

AI-Driven Marketplace Intelligence for Commercial Spaces

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ABSTRACT

The rapid expansion of digital commercial space marketplaces has significantly increased the complexity of managing bookings, pricing strategies, and service quality across multi-vendor platforms. Traditional marketplace systems rely heavily on manual decision-making and static historical data, proving insufficient in responding to real-time market trends, shifting customer preferences, and fluctuating demand. As a result, commercial space owners frequently face challenges such as inaccurate demand forecasting, revenue loss from rigid pricing, delayed customer support, and poor inventory utilization. This survey paper analyses how the strategic integration of Predictive Analytics and Generative Artificial Intelligence (GenAI) can enhance the efficiency, scalability, and customer experience of commercial space marketplaces. Specifically, the study evaluates AI-driven demand forecasting, dynamic pricing recommendations, automated customer support through intelligent agents, personalized property listing generation, and automated review analysis. The methodology involves reviewing AI-based marketplace use cases and technological frameworks currently shaping the industry. The proposed system utilizes historical and real-time data — including booking records, customer interactions, and urban mobility trends to generate actionable insights and automate critical operations. The framework also supports scalable deployment and intelligent decision-making for long-term marketplace optimization and business growth. Techniques such as Machine Learning, Natural Language Processing (NLP), BER-Topic clustering, and Large Language Models (LLMs) are examined for contextual automation and intelligent reasoning. Key findings indicate that AI-driven systems significantly reduce manual effort, improve pricing precision, and optimize occupancy rates for vendors. The study concludes that AI-powered marketplace intelligence provides a robust and scalable solution for building smarter, customer-centric commercial platforms, and establishes a foundation for future research into real-time data integration, continuous model learning, and advanced analytics in commercial real estate.

Keywords: Generative Artificial Intelligence, LLMs, Dynamic Pricing, Customer Support Automation

INTRODUCTION

Artificial Intelligence (AI) and Generative AI (GenAI) play a fundamental role in modern digital platforms, as they enable systems to collect, process, and analyze large volumes of data for intelligent decision-making. These technologies are widely used across various domains, including e-commerce, healthcare, finance, and smart systems, where automation, prediction, and personalization are essential. As digital marketplaces continue to expand, the demand for accurate, scalable, and data-driven solutions has increased significantly. AI systems are often considered the “brain” of modern platforms, as they allow systems to understand patterns, generate insights, and make real-time decisions based on dynamic data.

In multi-vendor commercial space marketplaces, managing operations such as bookings, pricing, customer queries, and review analysis becomes increasingly complex as the platform grows. Traditional systems mainly rely on historical data and manual processes, which often result in inefficient pricing strategies, delayed customer responses, and poor utilization of available spaces. Furthermore, these systems fail to consider real-time factors such as city events, customer preferences, and market trends, leading to reactive rather than proactive decision-making. Addressing these limitations is essential for improving operational efficiency and enhancing user

experience.

To overcome these challenges, AI-driven marketplace intelligence systems have been developed to integrate predictive analytics and Generative AI for smarter automation. These systems analyze multiple data sources, including booking records, customer interactions, and external factors, to forecast demand, suggest dynamic pricing, and automate customer support. Additionally, AI can generate personalized property descriptions and analyze customer reviews to identify patterns and improve service quality. However, implementing such systems requires a clear understanding of data processing, machine learning models, and system integration to ensure accurate and reliable performance.

This study focuses on designing and analyzing an AI-driven marketplace intelligence platform for commercial spaces. The system leverages predictive analytics to forecast demand, applies dynamic pricing strategies to optimize revenue, and utilizes Generative AI for customer support automation, personalized content generation, and review analysis. The proposed approach aims to reduce manual effort, improve decision-making, and enhance overall platform efficiency.

The significance of this study lies in its practical applications in business intelligence, automation, and digital marketplace optimization, as well as its academic value for understanding AI-based systems. By exploring this approach, the study contributes to a better understanding of how AI and GenAI can be effectively applied to solve real-world challenges, improve customer satisfaction, and support scalable and intelligent marketplace solutions.

LITERATURE REVIEW

GenAI in Commercial Space Marketplaces

The rapid evolution of rental platforms has been driven by urbanization and digital transformation, extending beyond residential housing into commercial space marketplaces such as offices, warehouses, and pop-up stores. Singh *et al.* [5] discussed how digital rental systems have transformed traditional property management by integrating online platforms, artificial intelligence, and data-driven decision-making.

These advancements enable efficient property discovery, tenant matching, and transaction management, which are equally applicable to commercial real estate where demand patterns are more dynamic and business-driven.

In commercial space marketplaces, demand is influenced by additional factors such as business activity, location accessibility, and economic trends. Traditional systems often fail to capture these dynamic patterns. Machine learning-based predictive systems address this limitation by analyzing multiple features simultaneously.

Singh *et al.* [4] demonstrated that models such as Random Forest and XG-Boost can accurately predict rental prices using attributes like location, size, and infrastructure. While their study focuses on housing, the same approach can be extended to commercial properties by incorporating additional features such as foot traffic, proximity to business hubs, and market demand trends.

Furthermore, predictive analytics plays a critical role in enabling dynamic pricing and demand forecasting, which are essential for commercial space optimization. Unlike residential rentals, commercial properties often require flexible pricing strategies based on short-term demand fluctuations. Machine learning models can support this by identifying patterns and recommending optimal pricing strategies, thereby improving occupancy rates and maximizing revenue.

Another key component of modern commercial platforms is customer interaction and support. Shareef [3] highlighted that traditional rule-based customer support systems are insufficient for handling complex and context-dependent queries.

The integration of Large Language Models (LLMs) enables conversational AI systems to understand user intent, provide personalized responses, and manage high volumes of queries efficiently. In commercial marketplaces, where users may inquire about availability, pricing, compliance, and services, such systems significantly

enhance user experience and operational efficiency.

Additionally, LLM-based systems support automation and personalization, which are critical in multi-vendor commercial platforms. These systems can generate contextual responses, summarize customer requirements, and assist in decision-making processes. The ability to continuously learn from user interactions further improves system performance, making GenAI a powerful tool for scalable customer support solutions.

Despite these advancements, several challenges remain in applying GenAI to commercial space marketplaces. Data heterogeneity, domain-specific requirements, and the need for real-time processing introduce complexities in system design.

Moreover, issues such as data privacy, model bias, and integration with existing platforms must be carefully addressed. However, with advancements in AI and scalable architectures, GenAI-driven systems are becoming increasingly viable for commercial applications.

Professional Development and Implementation of GenAI

The implementation of GenAI in commercial space marketplaces requires a combination of technical expertise and domain knowledge. Singh *et al.* [5] emphasized that modern rental systems rely heavily on digital technologies, necessitating skills in artificial intelligence, data analytics, and system integration. For commercial applications, this requirement is even more critical due to the complexity of demand patterns and business-specific needs.

Similarly, developing predictive models for commercial pricing requires expertise in data preprocessing, feature engineering, and model optimization. Singh *et al.* [4] highlighted the importance of preparing high-quality datasets and selecting relevant features to improve model accuracy. In commercial contexts, additional data sources such as economic indicators and mobility patterns must be incorporated to enhance predictive performance.

In the area of conversational AI, Shareef [3] demonstrated that implementing LLM-based systems involves advanced techniques such as tokenization, embedding, and reinforcement learning. These techniques enable systems to handle complex interactions and provide context-aware responses. Continuous monitoring and human-in-the-loop feedback mechanisms are essential to maintain system reliability and improve performance over time.

Overall, professional development through training, workshops, and practical implementation is crucial for successfully deploying GenAI systems. Organizations must invest in skill development to ensure effective adoption and utilization of AI technologies in commercial space marketplaces.

Paper Name	Publication Year	Research Gap / Limitation Identified	What We Adopted for Our Project
Ensemble Machine Learning Models Used for Forecasting in Rental Apartment Price Prediction of Metro City in India	2025	The study focuses mainly on residential apartment rental price prediction in Indian metro cities using machine learning models. It does not address commercial space marketplaces, real-time market fluctuations, demand hotspot prediction, or integration with user-facing intelligent systems.	We adopted the concept of machine learning-based price prediction and forecasting to support dynamic pricing for commercial spaces. The idea of using multiple property attributes for predictive analysis influenced our demand forecasting module.

Factors Affecting the Accommodation Price of Shared Rental Platforms under the Epidemic: Empirical Analysis Based on Big Data	2020	The research analyzes pricing factors for short-term shared accommodation platforms, mainly during epidemic conditions. It focuses on pricing determinants but lacks predictive automation, GenAI integration, and applicability to long-term commercial property intelligence.	We adopted the idea of multi-factor pricing analysis, including variables such as location, facilities, user reviews, and external contextual factors. This inspired our approach of using multiple real-world indicators for commercial demand and pricing optimization.
Pre-editor: Free Software to Support Collaborative Processes to Improve OpenStreetMap	2021	The paper focuses on collaborative geospatial mapping and OpenStreetMap data management rather than rental marketplaces. It does not address predictive analytics, property pricing, or intelligent marketplace automation.	We adopted the use of geospatial/location intelligence concepts from mapping systems. This supports our project's feature of location-based commercial hotspot identification and spatial demand analysis for commercial property recommendations.

Objectives

- 1) Enhance Marketplace Decision-Making through Predictive Analytics:** The primary objective of this project is to improve decision-making in commercial space marketplaces using AI-driven predictive analytics. The system analyzes historical booking data, location trends, and external factors such as city events and mobility patterns to forecast demand and suggest dynamic pricing strategies. This enables property owners to optimize occupancy, reduce vacancies, and maximize revenue through proactive planning.
- 2) Automate Customer Support using Generative AI:** The system aims to automate customer support operations by using Generative AI to process and respond to user queries related to bookings, policies, and services. It generates accurate, context-aware responses and summaries, reducing manual workload for support agents while improving response speed, consistency, and overall customer experience across the platform.
- 3) Improve Marketing Effectiveness through Personalized Content Generation:** Another key objective is to enhance marketing performance by generating AI-driven, SEO-optimized property descriptions tailored to different customer segments. By analyzing booking patterns and user preferences, the system creates personalized listings with relevant keywords and persuasive messaging, improving visibility, engagement, and conversion rates for commercial spaces.
- 4) Enable Intelligent Experience Analysis and ROI-Based Optimization:** The project aims to analyze unstructured customer reviews using AI techniques such as clustering and sentiment analysis to identify recurring issues and trends. By evaluating issue severity and frequency, the system prioritizes improvements based on return on investment (ROI), helping owners focus on high-impact fixes that enhance customer satisfaction and strengthen platform trust.

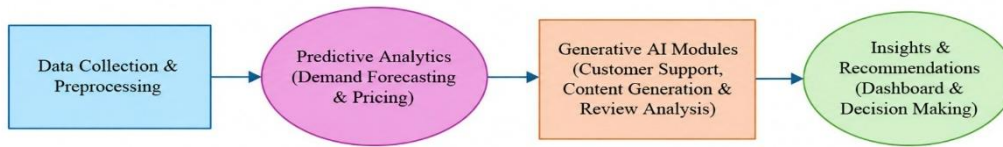
METHODOLOGY

This study adopts a mixed analytical approach by incorporating both quantitative and qualitative research methods to evaluate the effectiveness of AI-driven marketplace intelligence for commercial spaces. An exploratory research design was used to identify the limitations of traditional commercial space marketplace systems and examine how predictive analytics and Generative Artificial Intelligence (GenAI) can improve operational efficiency, customer experience, and revenue optimization.

The proposed system follows a sequential AI-driven framework in which data collection and preprocessing are

followed by predictive analysis, intelligent automation, and system-level evaluation.

Figure 1: Sequential AI-Driven Marketplace Analysis Framework



The data for this study was collected from multiple sources relevant to commercial space marketplaces, including historical booking records, pricing data, customer queries, property listings, and user reviews. In addition, external contextual data such as urban mobility trends, city events, socio-economic indicators, and location-based activity patterns were considered to capture real-time market dynamics. These datasets were used to simulate realistic marketplace conditions and evaluate the performance of the proposed AI-driven framework.

In the quantitative phase, structured data was analyzed to identify patterns related to demand forecasting, pricing behavior, occupancy trends, and customer interactions. Data preprocessing techniques such as cleaning, normalization, and feature extraction were applied to improve data quality and consistency. Machine learning models were then utilized to predict high-demand locations, analyze market trends, and recommend dynamic pricing strategies. Tools such as Python, Pandas, Scikit-learn, and visualization libraries were used for efficient data processing and predictive analysis.

In the qualitative phase, the study focused on analyzing the impact of Generative AI across major marketplace functions. Large Language Models (LLMs) were used to automate customer support by generating context-aware responses for booking, pricing, and policy-related queries. The system also generated SEO-optimized and personalized property descriptions tailored to different customer segments. Furthermore, customer reviews and feedback were analyzed using Natural Language Processing (NLP), BERTopic clustering, and sentiment analysis techniques to identify recurring issues, user preferences, and service quality trends.

The implementation process was carried out in multiple stages, including data collection, preprocessing, model training, intelligent automation, system integration, and evaluation. Predictive analytics modules were used to forecast demand hotspots and optimize pricing recommendations, while Generative AI modules automated customer interaction and content generation. Review intelligence modules analyzed unstructured feedback data to prioritize improvements based on issue severity and business impact.

Finally, the results obtained from both quantitative and qualitative analyses were combined to evaluate the overall effectiveness of the proposed system. The integrated AI-driven framework demonstrates how predictive analytics, machine learning, and Generative AI can enhance decision-making, improve operational efficiency, optimize revenue opportunities, and deliver a more personalized and scalable commercial marketplace experience.

CONCLUSION

This project presented a GenAI-powered approach for improving decision-making in commercial space marketplaces by integrating predictive analytics, dynamic pricing, and intelligent automation. The study highlighted the limitations of existing rental platforms, which primarily rely on static data and lack the ability to capture real-time demand fluctuations and market dynamics. By leveraging machine learning techniques for demand forecasting and Large Language Models for user interaction, the proposed system enables a more proactive and data-driven ecosystem for property owners and platform users.

The integration of multiple data sources, including historical trends and contextual factors, allows the system to generate actionable insights such as demand hotspots and optimized pricing strategies. Additionally, the use of conversational AI enhances user experience by providing personalized and context-aware support, thereby improving engagement and operational efficiency. The proposed solution demonstrates how combining

predictive intelligence with generative AI can significantly enhance the performance and usability of commercial space platforms.

Overall, the system contributes to reducing vacancy rates, maximizing revenue opportunities, and supporting informed decision-making in a competitive market environment. Future work can focus on incorporating real-time data streams, improving model accuracy through continuous learning, and expanding the system to support additional features such as automated marketing and advanced analytics dashboards. This research establishes a foundation for the application of GenAI in commercial real estate, highlighting its potential to transform traditional marketplace systems into intelligent and adaptive platforms.

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