



The Role of Artificial Intelligence in Improving Hotels Property Management Systems (PMS)

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Abstract:

This paper investigates how Artificial Intelligence (AI) can improve Hotel Property Management Systems (PMS) in the hospitality industry. It traces the evolution of PMS from manual to modern AI-infused counterparts, demonstrating how AI improves effectiveness and guest satisfaction. AI-driven PMS significantly improve efficiency in operations, making hotels more competitive in a dynamic landscape, by focusing on dynamic pricing strategies, real-time brand monitoring, and streamlined customer experiences. The paper highlights the practical significance of AI in the hospitality industry, promoting to a better understanding of technology's role in providing customized services and operational excellence, ultimately improving the quality of travel experiences.

Key words: Artificial Intelligence (AI), Channel manager, Hospitality industry, Property Management Systems (PMS), Revenue Management.

JEL Classification Codes: C88, L83, O32.

Introduction :

In today's quickly changing hospitality industry, remaining ahead of the competition needs more than just providing comfortable rooms and excellent service. The use of cutting-edge technology is currently an important component of success, and one of the most game-changing innovations is the incorporation of Artificial Intelligence (AI) to hotel Property Management Systems (PMS).

Property Management Systems (PMS) serve as the digital backbone of hotels, streamlining a multitude of operational tasks. In the hotel industry, a PMS handles everything from guest reservations and check-ins to billing and room tasks. It serves as a centralized hub for critical information such as room availability, rates, and guest preferences. Historically, these systems were primarily manual, posing accuracy and efficiency challenges. However, as technology has advanced, particularly with the incorporation of Artificial Intelligence (AI), PMS has experienced an important evolution. AI-powered PMS not only automates routine tasks but also improves decision-making processes, allowing hotels to provide seamless and personalized experiences to their guests. In this article, we will look at the creative role that AI contributes in healthcare.

1. Property Management Systems (PMS)

A property management system (PMS) is a software application that hotels use to manage their day-to-day operations (Koh & Mohamad Hassim, 2021; Moyeenudin, 2021). PMSs typically include modules for reservations, front desk, housekeeping, maintenance, billing and invoicing, analytics, and reporting (Moyeenudin et al., 2018).

The evolution of Property Management Systems (PMS) within the hotel industry represents a significant historical development. The management of hotel properties relied heavily on manual record-keeping processes, involving physical ledgers and logbooks. These manual systems were not only labor-intensive but also prone to errors and lacked the capacity to efficiently handle the intricacies of contemporary hotel operations (Z. Meng, 2002; Obinwanne, 2019). The advent of computer technology in the latter part of the 20th century marked a pivotal moment in the transformation of PMS. The transition from manual to software-based systems ushered in a new era of accuracy and efficiency (T.-Z. Liu & Lin, 2009). As technology continued to advance, PMS adopted cloud computing and artificial intelligence, further enhancing its capability to cater to the multifaceted demands of the modern hotel industry (Feng, 2021; Moyeenudin, 2021).

1.1 Applications and Uses of PMS:

Property Management Systems within the hotel industry serve as indispensable tools, coordinate various important functions. Foremost among these functions is the adept management of guest reservations, encompassing booking procedures, availability tracking, and reservation confirmations (Zorica & Cerovi, 2013). In addition to these fundamental responsibilities, contemporary PMS solutions have expanded their purview to include an range of important tasks. They assist in assigning rooms, making sure they align with guest preferences and available inventory. Additionally, PMS systems streamline the billing and invoicing procedures, enabling hotels to create accurate bills and manage payments seamlessly. PMS also greatly contributes to efficient housekeeping operations, optimizing the timely preparation of rooms for guest use. Moreover, it plays a central role in inventory management, ensuring that essential amenities and supplies are adequately stocked. In summary, PMS serves as a comprehensive tool that enhances hotel operations, leading to increased guest satisfaction and improved profitability (Chand Dhiman & Anand, 2015; Pucciani & Murphy, 2011).

1.2 Components of a PMS:

The structural arrangement of a Property Management System involves a network of interconnected components. At its core, there is the reservation system, responsible for organizing the booking of guest accommodations and diligently monitoring room availability (Bemile et al., 2014). The front desk module acts as the interface for guest check-in and check-out procedures, storing guest information and overseeing payment transactions (Murphy, 2013). Concurrently, room assignment features ensure the careful allocation of rooms, taking into account guest preferences and current availability. PMS also includes sections for billing and invoicing, allowing for precise calculation and settlement of guest charges (T.-Z. Liu & Lin, 2009; Moyeenudin et al., 2018). In many cases, PMS seamlessly integrates with point-of-sale systems, managing on-site services like restaurants (Cristian Morosan, 2022; Moyeenudin et al., 2018). Housekeeping management modules aid in coordinating room cleaning schedules to maintain rooms optimally prepared for guest use (Betsy B. Stringam & John H. Gerdes, 2021; Koh & Mohmad Hassim, 2021; Zorica & Cerovi, 2013). In addition to these fundamental functions, PMS systems incorporate reporting and analytics tools, providing valuable insights into hotel performance metrics. A detailed examination of these key functionalities follows (AltexSoft, 2022; Koh & Mohmad Hassim, 2021):

- **Reservation Functionality:** An important part of any hotel PMS, the reservation module simplifies reservations for rooms, controls stock, and enables e-payment while supporting several booking channels. This crucial part is in charge of verifying hotel

availability, blocking duplicate reservations, allowing group bookings, and providing E-payment processing. Additionally, it effectively handles the allocation and inventory of rooms and sends guests emails of confirmation upon completion of their reservation. Certain PMS systems go beyond this feature to allow guests to schedule activities for better visitor experiences. (AltexSoft, 2022; Koh & Mohmad Hassim, 2021).

- **Front-Desk Operations:** This function expedites the check-in and check-out procedures, guaranteeing easy modifications to bookings while preserving operational effectiveness.

Revenue Management: PMS optimizes revenue by algorithmic monitoring of competing rates and variables like local events and weather. It does this by automating pricing modifications based on hotel occupancy.

- **Channel Management:** This function is important for hospitality businesses as it instantly changes room availability across all booking channels, reducing human labour and optimizing income. Real-time updates on room availability are guaranteed by this functionality for a variety of booking channels, including direct booking platforms, global distribution systems (GDSs), and online travel agencies (OTAs). Booking transactions are streamlined, manual labor is reduced, and revenue potential is increased through real-time distribution. The hotel avoids overbooking with the help of the channel manager (Dyshkantiuk et al., 2020; Zorica & Cerovi, 2013).

- **Housekeeping Management:** Coordination of room ready is made easier and more efficient check-ins are made possible by the automation of housekeeping operations, such as cleaning and maintenance. (Pucciani & Murphy, 2011; Zorica & Cerovi, 2013).

- **Customer Data Management:** Effective customer relationship management (CRM) becomes possible by integration with the reservation system and front desk. This allows guest data to be collected and organized for marketing, loyalty programs, and personalized experiences. (AltexSoft, 2022).

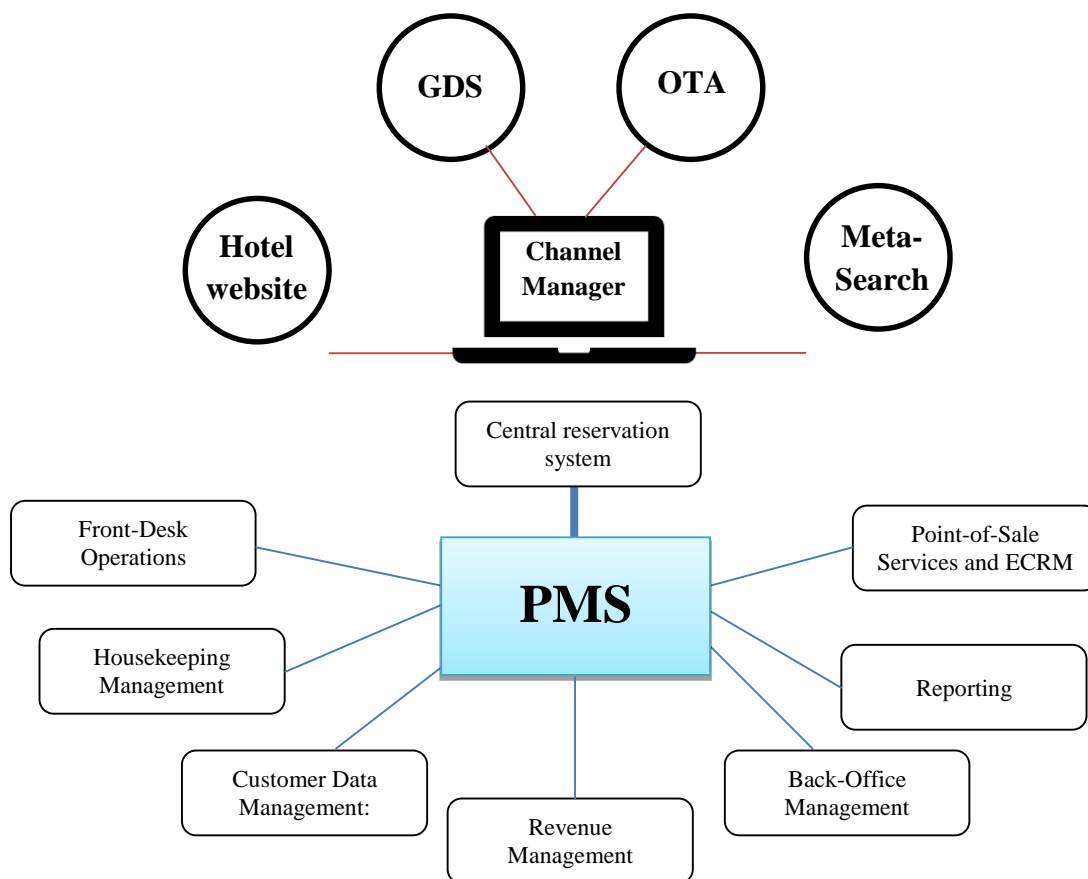
- **Back-Office Management:** Implementing automation and improving efficiency in a variety of areas, including event management, spa and gym operations, human resources, asset administration, conference room coordination, and space management.

- **Reporting:** Robust reporting provides data on revenue, reservations, and inventory, assisting in the identification of problems and the improvement of hotel management.

- **Point-of-Sale Services:** Versatile solutions simplify operational tasks through ensuring accurate reservations, effective housekeeping coordination, and faster guest check-ins. (AltexSoft, 2022).

PMS functions optimize operational efficiency and guest experiences while meeting industry demands, making them important in modern dynamic hospitality landscape.

Figure 1. Basic Structure and Components of a Hotel PMS



Source: AltexSoft (2022), Hotel Property Management Systems: Products and Features, <https://www.altexsoft.com/blog/travel/hotel-property-management-systems-products-and-features/> Accessed: 01-10-2023 23:44

In the hotel industry, the Property Management System (PMS) is a dynamic and complex system. It is constantly evolving and adopting new technologies, which is important to hotels looking for the best operations, guest satisfaction, and long-term financial success.

Smart technologies, such as in-room controls and facial recognition, are becoming increasingly common in the hospitality industry. These technologies are frequently connected to the Internet of Things (IoT), that necessitates the use of sensors and smart devices. These devices are linked and must work in tandem with the hotel's main operational center, known as the Property Management System (PMS) (Pillai & Sivathanu, 2020).

2. Artificial Intelligence Applications in Tourism Industry

Artificial Intelligence (AI) has emerged as a transformative force within the tourism industry, reshaping various facets of travel and hospitality (Nam et al., 2021). AI's integration into the tourism sector is characterized by its multifaceted applications, each contributing to enhanced efficiency, personalized experiences, and overall industry growth.

One notable application of AI in tourism is in the realm of **customer service and engagement**. Chatbots and virtual assistants, powered by AI algorithms, provide 24/7 customer support, assisting travelers in real-time with inquiries, bookings, and recommendations. These AI-driven conversational agents can efficiently handle routine customer interactions, freeing up human staff for more complex tasks while maintaining consistent and instant responses (Buhalis & Moldavska, 2022; Dash & Bakshi, 2019; Pillai & Sivathanu, 2020).

AI-driven **recommendation systems** are important in tailoring travel experiences. By analysing customer data, including previous travel choices and users' preferences, AI algorithms generate personalized recommendations for accommodations, activities, and gastronomy options. This not only enhances the traveller's experience but also aids in cross-selling and upselling, boosting revenue for tourism businesses (Argal et al., 2018; Renjith et al., 2020).

In the context of **revenue management**, AI offer the possibility of analyzing historical data, market trends, and demand patterns to optimize pricing strategies. Dynamic pricing models, powered by AI, enable hotels, airlines, and tour operators to adjust prices in real-time, maximizing revenue while ensuring competitive pricing (Hwang & Kim, 2006; Rana & Oliveira, 2014; Shukla et al., 2019; Talón-Ballesteró et al., 2022).

Furthermore, AI-powered **content generation** has been increasingly used in the creation of personalized travel itineraries and marketing materials. AI can curate travel content based on user profiles and preferences, generating engaging and informative content that resonates with individual travellers (Akehurst, 2009; Scharl et al., 2017; Xie & He, 2022).

Risk assessment and safety is another critical domain where AI contributes to tourism. AI-driven algorithms analyse data from various sources, including weather forecasts, traffic conditions, and geopolitical events, to assess potential risks to travelers (Ahmed et al., 2014). This proactive approach allows for timely alerts and risk mitigation strategies.

In the realm of **language translation**, AI-driven tools have broken down language barriers, facilitating communication between tourists and locals. Real-time translation

applications, powered by AI, enable travellers to converse seamlessly in foreign languages, enriching cross-cultural interactions (AltexSoft, 2022; Kasperè et al., 2021).

Moreover, AI's contribution to **data analytics** is instrumental in tourism. By processing vast volumes of data, AI uncovers valuable insights into consumer behavior, market trends, and operational efficiencies (Stroumpoulis et al., 2022). These insights inform strategic decision-making, enabling tourism businesses to adapt to changing market dynamics.

3. Artificial Intelligence Applications in Property Management Systems

AI applications in Hotel Property Management Systems (PMS) encompass various areas to enhance operational efficiency and guest experiences. The key applications of AI in Hotel PMS include:

3.1. Revenue Management:

AI plays a pivotal role in enhancing revenue management within Hotel Property Management Systems (PMS) through several mechanisms:

3.1.1. Pricing system:

One of the most impactful applications of AI for hotels is in enabling more dynamic and personalized pricing strategies. AI algorithms can analyze massive amounts of data to optimize pricing for revenue growth. Specifically, AI enables hotels to implement dynamic pricing that responds to real-time demand fluctuations (Talón-Ballesteró et al., 2022). By evaluating historical booking patterns, current occupancy levels, and competitor rates, local events, weather, and customer behavior, AI systems can suggest optimized price points to capitalize on high demand periods and encourage bookings during low demand (Ahmed et al., 2014). This dynamic approach maximizes revenue opportunities. Furthermore, AI allows for personalized pricing based on individual guest preferences and booking histories. Loyal, repeat guests can be offered customized promotions and discounts as incentives, driving guest satisfaction and loyalty (Hussein Al-shami et al., 2022; Phillips, 2021; Wagner & Eidenmuller, 2019). AI determines these personalized offers based on data analysis of guest behaviors and values (AltexSoft, 2022; Hwang & Kim, 2006; Rana & Oliveira, 2014; Talón-Ballesteró et al., 2022).

AI is not just used for making pricing decisions, but it also creates precise demand predictions by looking at both internal data and external factors like events that could affect how many rooms are booked (Goli et al., 2018, 2021). These AI-powered predictions help hotels set their pricing strategies, decide how much inventory to have, and plan their marketing campaigns based on expected demand (Lee & Lee, 2020). By using AI's data analysis and optimization abilities, hotels can create pricing strategies that are

responsive, adaptable, and customized to both the general market conditions and the preferences of individual guests (Singh, 2022). This increases the chance for more revenue and provides personalized experiences for guests.

In terms of integrating with Booking Engines, PMS systems that use AI can integrate easily with booking engines on a hotel's website. AI algorithms adjust pricing to encourage people to book directly on the hotel's website (Santosh Bisoi Dr. Ansuman Samal, 2020), which usually makes extra money because there are lower commissions compared to third-party channels.

3.1.2. Rate Parity and Occupancy Management:

AI can help hotels manage occupancy effectively. It can predict which rooms are likely to be booked and when, enabling hotels to allocate inventory efficiently and reduce the risk of overbooking or underbooking (Zhou & Liu, 2022). Also, AI ensures rate parity across various distribution channels (e.g., OTAs, direct booking platforms, the hotel's website) (Santosh Bisoi Dr. Ansuman Samal, 2020). Maintaining consistent rates across channels helps hotels avoid guest confusion and dependency on specific channels.

3.1.3. Promotion and Package Recommendations:

AI can suggest promotions and packages that are likely to attract guests and increase revenue (Argal et al., 2018; Renjith et al., 2020). For example, it can recommend adding breakfast or spa packages to specific room types based on guest preferences and historical data.

AI systems learn and adapt over time, refining pricing and revenue management strategies as they gather more data and insights (Bulchand-Gidumal, 2022). This continuous learning process leads to increasingly effective revenue optimization.

3.2. Brand Monitoring

Before discussing how AI can enhance brand monitoring, it's important to present a definition of Natural Language Processing (NLP). "Natural Language Processing is a theoretically motivated range of computational techniques for analyzing and representing naturally occurring texts at one or more levels of linguistic analysis for the purpose of achieving human-like language processing for a range of tasks or applications" (Liddy, 2001).

AI can significantly enhance brand monitoring within Property Management Systems (PMS) by efficiently analyzing and processing customer feedback and reviews from various online platforms and social media channels. Natural Language Processing (NLP) and AI-based solutions can quickly assess and react to guest feedback, enabling hotels to promptly address concerns and maintain a positive online reputation. These AI

tools can identify both positive and negative sentiments in guest reviews, track brand mentions, and evaluate customer experiences. As a result, hotels can gain valuable insights into how their brand is perceived, understand customer expectations, and identify areas needing improvement. AI's ability to process feedback at scale and in real-time empowers hotels to stay responsive and proactive in shaping a positive brand image, ultimately fostering customer satisfaction and loyalty (Hussein Al-shami et al., 2022).

3.3. Customer Experience Improvement

New-generation Property Management Systems (PMS) have the capability to control a wide range of innovative features, including messaging automation, smart rooms equipped with voice-controlled systems, facial recognition for guest check-in, and robots room service. These advanced technologies collectively enhance the customer experience within the hotel industry, ensuring a seamless, personalized, and efficient stay for guests.

AI-driven solutions can significantly enhance customer experience improvement within Property Management Systems (PMS) by providing innovative and efficient services. Messaging automation powered by AI-backed virtual assistants enables quick and convenient communication with guests, offering instant responses to their inquiries via preferred channels like texting (Santosh Bisoi Dr. Ansuman Samal, 2020). This enhances guest satisfaction by making them feel welcomed and well-taken care of. Additionally, facial recognition technology for check-in processes simplifies and speeds up the arrival experience, allowing guests to skip long lines and enjoy a hassle-free entry (Pillai & Sivathanu, 2020). Smart rooms equipped with voice-controlled systems enable guests to personalize their room settings and amenities, such as lighting and temperature, according to their preferences, enhancing their overall comfort (Buhalis & Moldavska, 2022; Hu et al., 2008; Lukanova & Ilieva, 2019). Moreover, AI-driven robots can assist in delivering items, providing information, and offering convenience services, freeing human staff from routine tasks and ensuring efficient, responsive guest service (De Kervenoael et al., 2020; Ivanov et al., 2019; Koo et al., 2021; Tung & Law, 2017). All these AI applications collectively contribute to a seamless, personalized, and efficient customer experience, ultimately increasing guest satisfaction and loyalty.

3.4. Resources Consumption Management and Predictive Maintenance

AI enhances resources consumption management (i.e. energy, food...) and predictive maintenance in hotels by employing smart resources management platforms supported by Internet of Things (IoT) devices to gather real-time data on energy usage and monitor various environmental factors within the building (Y. Meng, 2022). These

platforms analyse this data, allowing property owners to identify resources use patterns and make informed decisions to improve energy efficiency (Casteleiro-Roca et al., 2018). Additionally, AI enables predictive maintenance by continuously monitoring machinery and sending alerts when anomalies are detected, allowing for timely maintenance and cost reduction. This approach not only prolongs the lifespan of equipment but also ensures a comfortable and energy-efficient consumption for guests while reducing operational costs for hoteliers (Casteleiro-Roca et al., 2018; Huang et al., 2022; Y. Meng, 2022).

Conclusion:

This paper has delved into the profound impact of Artificial Intelligence (AI) on improving Hotel Property Management Systems (PMS). The integration of AI technology has ushered in a new era of efficiency and enhanced guest experiences within the hospitality industry. From dynamic pricing strategies to real-time brand monitoring and the streamlining of operational tasks, AI-driven PMS stands as a pivotal innovation that empowers hotels to stay competitive in a rapidly evolving landscape.

This paper emphasizes the growing importance of AI in the hotel sector, as it continues to shape the way properties manage their daily operations. The dynamic interplay between AI and PMS has redefined industry standards, setting the stage for a future where technology plays an increasingly central role in delivering seamless and personalized guest services. It is evident that AI's transformative capabilities in Property Management Systems are at the forefront of improving hotel operations and ensuring guest satisfaction.

Statement

LLM has been used as proofreading.

Referrals and references:

- Ahmed, M. M., Abdel-Aty, M., Lee, J., & Yu, R. (2014). Real-time assessment of fog-related crashes using airport weather data: A feasibility analysis. *Accident Analysis & Prevention*, 72, 309–317. <https://doi.org/10.1016/j.aap.2014.07.004>
- Akehurst, G. (2009). User generated content: the use of blogs for tourism organisations and tourism consumers. *Service Business*, 3(1), 51–61. <https://doi.org/10.1007/s11628-008-0054-2>

- AltexSoft. (2022). *Hotel Property Management Systems: Products and Features*. <https://www.altexsoft.com/blog/travel/hotel-property-management-systems-products-and-features/> Accessed: 01-10-2023.
- Argal, A., Gupta, S., Modi, A., Pandey, P., Shim, S., & Choo, C. (2018). Intelligent travel chatbot for predictive recommendation in echo platform. *2018 IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC)*, 176–183. <https://doi.org/10.1109/CCWC.2018.8301732>
- Bemile, R., Achampong, A., & Danquah, E. (2014). Online hotel reservation system. *International Journal of Innovative Science, Engineering & Technology*, 1(9), 583–588.
- Betsy B. Stringam, & John H. Gerdes. (2021). *Hospitality and Tourism Information Technology* (S. D. K. B. & G. C. (Eds.), H. & T. I. T. (pp. 1–60) C. Cobanoglu, Ed.). USF M3 Publishing, LLC. <https://doi.org/10.5038/9781732127593>
- Buhalis, D., & Moldavska, I. (2022). Voice assistants in hospitality: using artificial intelligence for customer service. *Journal of Hospitality and Tourism Technology*, 13(3), 386–403. <https://doi.org/10.1108/JHTT-03-2021-0104>
- Bulchand-Gidumal, J. (2022). Impact of Artificial Intelligence in Travel, Tourism, and Hospitality. In Z. Xiang, M. Fuchs, U. Gretzel, & W. Höpken (Eds.), *Handbook of e-Tourism* (pp. 1943–1962). Springer International Publishing. https://doi.org/10.1007/978-3-030-48652-5_110
- Casteleiro-Roca, J.-L., Gómez-González, J. F., Calvo-Rolle, J. L., Jove, E., Quintián, H., Martín, J. F. A., Perez, S. G., Diaz, B. G., Calero-Garcia, F., & Méndez-Perez, J. A. (2018). *Prediction of the Energy Demand of a Hotel Using an Artificial Intelligence-Based Model* (pp. 586–596). https://doi.org/10.1007/978-3-319-92639-1_49
- Chand Dhiman, M., & Anand, M. (2015). Understanding the Importance of Property Management Practices in Indian Hotel Industry. In *International Tourism and Hospitality in the Digital Age* (pp. 205–219). <https://doi.org/10.4018/978-1-4666-8268-9.ch013>
- Cristian Morosan. (2022). *INNOVATIVE HOSPITALITY TECHNOLOGY*. University of Houston, <https://uhlibraries.pressbooks.pub/innovative/chapter/hotel-systems-information-technology-in-hospitality/> Accessed: 21-10-2023.
- Dash, M., & Bakshi, S. (2019). An exploratory study of customer perceptions of usage of chatbots in the hospitality industry. *International Journal on Customer Relations*, 7(2), 27–33.
- De Kervenoael, R. J., Hasan, R., Schwob, A., & Goh, E. (2020). Leveraging human-robot interaction in hospitality services: Incorporating the role of perceived value, empathy, and information sharing into visitors' intentions to use social robots. *Tourism Management*. <https://doi.org/10.1016/j.tourman.2019.104042>
- Dyshkantiuk, O., Salamatina, S., Polishchuk, L., Komarnytskyi, I., Tserklevych, V., & Nedobiichuk, T. (2020). Modern hotel business management tools. *International Journal of Advanced Research in Engineering and Technology*, 11(6).
- Feng, X. (2021). Optimization of Property Information Management Model Based on Cloud Computing in Big Data Era. *2021 IEEE 4th Advanced Information Management, Communicates*,

- Electronic and Automation Control Conference (IMCEC)*, 222–227.
<https://doi.org/10.1109/IMCEC51613.2021.9482096>
- Goli, A., Khademi Zareh, H., Tavakkoli-Moghaddam, R., & Sadeghieh, A. (2018). A comprehensive model of demand prediction based on hybrid artificial intelligence and metaheuristic algorithms: A case study in dairy industry. *Journal of Industrial and Systems Engineering*, 11(4), 190–203. https://www.jise.ir/article_76524.html
 - Goli, A., Khademi-Zare, H., Tavakkoli-Moghaddam, R., Sadeghieh, A., Sasanian, M., & Malekalipour Kordestanizadeh, R. (2021). An integrated approach based on artificial intelligence and novel meta-heuristic algorithms to predict demand for dairy products: a case study. *Network: Computation in Neural Systems*, 32(1), 1–35. <https://doi.org/10.1080/0954898X.2020.1849841>
 - Hu, L., Long, Y., Qian, C., Zhang, L., & Lv, G. (2008). *Design and realization of intelligent tourism service system based on voice interaction* (L. Liu, X. Li, K. Liu, X. Zhang, & X. Wang, Eds.; p. 714427). <https://doi.org/10.1117/12.812827>
 - Huang, A., Chao, Y., de la Mora Velasco, E., Bilgihan, A., & Wei, W. (2022). When artificial intelligence meets the hospitality and tourism industry: an assessment framework to inform theory and management. *Journal of Hospitality and Tourism Insights*, 5(5), 1080–1100. <https://doi.org/10.1108/JHTI-01-2021-0021>
 - Hussein Al-shami, S. A., Mamun, A. Al, Ahmed, E. M., & Rashid, N. (2022). Artificial intelligent towards hotels' competitive advantage. An exploratory study from the UAE. *Foresight*, 24(5), 625–636. <https://doi.org/10.1108/FS-01-2021-0014>
 - Hwang, S. B., & Kim, S. (2006). Dynamic Pricing Algorithm for E-Commerce. In T. Sobh & K. Elleithy (Eds.), *Advances in Systems, Computing Sciences and Software Engineering* (pp. 149–155). Springer Netherlands.
 - Ivanov, S., Gretzel, U., Berezina, K., Sigala, M., & Webster, C. (2019). Progress on robotics in hospitality and tourism: a review of the literature. *Journal of Hospitality and Tourism Technology*. <https://doi.org/10.1108/JHTT-08-2018-0087>
 - Kasperè, R., Horbačauskienė, J., Motiejūnienė, J., Liubinienė, V., Patašienė, I., & Patašius, M. (2021). Towards Sustainable Use of Machine Translation: Usability and Perceived Quality from the End-User Perspective. *Sustainability*, 13(23), 13430. <https://doi.org/10.3390/su132313430>
 - Koh, W. S., & Mohamad Hassim, Y. M. (2021). Hotel Reservation Management System. *Applied Information Technology And Computer Science*, 2(2), 973–992. <https://publisher.uthm.edu.my/periodicals/index.php/aitcs/article/view/5047>
 - Koo, C., Xiang, Z., Gretzel, U., & Sigala, M. (2021). Artificial intelligence (AI) and robotics in travel, hospitality and leisure. *Electronic Markets*. <https://doi.org/10.1007/S12525-021-00494-Z>
 - Lee, J. J., & Lee, M. (2020). *Artificial Social Intelligence: Hotel Rate Prediction* (pp. 78–82). https://doi.org/10.1007/978-3-030-39442-4_7
 - Liddy, E. D. (2001). Natural Language Processing. In *Encyclopedia of Library and Information Science* (2nd ed.). Marcel Decker, Inc.

- Liu, T.-Z., & Lin, M. (2009). *CONSTRUCTING AN ONLINE PROPERTY MANAGEMENT SYSTEM FOR LEISURE FARMS*. <https://api.semanticscholar.org/CorpusID:167468782>
- Lukanova, G., & Ilieva, G. (2019). Robots, Artificial Intelligence, and Service Automation in Hotels. In *Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality* (pp. 157–183). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-78756-687-320191009>
- Meng, Y. (2022). Construction of Hotel Resource Information Platform Based on the Internet of Things Technology. *Mathematical Problems in Engineering*, 2022, 1–8. <https://doi.org/10.1155/2022/4898550>
- Meng, Z. (2002). *A Probe into the Limitations of Private Hotel Management*. <https://api.semanticscholar.org/CorpusID:167548443>
- Moyeenudin, H. M. (2021). *Cloud Based Property Management System in Integration with IoT*. <https://api.semanticscholar.org/CorpusID:236594527>
- Moyeenudin, H. M., Parvez, S. J., Anandan, R., & Narayanan, K. (2018). Data management with PMS in hotel industry. *International Journal of Engineering & Technology*, 7(2.21), 327–330.
- Murphy, H. C. (2013). The Property Management System: The View from the Front Desk on Training and Performance. In *Information and Communication Technologies in Tourism 2014* (pp. 777–783). Springer International Publishing. https://doi.org/10.1007/978-3-319-03973-2_56
- Nam, K., Dutt, C. S., Chathoth, P., Daghfous, A., & Khan, M. S. (2021). The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges. *Electronic Markets*, 31(3), 553–574. <https://doi.org/10.1007/s12525-020-00442-3>
- Obinwanne, C. O. (2019). The Role of Effective Internal Control System to the Financial Management of Hotel Operations. *International Journal of Research in Tourism and Hospitality*, 5(2). <https://doi.org/10.20431/2455-0043.0502003>
- Phillips, R. L. (2021). *Pricing and revenue optimization*. Stanford university press.
- Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management*, 32(10), 3199–3226. <https://doi.org/10.1108/IJCHM-04-2020-0259>
- Pucciani, K. K., & Murphy, H. C. (2011). An Investigation of Data Management and Property Management Systems in Hotels. *Industry Specific Strategy & Policy EJournal*. <https://api.semanticscholar.org/CorpusID:38274454>
- Rana, R., & Oliveira, F. S. (2014). Real-time dynamic pricing in a non-stationary environment using model-free reinforcement learning. *Omega*, 47, 116–126. <https://doi.org/10.1016/j.omega.2013.10.004>
- Renjith, S., Sreekumar, A., & Jathavedan, M. (2020). An extensive study on the evolution of context-aware personalized travel recommender systems. *Information Processing & Management*, 57(1), 102078. <https://doi.org/10.1016/j.ipm.2019.102078>

- Santosh Bisoi Dr. Ansuman Samal, M. R. (2020). Impact of Artificial Intelligence in the Hospitality Industry. *International Journal of Advanced Science and Technology*, 29(05), 4265–4276. <http://sersec.org/journals/index.php/IJAST/article/view/13739>
- Scharl, A., Lalicic, L., & Önder, I. (2017). *Tourism Intelligence and Visual Media Analytics for Destination Management Organizations* (pp. 165–178). https://doi.org/10.1007/978-3-319-44263-1_10
- Shukla, N., Kolbeinsson, A., Otwell, K., Marla, L., & Yellepeddi, K. (2019). Dynamic Pricing for Airline Ancillaries with Customer Context. *Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*, 2174–2182. <https://doi.org/10.1145/3292500.3330746>
- Singh, I. (2022). Dynamic Pricing using Reinforcement Learning in Hospitality Industry. 2022 *IEEE Bombay Section Signature Conference (IBSSC)*, 1–6. <https://doi.org/10.1109/IBSSC56953.2022.10037523>
- Stroumpoulis, A., Kopanaki, E., & Varelas, S. (2022). Role of artificial intelligence and big data analytics in smart tourism: a resource-based view approach. *WIT Transactions on Ecology and the Environment*, 256(2022), 99–108.
- Talón-Ballesteró, P., Nieto-García, M., & González-Serrano, L. (2022). The wheel of dynamic pricing: Towards open pricing and one to one pricing in hotel revenue management. *International Journal of Hospitality Management*, 102, 103184. <https://doi.org/10.1016/j.ijhm.2022.103184>
- Tung, V., & Law, R. (2017). *The potential for tourism and hospitality experience research in human-robot interactions*. <https://doi.org/10.1108/IJCHM-09-2016-0520>
- Wagner, G., & Eidenmuller, H. (2019). Down by algorithms: siphoning rents, exploiting biases, and shaping preferences: regulating the dark side of personalized transactions. *U. Chi. L. Rev.*, 86, 581.
- Xie, D., & He, Y. (2022). Marketing Strategy of Rural Tourism Based on Big Data and Artificial Intelligence. *Mobile Information Systems*, 2022, 1–7. <https://doi.org/10.1155/2022/9154351>
- Zhou, W., & Liu, Z. (2022). Design and Optimization of Hotel Management Information System Based on Artificial Intelligence. *Scientific Programming*, 2022, 1–9. <https://doi.org/10.1155/2022/2445343>
- Zorica, K.-Č., & Cerovi, Z. (2013). *IMPLEMENTATION OF PROPERTY MANAGEMENT SYSTEM IN HOTEL INDUSTRY*. <https://api.semanticscholar.org/CorpusID:5687569>