valuation. *Pacific Rim Property Research Journal*, *23*(2), pp.175-193.

Abidoye, R.B., Chan, A.P., Abidoye, F.A. and Oshodi, O.S., 2019. Predicting property price index using artificial intelligence techniques: Evidence from Hong Kong. *International Journal of Housing Markets and Analysis*, *12*(6), pp.1072-1092.

Abubakar, I.R. and Alshammari, M.S., 2023. Urban planning schemes for developing low-carbon cities in the Gulf Cooperation Council region. *Habitat International*, *138*, p.102881.

Agrawal, A.K., Gans, J.S. and Goldfarb, A., 2021. *AI adoption and system-wide change* (No. w28811). National Bureau of Economic Research.

Ajayi, F., Ademola, O.M., Amuda, K.F. and Alade, B., 2024. AI-driven decarbonization of buildings: Leveraging predictive analytics and automation for sustainable energy management. *World Journal of Advanced Research and Reviews*, *24*(01), pp.061-079.

AlBahsh, E.R. and Hosseinian-Far, A., 2021. The implication of big data analytics on competitive intelligence: A qualitative case study of a real estate developer in the UAE. In *Strategy, Leadership, and AI in the Cyber Ecosystem* (pp. 339-360). Academic Press.

Aldahiri, A., Alrashed, B. and Hussain, W., 2021. Trends in using IoT with machine learning in health prediction system. *Forecasting*, *3*(1), pp.181-206.

Alfiyatin, A.N., Febrita, R.E., Taufiq, H. and Mahmudy, W.F., 2017. Modeling house price prediction using regression analysis and particle swarm optimisation case study: Malang, East Java, Indonesia. *International Journal of Advanced Computer Science and Applications*, *8*(10).

Alharahsheh, H.H. and Pius, A., 2020. A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, *2*(3), pp.39-43.

Ali, B.J. and Anwar, G., 2021. Real Estates Strategies: Analysis of Strategic Management Practices in Real Estate Companies. *Ali, BJ, and Anwar, G.(2021). Real Estates Strategies: Analysis of Strategic Management Practices in Real Estate Companies. International Journal of Rural Development, Environment and Health Research*, *5*(3), pp.35-48.

Amann, J., Blasimme, A., Vayena, E., Frey, D. and Madai, V.I., 2020. Explainability for artificial intelligence in healthcare: a multidisciplinary perspective. *BMC Medical Informatics and Decision Making*, *20*(1), pp.1-9.

Anthony, J., Abdul Majid, M., Romli, A., 2019. Green information technology adoption towards a sustainability policy agenda for government-based institutions: An administrative perspective. *J. Sci. Technol. Policy Manag.* 10 (2), 274–300.

Areo, G., 2024. The Impact of Artificial Intelligence and Machine Learning on Real Estate: Current Applications and Future Trends.

Aristodemou, L. and Tietze, F., 2018. The state-of-the-art on Intellectual Property Analytics (IPA): A literature review on artificial intelligence, machine learning and deep learning methods for analysing intellectual property (IP) data. *World Patent Information*, *55*, pp.37-51.

Armat, M.R., Assarroudi, A., Rad, M., Sharifi, H. and Heydari, A., 2018. Inductive and deductive: Ambiguous labels in qualitative content analysis. *The Qualitative Report*, *23*(1), pp.219-221.

Ashok, R. and Rajesh, R., 2020. An analysis of third-party logistics market in the United Arab Emirates. *International Journal of Supply Chain Management*, *9*(1), pp.888-901.

Averin, A., Rukhlov, P. and Musaev, E., 2021, September. Review of Existing Solutions in the Field of Real Estate and Cadastral Accounting Based on Blockchain Technology. In *2021 International Conference on Quality Management, Transport and Information Security, Information Technologies (ITandQMandIS)* (pp. 144-147). IEEE.

Awa, H.O. and Ojiabo, O.U., 2016. A model of adoption determinants of ERP within TOE framework. *Information Technology and People*.

Baldominos, A., Blanco, I., Moreno, A.J., Iturrarte, R., Bernárdez, Ó. and Afonso, C., 2018. Identifying real estate opportunities using machine learning. *Applied sciences*, *8*(11), p.2321.

Banerjee, D. and Dutta, S., 2017, September. Predicting the housing price direction using machine learning techniques. In *2017 IEEE international conference on power, control, signals and instrumentation engineering (ICPCSI)* (pp. 2998-3000). IEEE.

Barkham, R., Bokhari, S. and Saiz, A., 2022. Urban big data: city management and real estate markets. In *Artificial Intelligence, Machine Learning, and Optimisation Tools for Smart Cities* (pp. 177-209). Springer, Cham.

Bellman, L., 2018. High-impact information types on market value: property appraisers' information sources and assessment confidence. *Journal of ProPerty research*, *35*(2), pp.139-163.

Belotto, M.J., 2018. Data analysis methods for qualitative research: Managing the challenges of coding, interrater reliability, and thematic analysis. *The Qualitative Report*, *23*(11), pp.2622-2633.

Benduch, D., 2023. New technologies in real estate management and protection of privacy. *GIS Odyssey Journal*, *3*(1).

Berente, N., Gu, B., Recker, J. and Santhanam, R., 2021. Managing artificial intelligence. MIS quarterly, 45(3), pp.1433-1450.

Bidollahkhani, M. and Kunkel, J.M., 2024. Revolutionizing system reliability: The role of AI in predictive maintenance strategies. *arXiv preprint arXiv:2404.13454*.

Biggam, J., 2018. *EBOOK: Succeeding with the researcherr Master's Dissertation: A Step-by-Step Handbook: Step-by-step Handbook*. UK: McGraw-Hill Education.

Binashour, I., Albairaq, A.A., Sulaiman, A.S., Hayek, E.M. and Hazarika, A.F., 2021. The Impact Of Board Of Director Characteristics On Earning Management In The Real Estate Companies Listed United Arab Emirates. *Acad. Account. Financ. Stud. J*, *12*(1), pp.1-12.

Birt, L., Scott, S., Cavers, D., Campbell, C. and Walter, F., 2016. Member checking: a tool to enhance trustworthiness or merely a nod to validation? *Qualitative health research*, *26*(13), pp.1802-1811.

Blankenburg, K., Blankenburg and Torregrosa, 2018. Intellectual capital in German non-profit organisations. UK: Springer Verlag.

Bock, T., 2015. The future of construction automation: Technological disruption and the upcoming ubiquity of robotics. Autom. Constr, 59, pp. 113–121

Bond, T. and Mitchels, B., 2021. Confidentiality and Record Keeping in Counselling and Psychotherapy. *Confidentiality and Record Keeping in Counselling and Psychotherapy*, pp.1-264.

Booyse, D. and Scheepers, C. B., 2024. Barriers to adopting automated organisational decision-making through the use of artificial intelligence. *Management Research Review,* 47(1), pp. 64-85.

Bostrom, P. K., 2019. In Search of Themes -Keys to Teaching Qualitative Analysis in Higher Education. *The Qualitative Report,* 24(5), pp. 1001-1011.

Bouabdallaoui, Y., Lafhaj, Z., Yim, P., Ducoulombier, L. and Bennadji, B., 2021. Predictive maintenance in building facilities: A machine learning-based approach. *Sensors*, *21*(4), p.1044.

Bowen, P.W., Rose, R. and Pilkington, A., 2017. Mixed methods theory and practice. Sequential, explanatory approach. International Journal of Quantitative and Qualitative Research Methods, 5(2), p.10.

Braesemann, F. and Baum, A., 2020. PropTech: Turning real estate into a data-driven market? *Available at SSRN 3607238*.

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), p. 77–101.

Braun, V. and Clarke, V., 2021. Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches. *Counselling and Psychotherapy Research*, *21*(1), pp.37-47.

Braun, V., Clarke, V. and Hayfield, N., 2022. 'A starting point for your journey, not a map': Nikki Hayfield in conversation with Virginia Braun and Victoria Clarke about thematic analysis. *Qualitative Research in Psychology*, *19*(2), pp.424-445.

Braun, V., Clarke, V., Boulton, E., Davey, L. and McEvoy, C., 2021. The online survey as a qualitative research tool. *International Journal of Social Research Methodology*, *24*(6), pp.641-654.

Brown, A. and Danaher, P.A., 2019. CHE principles: Facilitating authentic and dialogical semi-structured interviews in educational research. *International Journal of Research and Method in Education*, *42*(1), pp.76-90.

Brownscombe, J.W., Lédée, E.J., Raby, G.D., Struthers, D.P., Gutowsky, L.F., Nguyen, V.M., Young, N., Stokesbury, M.J., Holbrook, C.M., Brenden, T.O. and Vandergoot, C.S., 2019. Conducting and interpreting fish telemetry studies: considerations for researchers and resource managers. *Reviews in Fish Biology and Fisheries*, *29*(2), pp.369-400.

Bryman, A., 2016. Social research methods. 5th ed. Oxford: Oxford University Press.

Burkholder, G.J., Cox, K.A., Crawford, L.M. and Hitchcock, J.H. eds., 2019. *Research design and methods: An applied guide for the scholar-practitioner*. Sage Publications.

Busetto, L., Wick, W. and Gumbinger, C., 2020. How to use and assess qualitative research methods. *Neurological Research and practice*, *2*(1), pp.1-10.

Castleberry, A. and Nolen, A., 2018. Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in pharmacy teaching and learning*, *10*(6), pp.807-815.

Chandra, Y. and Shang, L., 2019. Inductive coding. In *Qualitative research using R: A systematic approach* (pp. 91-106). Springer, Singapore.

Cîmpeanu, I.A., 2021. Business Activities Using Chatbots. *Informatica economica*, *25*(3).

Collier, P.M., Berry, A.J., and Burke, G.T. 2017. Risk and Management Accounting: Best Practice Guidelines for Enterprise-wide Internal Control Procedures

Conway, J.J.E., 2018. Artificial intelligence and machine learning: Current applications in real estate.

Creswell, J.W. and Hirose, M., 2019. Mixed methods and survey research in family medicine and community health. *Family Medicine and Community Health*, *7*(2).

Creswell, J.W. and Poth, C.N., 2018. Qualitative inquiry and research design: Choosing among five approaches. 4th ed. Thousand Oaks, CA: SAGE Publications.

Dakrory, A.S., 2023. UAE sovereign achievements and future aspirations in vision 2030. *AAU Journal of Business and Law*, *7*(1).

Daly, S., Hughson, H. and Loutzenhiser, G., 2021. Valuation for the purposes of a wealth tax. *Fiscal Studies*, *42*(3-4), pp.615-650.

Del Giudice, V., De Paola, P. and Del Giudice, F.P., 2020. COVID-19 infects real estate markets: Short and mid-run effects on housing prices in Campania region (Italy). *Social sciences*, *9*(7), p.114.

Deloitte., 2020. Thriving in the era of pervasive AI. Available at: https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/innovatie/deloitte-nl-exec-deck-state-of-ai-in-the-enterprise-3rd-edition-final.pdf.

Devapitchai, J.J., Krishnapriya, S.V., Karuppiah, S.P. and Saranya, S., 2024. Using AI-driven decision-making tools in corporate investment planning. In *Generative AI for transformational management* (pp. 137-160). IGI Global.

Dong, L., Wang, Y., Scipioni, A., Park, H.S. and Ren, J., 2018. Recent progress on innovative urban infrastructures system towards sustainable resource management. *Resources, Conservation and Recycling*, *128*, pp.355-359.

Dutta, G., Kumar, R., Sindhwani, R. and Singh, R.K., 2020. Digital transformation priorities of India's discrete manufacturing SMEs–a conceptual study in perspective of Industry 4.0. *Competitiveness Review: An International Business Journal*.

Dwivedi, Y.K., Rana, N.P., Janssen, M., Lal, B., Williams, M.D., Clement, M., 2017. An empirical validation of a unified model of electronic government adoption (UMEGA). *Gov. Inf. Q.* 34 (2), pp. 211–230.

Elfenbein, D.M. and Schwarze, M.L., 2020. Qualitative research methods. In *Health Services Research* (pp. 249-260). Springer, Cham.

Felli, F., Liu, C., Ullah, F. and Sepasgozar, S., 2018, September. Implementation of 360 videos and mobile laser measurement technologies for immersive visualisation of real estate and properties. In *Proceedings of the 42nd AUBEA Conference, Singapore* (Vol. 1).

Fields, D. and Rogers, D., 2021. Towards a critical housing studies research agenda on platform real estate. *Housing, theory and society*, *38*(1), pp.72-94.

Fisher, J.D., Geltner, D.M. and Webb, R.B., n.d. *Value Indices of Commercial Real Estate: A Comparison of Index Construction Methods*.

Force, I.A.I.T., 2022. A review of the methods, applications, and challenges of adopting artifical intelligence in the property assessment office. *Journal of Property Tax Assessment and Administration*, *19*(1), p.2.

Fowler, S.B. and Lapp, V., 2019. Sample size in quantitative research: Sample size will affect the significance of your research. *American Nurse Today*, *14*(5), pp.61-63.

Gao, H., Koch, C. and Wu, Y., 2019. Building information modelling based building energy modelling: A review. *Applied energy*, *238*, pp.320-343.

Gao, H., Miao, H., Liu, L., Kai, J. and Zhao, K., 2018. Automated quantitative verification for service-based system design: A visualisation transform tool perspective. *International Journal of Software Engineering and Knowledge Engineering*, *28*(10), pp.1369-1397.

Gharahighehi, A., Pliakos, K. and Vens, C., 2021. Recommender Systems in the Real Estate Market—A Survey. *Applied Sciences*, *11*(16), p.7502.

Ghouri, A.M. and Mani, V., 2019. Role of real-time information-sharing through SaaS: An industry 4.0 perspective. *International Journal of Information Management*, *49*, pp.301-315.

Girya, L., Zorenko, E., Ulianov, N., Egorov, D. and Nechepurenko, A., 2021. Organisational and technological computer-aided process of real estate management. In *E3S Web of Conferences* (Vol. 263, p. 04032). EDP Sciences.

Goldman, M.J., Turner, M.D. and Daly, M., 2018. A critical political ecology of human dimensions of climate change: Epistemology, ontology, and ethics. *Wiley Interdisciplinary Reviews: Climate Change*, *9*(4), p.e526.

Guest, G., MacQueen, K., Namey, E., 2012. Applied Thematic Analysis. SAGE Publications, Thousand Oaks: California.

Guest, G., Namey, E. and Chen, M., 2020. A simple method to assess and report thematic saturation in qualitative research. *PloS one*, *15*(5), p.0232076.

Gupta, B.N. and Gupta, N., 2022. Research methodology. SBPD Publications.

Hafifi, S. and Magraoua, F.B.D., 2021. Blockchain Technology as a Method Based on Organising Big Data to Build Smart Cities: The Dubai Experience. In *Big Data Analytics* (pp. 145-157). Apple Academic Press.

Haneem, F., Kama, N., Taskin, N., Pauleen, D., Bakar, N.A.A., 2019. Determinants of master data management adoption by local government organisations: An empirical study. Int. J. Inf. Manage. 45, 25–43.

Härmand, K., 2021, April. Digitalisation before and after the Covid-19 crisis. In *ERA Forum* (Vol. 22, No. 1, pp. 39-50). Springer Berlin Heidelberg.

Hausler, J., Ruscheinsky, J. and Lang, M., 2018. News-based sentiment analysis in real estate: a machine learning approach. *Journal of Property Research*, *35*(4), pp.344-371.

He, H.M., Chen, Y., Xiao, J.Y., Chen, X.Q. and Lee, Z.J., 2021. Data analysis on the influencing factors of the real estate price. *Artificial Intelligence Evolution*, pp.52-66.

Hennink, M.M., Kaiser, B.N. and Weber, M.B., 2019. What influences saturation? Estimating sample sizes in focus group research. *Qualitative health research*, *29*(10), pp.1483-1496.

Heron, J., 1996. *Co-operative Inquiry: Research into the Human Condition*. London: Sage Publications.

Herring, R.J., 2015. *Real Estate Booms and Banking Busts: An International Perspective*.

Hinings, B., Gegenhuber, T. and Greenwood, R., 2018. Digital innovation and transformation: An institutional perspective. *Information and Organisation*, *28*(1), pp.52-61.

Huang, M.H. and Rust, R.T., 2021. A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, *49*(1), pp.30-50.

International Property Measurement Standards Coalition (IPMSC), 2024. *International Standards for Property Measurement*. [online] Available at: https://ipmsc.org/ [Accessed 1 January 2025].

Ivanov, S., 2020. The impact of automation on tourism and hospitality jobs. *Information Technology and Tourism*, *22*(2), pp.205-215.

Izumi, T., Shaw, R., Djalante, R., Ishiwatari, M. and Komino, T., 2019. Disaster risk reduction and innovations. *Progress in Disaster Science*, *2*, p.100033.

Jati, D.G.P., 2021. Uav-Based Photogrammetry Data Transformation as a Building Inspection Tool: Applicability in Mid-High-Rise Building. *Jurnal Teknik Sipil*, *16*(2), pp.113-121. *Journal of Housing Markets and Analysis*, *12*(6), pp.1072-1092.

Javadi, M. and Zarea, K., 2016. Understanding Thematic Analysis and its Pitfall. *J. Client Care*, Volume 1.

Jeong, M., Zhang, D., Morgan, J.C., Ross, J.C., Osman, A., Boynton, M.H., Mendel, J.R. and Brewer, N.T., 2019. Similarities and differences in tobacco control research findings from convenience and probability samples. *Annals of Behavioral Medicine*, *53*(5), pp.476-485.

Jigyasu, D., 2021. An Evaluation on Artificial Intelligence. *Journal of Advanced Research in Applied Artificial Intelligence and Neural Network*, *4*(2), pp.3-5.

Johnson, J.L., Adkins, D. and Chauvin, S., 2020. A review of the quality indicators of rigour in qualitative research. *American journal of pharmaceutical education*, *84*(1).

Kabaivanov, S. and Markovska, V., 2021, March. Artificial intelligence in real estate market analysis. In *AIP Conference Proceedings* (Vol. 2333, No. 1, p. 030001). AIP Publishing LLC.

Kaganova, O., Al-Sultan, F., and Speakman, J., 2020. Overview of Real Estate Markets in Kuwait, *Journal of Real Estate Literature*, *13*(3), pp. 287-304.

Kaplan, A. and Haenlein, M., 2019. Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), pp.15-25.

Kasirye, F., 2021. *Reliability, Errors in Survey Research and their Threat to Validity and Reliability*, s.l.: ResearchGate.

Key, T.M., Clark, T., Ferrell, O.C., Stewart, D.W. and Pitt, L., 2020. Marketing's theoretical and conceptual value proposition: Opportunities to address marketing's influence. *AMS Review*, *10*(3), pp.151-167.

Khan, M.U.H., 2019. Innovative UAE. *Defence Journal*, *23*(5), p.60.

Khan, S. and Iqbal, M., 2020. AI-Powered Customer Service: Does it Optimize Customer Experience? *2020 8th International Conference on Reliability, Infocom Technologies and Optimisation (Trends and Future Directions)(ICRITO)*. IEEE, pp.590–594.

Kiger, M.E. and Varpio, L., 2020. Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, *42*(8), pp.846-854.

Kim, D.J., Hebeler, J., Yoon, V., Davis, F., 2018. Exploring determinants of semantic web technology adoption from IT professionals' perspective: Industry competition, organisation innovativeness, and data management capability. *Comput. Hum. Behav.* 86, 18–33.

Kineber, A.F., Antwi-Afari, M.F., Elghaish, F., Zamil, A.M., Alhusban, M. and Qaralleh, T.J.O., 2023. Benefits of implementing occupational health and safety management systems for the sustainable construction industry: a systematic literature review. *Sustainability*, *15*(17), p.12697.

Koelemaij, J., 2022. The world's number 1 real estate development exporter? Assessing announced transnational projects from the United Arab Emirates between 2003–2014. *Environment and Planning A: Economy and Space*, *54*(2), pp.226-246.

Köhler, T., Smith, A. and Bhakoo, V., 2022. Templates in qualitative research methods: Origins, limitations, and new directions. *Organisational Research Methods*, *25*(2), pp.183-210.

Kok, N., Koponen, E.L. and Martínez-Barbosa, C.A., 2017. Big data in real estate? From manual appraisal to automated valuation. *The Journal of Portfolio Management*, *43*(6), pp.202-211.

Kovalainen, A. and Eriksson, P., 2015. Qualitative methods in business research: A practical guide to social research. *Qualitative Methods in Business Research*, pp.1-376.

Krcmar, H., 2015. *Information management (Information Management*), 6th ed. Heidelberg: Springer Gabler.

Kumar, I., Rawat, J., Mohd, N. and Husain, S., 2021. Opportunities of artificial intelligence and machine learning in the food industry. Journal of Food Quality, 2021.

Kuppan, K., Acharya, D.B. and Divya, B., 2024. Foundational AI in Insurance and Real Estate: A Survey of Applications, Challenges, and Future Directions. *IEEE Access*.

Kuvalekar, A., Manchewar, S., Mahadik, S. and Jawale, S., 2020, April. House Price Forecasting Using Machine Learning. In *Proceedings of the 3rd International Conference on Advances in Science and Technology (ICAST)*.

Lambourne, T., 2021. Valuing sustainability in real estate: a case study of the United Arab Emirates. *Journal of Property Investment and Finance*.

Lechner, M., Hasani, R., Amini, A., Henzinger, T.A., Rus, D. and Grosu, R., 2020. Neural circuit policies enabling auditable autonomy. *Nature Machine Intelligence*, *2*(10), pp.642-652.

Lee, D., Lee, S.H., Masoud, N., Krishnan, M.S. and Li, V.C., 2021. Integrated digital twin and blockchain framework to support accountable information sharing in construction projects. *Automation in construction*, *127*, p.103688.

Lee, J. and Ryu, J.P., 2021. Prediction of Housing Price Index Using Artificial Neural Network. *Journal of the Korea Academia-Industrial Cooperation Society*, *22*(4), pp.228-234.

Li, J., Fang, W., Shi, Y. and Ren, C., 2022. Assessing economic, social and environmental impacts on housing prices in Hong Kong: a time-series study of 2006, 2011 and 2016. *Journal of Housing*, *37*(3), pp.1433-1457.

Li, M., Shen, L. and Huang, G.Q., 2019. Blockchain-enabled workflow operating system for logistics resources sharing in E-commerce logistics real estate service. *Computers and Industrial Engineering*, *135*, pp.950-969.

Liang, Y., Qi, G., 2017. The determinants of e-government cloud adoption: multi-case analysis of China. *Int. J. Netw. Virtual Organisations* 17 (2–3), 184–201.

Lin, R.F.Y., Ou, C., Tseng, K.K., Bowen, D., Yung, K.L. and Ip, W.H., 2021. The Spatial neural network model with disruptive technology for property appraisal in the real estate industry. *Technological Forecasting and Social Change*, *173*, p.121067.

Lincoln, Y.S. and Guba, E.G., 1985. Naturalistic inquiry. Beverly Hills, CA: SAGE Publications.

Lisi, G., 2021. Property valuation: the hedonic pricing model: the application of search-and-matching models. *Journal of Property Investment and Finance.*

Lisowski, E., 2022. AI in Real Estate: Current Implementation and Trends. Available at: https://addepto.com/blog/ai-in-real-estate-use-cases/ [Accessed 1 January 2025].

Liu, D., Xia, X., Chen, J. and Li, S., 2021. Integrating building information model and augmented reality for drone-based building inspection. *J. Comput. Civ. Eng*, *35*(2), p.04020073.

London, K. and Pablo, Z., 2017. An actor–network theory approach to developing an expanded conceptualisation of collaboration in industrialized building housing construction. *Construction Management and Economics*, *35*(8-9), pp.553-577.

Ma, W., Wang, X., Hu, M. and Zhou, Q., 2021. Machine Learning Empowered Trust Evaluation Method for IoT Devices. *IEEE Access*, *9*, pp.65066-65077.

Majumder, S. and Biswas, D., 2022. COVID-19: impact on quality of work life in real estate sector. *Quality and Quantity*, *56*(2), pp.413-427.

Majumder, S., 2022. AI in health and safety management for real estate 4.0. *International Journal of Ambient Computing and Intelligence (IJACI)*, *13*(1), pp.1-18.

Malpezzi, S., 2003. Hedonic pricing models: a selective and applied review. *Housing economics and public policy*, *1*, pp.67-89.

Manjula, R., Jain, S., Srivastava, S. and Kher, P.R., 2017, November. Real estate value prediction using multivariate regression models. In *IOP Conference Series: Materials Science and Engineering* (Vol. 263, No. 4, p. 042098). IOP Publishing.

Manne, R. and Kantheti, S.C., 2021. Application of artificial intelligence in healthcare: chances and challenges. *Current Journal of Applied Science and Technology*, *40*(6), pp.78-89.

March, C., 2021. Strategic interactions between humans and artificial intelligence: Lessons from experiments with computer players. Journal of Economic Psychology, 87, p.102426.

Marcondes, F.S., Almeida, J.J. and Novais, P., 2018, November. Chatbot theory. In *International Conference on Intelligent Data Engineering and Automated Learning* (pp. 374-384). Springer, Cham.

Marlina, E., Purwaningsih, M., Al Hakim, S. and Maryati, I., 2025. Ensuring Trustworthiness in Qualitative Research: The Role of Triangulation Techniques. In *Qualitative Research Methods for Dissertation Research* (pp. 347-376). IGI Global Scientific Publishing.

Marquez, E., Coughenour, C., Gakh, M., Tu, T., Usufzy, P. and Gerstenberger, S., 2022. A Mixed-Methods Assessment of Residential Housing Tenants' Concerns about Property Habitability and the Implementation of Habitability Laws in Southern Nevada. *International Journal of Environmental Research and Public Health*, *19*(14), p.8537.

Marr, B. (2016) Why everyone must get ready for the 4th industrial revolution, Available at: https:// www.forbes.com/sites/bernardmarr/2016/04/05/why-everyone-must-get-ready for-4th-industrial-revolution/#26be9e2f3f90. [Accessed on 11 June 2022]

McGrath, P., Desai, K. and Junquera, P., 2019. Resistance is futile: how corporate real estate companies can deploy artificial intelligence as a competitive advantage. Corporate Real Estate Journal, 9(2), pp.121-129.

McKinsey Global Institute. 2017. Artificial Intelligence The Next Digital Frontier? Available at: https://www.mckinsey.com/~/media/mckinsey/industries/advanced%20electronics/our%20insights/how%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/mgi-artificial-intelligence-discussion-paper.ashx.

Melaku, T.M., 2019. *You don't look like a lawyer: Black women and systemic gendered racism*. UK: Rowman and Littlefield.

Mohajan, H.K., 2018. Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People*, *7*(1), pp.23-48.

Mohamad, A.M., Yan, F.Y.Y., Aziz, N.A. and Norhisham, S., 2022, May. Inductive-Deductive Reasoning in Qualitative Analysis using ATLAS. ti: Trending Cybersecurity Twitter Data Analytics. In *2022 3rd International Conference for Emerging Technology (INCET)* (pp. 1-5). IEEE.

Molinillo, S., Japutra, A., 2017. Organisational adoption of digital information and technology: *a theoretical review*. In: The Bottom Line.

Mora, O.B., Rivera, R., Larios, V.M., Beltrán-Ramírez, J.R., Maciel, R., Ochoa, A., 2018. A use case in cybersecurity based in blockchain to deal with the security and privacy of citizens and smart cities cyberinfrastructures. In: 2018 IEEE *International Smart Cities Conference (ISC2).* IEEE, pp. 1–4.

Morley, J., Floridi, L., Kinsey, L. and Elhalal, A., 2020. From what to how: an initial review of publicly available AI ethics tools, methods and research to translate principles into practices. *Science and engineering ethics*, *26*(4), pp.2141-2168.

Moro, M.F., Weise, A.D. and Bornia, A.C., 2020. Model hybrid for sales forecast for the housing market of São Paulo. *Real Estate Management and Valuation*, *28*(3), pp.45-64.

Moser, A. and Korstjens, I., 2018. Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, *24*(1), pp.9-18.

Mullainathan, S. and Spiess, J., 2017. Machine learning: an applied econometric approach. *Journal of Economic Perspectives*, *31*(2), pp.87-106.

Munawar, H.S., Qayyum, S., Ullah, F. and Sepasgozar, S., 2020. Big data and its applications in smart real estate and the disaster management life cycle: A systematic analysis. *Big Data and Cognitive Computing*, *4*(2), p.4.

Naeem, M., Ozuem, W., Howell, K. and Ranfagni, S., 2023. A Step-by-Step Process of Thematic Analysis to Develop a Conceptual Model in Qualitative Research. *International Journal of Qualitative Methods*, Volume 22, pp. 1-18.

Narang, N.K., 2022. Sustainable Digital Transformation of Urban Landscape Through Disruptive Technologies and Standards. In *Building on Smart Cities Skills and Competences* (pp. 95-122). Springer, Cham.

Nasreen, Z. and Ruming, K., 2022. Struggles and opportunities at the platform interface: tenants' experiences of navigating shared room housing using digital platforms in Sydney. *Journal of Housing and the Built Environment*, *37*(3), pp.1537-1554.

Naz, F., Kumar, A., Upadhyay, A., Chokshi, H., Trinkūnas, V. and Magda, R., 2022. Property management enabled by artificial intelligence post Covid-19: An exploratory review and future propositions. *International Journal of Strategic Property Management*, *26*(2), pp.156-171.

Neupane, C., Wibowo, S., Grandhi, S., Hossain, M.R., 2019. A trust-based smart city adoption model for the Australian regional cities: a conceptual framework. In: *Proceedings of the 30th Australasian Conference on Information Systems* (ACIS 2019). pp. 9-11.

Nnaji, C. and Karakhan, A.A., 2020. Technologies for safety and health management in construction: Current use, implementation benefits and limitations, and adoption barriers. *Journal of Building Engineering*, *29*, p.101212.

Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J., 2017. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*(1).

Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J., 2017. Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), pp.1-13.

Okpala, I., Nnaji, C. and Karakhan, A.A., 2020. Utilising emerging technologies for construction safety risk mitigation. *Practice Periodical on Structural Design and Construction*, *25*(2), p.04020002.

Olick, D., 2021. Artificial intelligence is taking over real estate – here's what that means for homebuyers. Available at: https://www.cnbc.com/2021/09/17/what-artificial-intelligence-means-for-homebuyers-real-estate-market.html [accessed on 11 June 2022]

Otchere, D.A., Ganat, T.O.A., Gholami, R. and Ridha, S., 2021. Application of supervised machine learning paradigms in the prediction of petroleum reservoir properties: Comparative

analysis of ANN and SVM models. *Journal of Petroleum Science and Engineering*, *200*, p.108182.

Pandey, P. and Pandey, M.M., 2021. Research methodology tools and techniques. Bridge Center.

Pasquale, F., 2021. Humans Judged by Machines: The Rise of Artificial Intelligence in Finance, Insurance, and Real Estate. In Robotics, AI, and Humanity (pp. 119-128). Springer, Cham.

Patton, M.Q., 2015. Qualitative research & evaluation methods: Integrating theory and practice. 4th ed. Thousand Oaks, CA: SAGE Publications.

Pellegrino, J.W. and Glaser, R., 2021. Components of inductive reasoning. In *Aptitude, learning, and instruction* (pp. 177-218). Routledge.

Penumuru, D.P., Muthuswamy, S. and Karumbu, P., 2020. Identification and classification of materials using machine vision and machine learning in the context of industry 4.0. *Journal of Intelligent Manufacturing*, *31*(5), pp.1229-1241.

Perannagari, K.T. and Chakrabarti, S., 2019. Factors influencing acceptance of augmented reality in retail: insights from thematic analysis. *International Journal of Retail and Distribution Management*.

Phan, T.D., 2018, December. Housing price prediction using machine learning algorithms: The case of Melbourne city, Australia. In *2018 International conference on machine learning and data engineering (iCMLDE)* (pp. 35-42). IEEE.

Pinter, G., Mosavi, A. and Felde, I., 2020. Artificial intelligence for modelling real estate prices using call detail records and a hybrid machine learning approach. Entropy, 22(12), p.1421.

Power, M., 2004. The risk management of everything. *The Journal of Risk Finance* [Online], 5(3), pp.58–65. Available from: https://doi.org/10.1108/eb023001.

PWC, 2019. *PwC's Global Artificial Intelligence Study: Exploiting the AI Revolution*. [online] PWC. Available at: https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html.

PWC.com, 2024. *The Potential Impact of Artificial Intelligence in the Middle East*. [online] Available at: https://www.pwc.com/m1/en/publications/potential-impact-artificial-intelligence-middle-east.html [Accessed 1 January 2025].

Rani, A., Singh, R., Taneja, S., Prasad, A.B. and Dhiman, S., 2021. A Review on Key Performance Indicators for Measuring Real Estate Project Success. *International Journal of Sustainable Development and Planning*, *16*(4), pp.791-800.

Raval, H., 2020. Limitations of existing chatbot with analytical survey to enhance the functionality using emerging technology. *International Journal of Research and Analytical Reviews (IJRAR)*, 7(2).

Ray, S., 2019, February. A quick review of machine learning algorithms. In *2019 International Conference on machine learning, Big Data, cloud and Parallel Computing (COMITCon)* (pp. 35-39). IEEE.

Read, D.C. and Carswell, A., 2018. Is property management viewed as a value-added service? *Property Management*.

Reja, V.K. and Varghese, K., 2019, May. Impact of 5G technology on IoT applications in construction project management. In *ISARC. Proc. Int. Symp. Autom. Robot. Constr* (Vol. 36, pp. 209-217).

Renigier-Biłozor, M., Chmielewska, A., Walacik, M., Janowski, A. and Lepkova, N., 2021. Genetic algorithm application for real estate market analysis in the uncertainty conditions. *Journal of Housing and the Built Environment*, *36*(4), pp.1629-1670.

Renigier-Biłozor, M., Janowski, A. and d'Amato, M., 2019. Automated valuation model based on fuzzy and rough set theory for real estate market with insufficient source data. *Land Use Policy*, *87*, p.104021.

Renigier-Biłozor, M., Źróbek, S., Walacik, M., Borst, R., Grover, R. and d'Amato, M., 2022. International acceptance of automated modern tools use must-have for sustainable real estate market development. *Land Use Policy*, *113*, p.105876.

Riadh, A.D., 2022. Dubai, the sustainable, smart city. *Renewable Energy and Environmental Sustainability*, *7*, p.3.

Ruane, J.M., 2016. *Introducing social research methods: Essentials for getting the edge*. UK: John Wiley and Sons.

Ryan, G., 2018. Introduction to positivism, interpretivism and critical theory. *Nurse researcher*, *25*(4), pp.41-49.

Sadhya, V. and Sadhya, H., 2018. Barriers to adoption of blockchain technology.

Salama, M., Maqsood, M.Z. and Hana, A.R., 2024, December. Literary Analysis: Disruptive Technologies and Digital Transformation in Residential Real Estate. In *2024 International Conference on Decision Aid Sciences and Applications (DASA)* (pp. 1-8). IEEE.

Sanderson, D.C. and Read, D.C., 2020. Recognising and realising the value of customer-focused property management. *Property Management*.

Saunders, M.N., Lewis, P., Thornhill, A. and Bristow, A., 2015. Understanding research philosophy and approaches to theory development.

Scharp, K.M. and Sanders, M.L., 2019. What is a theme? Teaching thematic analysis in qualitative communication research methods. *Communication Teacher*, *33*(2), pp.117-121.

Schraagen, J.M. and van Diggelen, J., 2021. A brief history of the relationship between expertise and artificial intelligence. *Expertise at work: Current and emerging trends*, pp.149-175.

Shaheen, M. and Pradhan, S., 2019. Sampling in qualitative research. In Qualitative techniques for workplace data analysis (pp. 25-51). IGI Global.

Shalwa, 2024. *AI in Real Estate: Key Statistics, Market Trends, and Future Growth*. Artsmart AI Blog, [online] 14 December. Available at: https://artsmart.ai/blog/ai-in-real-estate-statistics/ [Accessed 1 January 2025].

Sharma, I., Garg, I. and Kiran, D.D., 2020. Industry 5.0 And Smart Cities: A Futuristic Approach. *Clinical Medicine*, 07(08).

Shaw, J., 2020. Platform real estate: Theory and practice of new urban real estate markets. *Urban Geography*, *41*(8), pp.1037-1064.

Shaw, R.L., Bishop, F.L., Horwood, J., Chilcot, J. and Arden, M., 2019. Enhancing the quality and transparency of qualitative research methods in health psychology. *British Journal of Health Psychology*, *24*(4), pp.739-745.

Shim, J. and Hwang, C., 2018. Kernel-based geographically and temporally weighted autoregressive model for house price estimation. *PloS one*, *13*(10), p.e0205063.

Shiu, J.Y., Lu, S.T., Chang, D.S. and Wu, K.W., 2019. Fuzzy multicriteria decision-making tools for selecting a professional property management company. *International Transactions in Operational Research*, *26*(4), pp.1527-1557.

Sinaeepourfard, A., Krogstie, J., Petersen, S.A., 2018. A big data management architecture for smart cities based on fog-to-cloud data management architecture.

Sing, T.F., Yang, J.J. and Yu, S.M., 2022. Boosted tree ensembles for artificial intelligence-based automated valuation models (AI-AVM). *The Journal of Real Estate Finance and Economics*, *65*(4), pp.649-674.

Siniak, N., Kauko, T., Shavrov, S. and Marina, N., 2020, June. The impact of proptech on real estate industry growth. In *IOP Conference Series: Materials Science and Engineering* (Vol. 869, No. 6, p. 062041). IOP Publishing.

Sircar, A., Yadav, K., Rayavarapu, K., Bist, N. and Oza, H., 2021. Application of machine learning and artificial intelligence in the oil and gas industry. Petroleum Research.

Skrebeca, J., Kalniete, P., Goldbergs, J., Pitkevica, L., Tihomirova, D. and Romanovs, A., 2021. Modern Development Trends of Chatbots Using Artificial Intelligence (AI). *2nd International Scientific Conference on Information Technology and Management Science of Riga Technical University (ITMS)*, Latvia: IEEE, pp.1–6.

Smith, B., 2018. Generalizability in qualitative research: Misunderstandings, opportunities and recommendations for the sport and exercise sciences. *Qualitative research in sport, exercise and health*, *10*(1), pp.137-149.

Souza, L.A., Koroleva, O., Worzala, E., Becker, A. and Derrick, N., 2020. The technological impact on real estate investing: robots vs humans: new applications for organisational and portfolio strategies. Journal of Property Investment and Finance.

Stacey, A. ed., 2019, June. ECRM 2019 18th European Conference on Research Methods in Business and Management. UK: Academic Conferences and Publishing Limited.

Stone, M., Knapper, J., Evans, G., Aravopoulou, E., 2018. Information management in the smart city. In: *The Bottom Line.*

Su, T., Li, H. and An, Y., 2021. A BIM and machine learning integration framework for automated property valuation. *Journal of Building Engineering*, *44*, p.102636.

Subedi, D., 2016. Explanatory sequential mixed method design as the third research community of knowledge claim. American Journal of Educational Research, 4(7), pp.570-577.

Sundler, A., Lindberg, E., Nilsson, C. and Palmér, L., 2019. Qualitative thematic analysis based on descriptive phenomenology. *Nurs. Open*, *6*(3), p. 733–739.

Tamminen, K.A. and Poucher, Z.A., 2020. Research philosophies. In *The Routledge International Encyclopedia of Sport and Exercise Psychology* (pp. 535-549). Routledge.

Tavasoli, A., PoorBaferani, H. and Shekarchizadeh, M., 2021. Comparative study of modern registration and crime prevention management in the registration system of Iran and the UAE. *Culmination of Law*, *7*(3), pp.2-30.

Teizer, J., Wolf, M., Golovina, O., Perschewski, M., Propach, M., Neges, M. and König, M., 2017. Internet of Things (IoT) for integrating environmental and localisation data in Building Information Modeling (BIM). In *ISARC. Proceedings of the International Symposium on Automation and Robotics in Construction* (Vol. 34). IAARC Publications.

Tejani, A., 2024. AI-Driven Predictive Maintenance in HVAC Systems: Strategies for Improving Efficiency and Reducing System Downtime. *ESP International Journal of Advancements in Science & Technology (ESP-IJAST)*, *2*(3), pp.6-18.

Tian, C., Peng, X. and Zhang, X., 2021. COVID-19 pandemic, urban resilience and real estate prices: the experience of cities in the Yangtze River Delta in China. *Land*, *10*(9), p.960.

Tojimatovich, A.A. and Saydaliyevich, U.S., 2021. Formation Of Science as A Value and Classification of Values. *Texas Journal of Multidisciplinary Studies*, *3*, pp.172-178.

Treleaven, P., Barnett, J., Knight, A. and Serrano, W., 2021. Real estate data marketplace. *AI and Ethics*, *1*(4), pp.445-462.

Truong, Q., Nguyen, M., Dang, H. and Mei, B., 2020. Housing price prediction via improved machine learning techniques. *Procedia Computer Science*, *174*, pp.433-442.

Ullah, F. and Al-Turjman, F., 2021. A conceptual framework for blockchain smart contract adoption to manage real estate deals in smart cities. *Neural Computing and Applications*, pp.1-22.

Ullah, F. and Sepasgozar, S.M., 2020. Key factors influencing purchase or rent decisions in smart real estate investments: A system dynamics approach using online forum thread data. *Sustainability* 12 (11), 4382

Ullah, F., Qayyum, S., Thaheem, M.J., Al-Turjman, F. and Sepasgozar, S.M., 2021. Risk management in sustainable smart cities governance: A TOE framework. *Technological Forecasting and Social Change*, *167*, p.120743.

Ullah, F., Sepasgozar, P.S. and Ali, T.H., 2019, December. Real estate stakeholders technology acceptance model (RESTAM): User-focused big9 disruptive technologies for smart real estate management. In *Proceedings of the 2nd International Conference on Sustainable Development in Civil Engineering (ICSDC 2019), Jamshoro, Pakistan* (pp. 5-7).

Ullah, F., Sepasgozar, S.M. and Wang, C., 2018. A systematic review of smart real estate technology: Drivers of, and barriers to, the use of digital disruptive technologies and online platforms. *Sustainability*, *10*(9), p.3142.

Ullah, F., Sepasgozar, S.M., Shirowzhan, S. and Davis, S., 2021a. Modelling users' perception of the online real estate platforms in a digitally disruptive environment: An integrated KANO-SISQual approach. *Telematics and Informatics*, *63*, p.101660.

Ullah, F., Sepasgozar, S.M., Thaheem, M.J. and Al-Turjman, F., 2021b. Barriers to the digitalisation and innovation of Australian Smart Real Estate: A managerial perspective on the technology non-adoption. *Environmental Technology and Innovation*, *22*, p.101527.

Umam, B., Darmawan, A.K., Anwari, A., Santosa, I., Walid, M., Hidayanto, A.N., 2020. Mobile-based smart regency adoption with TOE framework: An empirical inquiry from Madura Island Districts. In: 2020 4th *International Conference on Informatics and Computational Sciences (ICICoS).* IEEE, pp. 1–6.

Van der Maas, H.L., Snoek, L. and Stevenson, C.E., 2021. How much intelligence is there in artificial intelligence? A 2020 update. *Intelligence*, *87*, p.101548.

Van der Walt, J.L., 2020. Interpretivism-constructivism as a research method in the humanities and social sciences–more to it than meets the eye. *International Journal*, *8*(1), pp.59-68.

Van Rijmenam, M. and Logue, D., 2021. Revising the 'science of the organisation': theorising AI agency and actorhood. *Innovation*, *23*(1), pp.127-144.

Varma, A., Sarma, A., Doshi, S. and Nair, R., 2018, April. House price prediction using machine learning and neural networks. In *2018 second international conference on inventive communication and computational technologies (ICICCT)* (pp. 1936-1939). IEEE.

Varpio, L. and MacLeod, A., 2020. Philosophy of Science series: harnessing the multidisciplinary edge effect by exploring paradigms, ontologies, epistemologies, axiologies, and methodologies. *Academic Medicine*, *95*(5), pp.686-689.

Vatansever, M., Demir, I. and Hepşen, A., 2020. Cluster and forecasting analysis of the residential market in Turkey: an autoregressive model-based fuzzy clustering approach. *International Journal of Housing Markets and Analysis*.

Viriato, J.C., 2019. AI and machine learning in real estate investment. *The Journal of Portfolio Management*, *45*(7), pp.43-54

VTS, 2022a. A mission-critical platform for the world's most influential landlords and brokers. https://www.vts.com/vts-platform

VTS, 2022b. The most powerful end-to-end tenant experience solution. https://www.vts.com/property-managers-software

Wang, D. and Li, V.J., 2019. Mass appraisal models of real estate in the 21st century: A systematic literature review. *Sustainability*, *11*(24), p.7006.

Wang, P., Huang, Y., Zhu, J. and Shan, M., 2022. Construction Dispute Potentials: Mechanism versus Empiricism in Artificial Neural Networks. *Sustainability*, *14*(22), p.15239.

Wei, C., Fu, M., Wang, L., Yang, H., Tang, F. and Xiong, Y., 2022. The research development of hedonic price model-based real estate appraisal in the era of big data. *Land*, *11*(3), p.334.

Williams, M. and Moser, T., 2019. The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), pp.45-55.

Yadav, S.K., Singh, S. and Gupta, R., 2019. Sampling methods. In *Biomedical Statistics* (pp. 71-83). Springer, Singapore.

Yang, C., Shen, W., Chen, Q. and Gunay, B., 2018. A practical solution for HVAC prognostics: Failure mode and effects analysis in building maintenance. *Journal of Building Engineering*, *15*, pp.26-32.

Yigitcanlar, T., Desouza, K.C., Butler, L. and Roozkhosh, F., 2020. Contributions and risks of artificial intelligence (AI) in building smarter cities: Insights from a systematic review of the literature. *Energies*, *13*(6), p.1473.

Yin, J., Wu, J. and Wang, Z., 2021. Analysis of Insurance Funds Utilisation Channels and Mechanisms. In *Whither Has the Money Gone* (pp. 73-93). Springer, Singapore.

Yu, K.H., Zhang, Y., Li, D., Montenegro-Marin, C.E. and Kumar, P.M., 2021. Environmental planning based on reduce, reuse, recycle and recover using artificial intelligence. *Environmental Impact Assessment Review*, *86*, p.106492.

Yulianto, H., 2021. Philosophy of Management Science: Ontology, Epistemology, and Axiology Perspectives. *Cross-Border Journal of Business Management*, *1*(1), pp.152-162.

Zahrt, A.F., Henle, J.J., Rose, B.T., Wang, Y., Darrow, W.T. and Denmark, S.E., 2019. Prediction of higher-selectivity catalysts by computer-driven workflow and machine learning. *Science*, *363*(6424), p.5631.

Zhang, C. and Lu, Y., 2021. Study on artificial intelligence: The state of the art and future prospects. Journal of Industrial Information Integration, 23, p.100224.

Zhang, N., 2021. Big data simulation for financial risk assessment of real estate bubble based on embedded system and artificial intelligence algorithm. *Microprocessors and Microsystems*, *82*, p.103941.

Zhou, G., Ji, Y., Chen, X. and Zhang, F., 2018. Artificial neural

Ziakis, C., 2022. Blockchain and Artificial Intelligence in Real Estate. In International Conference on Decision Support System Technology (pp. 44-54). Springer, Cham.

Zimmerman, A., 2021. *Methodological innovations in research and academic writing*. Germany: IGI Global.

APPENDICES

Appendix A: Ethics Approval

University of Central Lancashire
UCLan

University of Central Lancashire
Preston PR1 2HE
01772 201201
uclan.ac.uk

20th September 2023

Ahmad Abu Arja / Salem Al-Karbi
School of Sport and Health services
University of Central Lancashire

Dear Ahmad and Salem,

Re: BAHSS2 Ethics Panel Application
Unique Reference Number: BAHSS2 01076

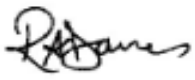
The BAHSS2 Ethics Review Panel has granted approval of your proposal application, 'Role of Artificial Intelligence in the Real Estate Industry of the UAE'.

Approval is granted up to the end of project date*.

It is your responsibility to ensure that

- the project is carried out in line with the information provided in the forms you have submitted
- you regularly re-consider the ethical issues that may be raised in generating and analysing your data
- any proposed amendments/changes to the project are raised with, and approved, by Committee
- you notify ethicsinfo@uclan.ac.uk if the end date changes or the project does not start
- serious adverse events that occur from the project are reported to Panel
- a closure report is submitted to complete the ethics governance procedures (Existing paperwork can be used for this purposes e.g. funder's end of grant report; abstract for student award or NRES final report. If none of these are available use e-Ethics Closure Report Proforma).

Yours sincerely,



Richard Davies, Deputy Vice-Chair
BAHSS2 Ethics Panel

* for research degree students this will be the final lapse date

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals gained.

Appendix B: Interview Questions

1. What is the role of Artificial Intelligence in real estate sector?
2. How has natural language processing impacted on the performance of real estate industry?
3. What advantages have AI – based digital applications and media provided to the real estate industry?
    - Probe: *What issues or risks have you observed while using AI-based digital applications and media?*
4. In what ways has the real estate industry benefited from automation of process?
5. What measures has the real estate industry adopted to process vast amounts of data and provide customized solutions to the clients?
    - Probe: *Please share your experience regarding this, what measures have you taken to ensure customer satisfaction?*
6. What is your opinion regarding the effectiveness of Artificial intelligence in real estate sector?
7. How can AI technologies improve the efficiency of real estate companies to offer greater value services to clients?
8. How does AI contribute to the identification of opportunities for real estate investors to locate profitable investment sources?
    - Probe: *In your opinion, which area of real estate operation is highly impacted by AI technology adoption and why?*
9. What techniques or applications does AI offer to optimize the performance of the mortgage industry?
10. Please suggest any tools or platforms that can enhance the capabilities of AI enabled real estate systems to offer robust solutions for communication problems?
    - Probe: *Please suggest specific areas of improvement as per your experience with AI-enabled real estate systems.*

Appendix C: Consent Form

Version number & date:
Research ethics approval number:
Title of the research project: Role of Artificial Intelligence in the Real Estate Industry of the UAE
Name of researcher(s): Dr Ahmad Abu-Arja / Salem Al-Karbi

Please initial box

1. I confirm that I have read and have understood the information sheet dated [23.11.2022] for the above study, or it has been read to me. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. In addition, I understand that I am free to decline to answer any particular question or questions. ☐
3. I understand that I can ask for access to the information I provide and I can request the destruction of that information if I wish at any time prior to [**the time once the interview has been transcribed and anonymsed as at that I would not be possible to ideintify the participants**]. I understand that following [**once the interview has been transcribed and anonymised**] I will no longer be able to request access to or withdrawal of the information I provide. ☐
4. I understand that the information I provide will be held securely and in line with data protection requirements at the University of Lancashire. ☐
5. I understand that signed consent forms and audio recordings will be retained [in custody of researcher] until **the award of the prof doc.** ☐
6. I understand that there is still a potential increased risk of exposure to COVID-19 by attending face-to-face, despite the mitigating actions detailed in the information sheet [23.11.2022] to reduce the risk. ☐
7. I agree to take part in the above study. ☐

_____	_____	_____
Participant name	Date	Signature

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting:

_____	_____	_____
Name of person taking consent	Date	Signature

Appendix D: Sample of Participant Quotes and Associated Codes Used in Thematic Analysis

This appendix presents a sample of anonymised participant quotes and the corresponding codes developed during the early stages of thematic analysis. These extracts were used to support theme construction discussed in Chapter 4. The full dataset remains securely stored in accordance with University of Lancashire's ethical guidelines and is not published in full here to protect participant confidentiality.

Table A.1: Representative Sample of Interview Quotes and Associated Codes

Quotes from the Transcripts	Codes
"AI systems can ensure compliance with legal and regulatory requirements in real estate transactions, minimising the risk of legal disputes and penalties." (Participant F15)	Legal compliance, minimising legal risks
"Improved compliance by ensures compliance with regulations and industry standards by automating processes such as contract management, document verification, and regulatory reporting." (Participant F7)	Regulatory compliance, legal processes
"It can monitor real estate advertisements and listings for compliance with regulations and fair housing laws, helping businesses avoid legal risks and discrimination issues." (Participant F8)	regulatory compliance and minimising legal risk
"AI-powered NLP (Natural Language Processing) algorithms can analyse real estate documents, contracts, and legal agreements, extracting relevant information and identifying potential risks." (Participant F11)	Identification of legal risks and contract analysis.
"As an IT officer, cybersecurity is the most impacted area, the AI has allowed analysing network traffic and determine anomalies promptly." (Participant F4)	Identification of security risks, Network Analysis
"AI algorithms analyse transaction data to detect fraudulent activities such as identity theft, mortgage fraud, and property scams, helping to safeguard real estate transactions."	Identifications of financial risks, transaction analysis
"AI-driven pricing models adjust property prices based on supply and demand dynamics, market conditions, and other relevant factors, enabling investors to optimise returns and negotiate favourable deals." (Participant F3)	Pricing strategy Market conditions analysis
"AI-powered predictive models forecast borrower behaviour, market trends, and economic indicators to optimize lending strategies, pricing models, and risk management practices, improving profitability and performance." (Participant F4)	Pricing models, Market indicators analysis
"AI-powered tools analyse competitor activities, pricing strategies, and market positioning to identify competitive advantages and opportunities for differentiation in the real estate market." (Participant F5)	Pricing strategies, Market positioning analysis
"AI-powered predictive models forecast future property prices, rental yields, and market dynamics, helping investors anticipate opportunities for profit and make informed investment decisions." (Participant F14)	Informed decision-making Predictive analysis Forecasting

"Real estate companies use predictive modelling techniques to forecast property prices, rental yields, and demand trends, helping clients make informed decisions about buying, selling, or investing in properties." (Participant F4)	Predictive analysis, forecasting, informed decision-making
"AI models analyse market forecasting macroeconomic indicators, demographic trends, and other factors to forecast future demand for real estate in specific markets, guiding investment decisions." (Participant F10)	Market forecasting, investment decision-making
"This was when … safety monitoring tool that did not identify the issue of gas leakage. Upon investigation, it was revealed that the system missed the prediction because it was out of its normal parameters. This resulted in constant oversights and tuning of the system parameters to ensure accurate detection of hazards and offer solutions." (Participant F6)	missed predictions and oversights of AI
"Also, the AI was found to be missing some critical alerts for cost overruns and delays in the project completion." (Participant F11)	Missed alerts
"One of our most important clients requested a complex financial prediction which was then misjudged by our AI tool. So, all of this led to delayed service, we went out of the way to handle this client and compensate with additional offers. After this, a meeting was held and it was agreed that the AI chatbots are better reserved for fulfilling simple requests where complex financial projects should be handled by specialized personnel." (Participant F7)	Misjudgement Reducing overreliance on technology
"The issue of false positives is something that has irritated me in the past, especially in terms of security alerts. There have been instances where our AI system generated a false alert about a normal network routine which caused panic." (Participant F4)	False alerts, false-positives
"I remember this one time we faced issues because of an unreliable prediction made by our AI systems. Specifically, due to incomplete historical data the AI system provided a miscalculated tenant behavior." (Participant F3)	Lack of quality data for reliable AI insights
"I had recently started processing large amounts of data. This occurred while I was using an AI-based forecasting tool to predict the budget which resulted in misinterpreting occasional setbacks as prolonged trends" (Participant F5)	Processing large data inaccurately
"In my experience, the AI systems can further be effectively used in engineering operations in the real estate industry after …. ensuring the availability of quality and reliable data so that the projections are accurate and based on relevant data."	Availability of quality and reliable data
The tools and systems have been great in analysing the data loaded by the sensors in real time. This has provided us with detect issues of our employees who are not complying with safety norms and rules and rectify their behaviours in more efficient ways. (Participant F6)	Efficient management of employees
"AI powered systems automate …improving efficiency and reducing operational costs for property owners and investors." (Participant F9)	Automation and efficiency
We have used several AI tools to enhance service efficiency and effective tenant communication" (Participant F3)	Service efficiency

"AI-powered systems can analyse feedback and performance data to identify areas for improvement and optimise service delivery, ensuring that real estate companies stay competitive and continue to offer value-added services to clients." (Participant F14).	Value-added customer services
"AI-powered NLP algorithms analyse borrower communications, loan documents, and customer feedback to extract insights, identify trends, and improve communication and service delivery in the mortgage industry." (Participant F7)	AI-powered customer-centric communication
"After this, we observed 20% upsurge in client satisfaction because this improved AI capability to understand the requests better enhancing the quality of our services." (Participant F7)	Increase in Client satisfaction due to better service quality
"AI anticipated that there were possible failures on usage and sensor readings that would occur and before it escalates, they can be solved. This was proven as a preventive system since it assisted in cutting down on the frequency of repairs and costs significantly." (Participant F15)	Cost-effective
"Smart Buildings AI-enabled sensors and IoT devices can optimize energy usage, improve security, and enhance the overall functionality of buildings, making them more sustainable and cost-effective." (Participant F7)	Cost-effective and sustainable
"Cost Saving by AI tools automate routine tasks, reducing the need for manual labour and overhead costs, resulting in cost savings for real estate businesses." (Participant F8)	Cost saving AI tools
"the AI-driven property recommendation that we used raised fairness issues because the property recommendation system favoured some of the neighbourhoods more than others. This created biases in the system resulting in unfair recommendations" (Participant F1)	Bias and unfair
"For instance, one of our AI tools related to email sort placed an urgent client request as low priority." (Participant F8)	Bias and inaccurate sorting
"With this experience, I have observed that there have been some misinterpretations of inventory needs and some insights were not quite recent/relevant to the ongoing industrial trends." (Participant F9)	Inaccurate and outdated insights
"AI system failed to detect project disruptions in the supply chain operations leading to delays and high response time. This demonstrated the necessity for integrating real-time contingency plans and updating of data for addressing risks." (Participant F10)	Failure to address real-time issues
"AI took time to adjust its scheduled predictions when faced with sudden and unexpected ground conditions. We were facing a delay and then human intervention became necessary to keep things running on time and without errors." (Participant F12)	Failure in real-time and 'sudden change' scenario
"Lastly, I would like to say that the ability of the AI tools can be enhanced to make it more adaptable to process real-time data and sudden fluctuations and increase resiliency" (Participant F9)	Adaptability to real-time data and sudden changes is missing.
"Improved efficiency workflows eliminate manual tasks such as data entry, scheduling, and communication, allowing real estate professionals to focus on high-value activities." (Participant F2)	Automated and efficient workflows
"Automated underwriting by analysing borrower data, credit history, income statements, and financial documents to assess creditworthiness and streamline the	

underwriting process, reducing manual effort and processing time". (Participant F1)	Automated and streamlined financial processes
"Many Chat is a chatbot platform that enables real estate agents to create AI-powered chatbots for Facebook Messenger, SMS, and email to automate communication, qualify leads, and provide property recommendations." (Participant F9)	Automated communication
"AI systems can automate routine property management tasks such as rent collection, maintenance scheduling, and tenant communication, improving efficiency and reducing costs" (Participant F5)	AI automated processes reduces costs
"AI powered virtual tour platforms create immersive 3D tours of properties, allowing potential buyers to explore properties remotely and reducing the need for physical viewings" (Participant F6)	Property viewing-related costs are reduced
"Saving cost by reduces the need for manual labour and administrative overhead, resulting in cost savings for real estate businesses" (Participant F8)	Administrative and labour-related cost reduction
"AI-driven innovations such as blockchain, IoT, and augmented reality are revolutionising the real estate industry, enabling new business models, improving transparency, and enhancing the overall customer experience." (Participant F15)	Innovative technologies for new business models
"Innovation By embracing AI technologies, real estate companies can innovate and differentiate themselves in the market, offering cutting-edge services and solutions that address clients' evolving needs and expectations" (Participant F15).	Innovative technologies to differentiate in market
"I think that blockchain integration with AI can be an improvement for property transactions in the real estate business. This can enable transparent and secure record-keeping of contracts and property ownership" (Participant F12)	Integrated Innovation for transparency and security
"AI can assist real estate investors in managing their portfolios by providing insights into property performance, vacancy rates, rental yields, and potential investment opportunities. (Participant F13)	Insights about investment opportunities
"AI customer bots have been really inspiring and useful when it comes to measures that we have taken to retain customer trust. For instance, customers are responded to and their requests are addressed at timely manner." (Participant F4)	Timely response to queries
"The tool has also resulted in decreasing response time by 30% which resulted in satisfactory outcomes for both our clients and as well as employees. This proactivity has been significant in improving client's trust in our services and their confidence" (Participant F6)	Decreasing response time improving timeliness
But I have faced issues especially in the beginning of using this technology, the interface was not really pleasing and understandable.	Complex interface
"Well, there are issues that are because of the functionalities of the AI like the complex interpretability issues and the problem of not really understanding the interface of the AI" (Participant F13)	Complex functionality, interpretability and interface
"I think the AI systems with relevance to leasing must improve accuracy and user-friendliness. I have personally faced difficulty of interpreting complex AI insights." (Participant F3)	Complex AI insights
"AI enables real estate businesses to create targeted marketing campaigns based on customer data, improving lead generation and conversion rates." (Participant F5)	Customer data based targeted marketing

"Enhance customer experience-based chatbots and virtual assistants provide round-the-clock customer support, answering queries, scheduling viewings, and providing personalized recommendations, improving customer satisfaction." (Participant F2)	Personalised recommendations to customers round the clock
"We are considering… robust data analytics. That would certainly lead to deeper information about client's preferences and anticipations about the services. Using this we would be better at offering effective and personalized services to all of our clients strengthening customer relations" (Participant F7)	Personalised customer services with robust data analytics
"AI-powered chatbot solutions for real estate websites enable agents to engage with visitors, capture leads, and provide interactive property search experiences through conversational interfaces." (Participant F10)	Customer-friendly Chatbot
"This one time a customer shared his experience with our chatbot which addressed his concerns late at night and his queries about software were catered to. The customer was able to employ troubleshooting methods given by the AI and resolve the issue" (Participant F4)	AI troubleshooting and Support
"AI-driven chat bots at our website are dedicated to answering the queries and concerns of our clients 24 hours. This area has enhanced our lead conversion rate; this is because the customers get all the information from the bots even after working hours resulting in fast sales" (Participant F2)	Better communication with clients, 24 hours customer support with AI chatbots
"This one time we received feedback of inaccurate listings we immediately took action to address this issue. By following these kinds of measures we have witnessed the satisfaction of our clients and retained their trust in our services." (Participant F1)	Inaccurate AI chatbot interactions
"Another time, the AI chatbot was unable to understand the complex requests of our VIP client and that was really embarrassing for me because they personally contacted me about this issue." (Participant F8)	AI limitations in handling complex client requests
"For instance, in our predictive maintenance system, what happens is that it turns what really is not a problem into a critical problem as sensed from our sensors. This could increase the amount of time and resources needed to solve the same problem, the certain methods need to be reviewed and confirmed by human personnel." (Participant F15)	False-positives and human intervention