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AGILE TRANSFORMATION OF THE HOSPITALITY INDUSTRY THROUGH ARTIFICIAL INTELLIGENCE

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Abstract:

Artificial intelligence is becoming increasingly important in enhancing operations in diverse fields, including the hospitality industry. The application of artificial intelligence can contribute to faster adaptation to changes in guest requirements and market conditions. Through process automation, real-time data analysis and personalization of services, AI can support the flexibility and efficiency of hotel operations. By implementing AI solutions, hotels can make decisions faster, improve customer experience and optimize internal operations. The subject of the work is the analysis of the role of artificial intelligence (AI) as a factor that enables and improves agility in the hospitality industry. The paper investigates how the application of AI technologies - including automation, data analytics, predictive models and personalization of services - contributes to faster decision-making, flexibility of business processes and adaptation to constant changes in the hospitality industry.

Keywords:

artificial intelligence, agility, innovation, organizational change, hospitality industry.

1. INTRODUCTION

In the modern business environment, agility is a key factor for the success and sustainability of companies, especially in dynamic and competitive sectors such as hospitality industry. Changing guest requests, rapid technological development, global competition and unexpected situations (such as pandemics, climate change or instability in supply chains) create the need for greater agility. Agile transformation, which involves adapting organizational structures, processes and culture in order to quickly and effectively respond to changes in the market and guest requirements, is becoming imperative for hotels that want to remain competitive, efficient and relevant (Ruel & Njoku, 2021; Rigby *et al.*, 2016). Nevertheless, the development and application of artificial intelligence (AI) significantly accelerate and facilitate these transformation processes, enabling hotels to implement innovative technologies that improve operational efficiency and guest experience (Ivanov & Webster, 2019).

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Artificial intelligence encompasses a wide range of technologies such as machine learning, natural language processing (NLP), process automation and big data analytics, which together can provide deep insights and automation within hospitality (Wirtz *et al.*, 2019). By introducing artificial intelligence, hotels can adapt their services and processes more quickly to market requests, which is the essence of agility. For example, the personalization of services through AI chatbots, the optimization of inventory and price management, the prediction of guest needs based on the analysis of their previous stays, are just some of the examples of how artificial intelligence works as a catalyst for agile transformation (Buhalis & Leung, 2018). In addition, the existence of recommendation systems, agents and big data analytics enables hotels to reduce costs, increase guest satisfaction, optimize resources and speed up operations (Štilić *et al.*, 2025; Vukolić *et al.*, 2025). Artificial intelligence has the potential to be a catalyst for agile transformation, not only through the automation of operational tasks but also through improved decision-making, personalized services, trend forecasting and the ability to rapidly adapt to change (Popa *et al.*, 2025).

In addition, the COVID-19 pandemic has further emphasized the need for agile approaches in the hospitality industry, as market conditions have changed rapidly and unpredictably, and guest expectations regarding hygiene, safety and digitization of services have become more rigorous. In this context, artificial intelligence has enabled hotels to optimize work processes, reduce operational costs and improve guest experience, adapting to new challenges (Gretzel *et al.*, 2015).

Research in the field of applying artificial intelligence in the hospitality industry indicates significant benefits that this technology brings but also challenges in implementation, including the need for appropriate IT infrastructure capacities, employee education and change management within the organization (Wirtz *et al.*, 2019). Precisely because of these challenges, an agile approach to transformation enables continuous adaptation and iterative improvement of processes, thus increasing the probability of success of digital initiatives (Rigby *et al.*, 2016).

This paper aims to analyze the role of artificial intelligence as a driver of agile transformation in the hospitality industry, investigating how the integration of artificial intelligence technologies, including automation, data analytics, predictive models and personalization of services, can contribute to faster decision-making, flexibility of business processes and adaptation to constant changes in this sector. Furthermore, the aim of this work is to identify specific areas (functions, processes) where the application of AI can significantly improve agility and consideration of challenges and preconditions for successful implementation.

2. LITERATURE REVIEW

2.1. DEFINING BUSINESS AGILITY

The term agility refers to the ability of an organization to respond quickly to change and uncertainty (Akhtar *et al.*, 2018). Business agility can be defined as the ability of a company to use its human resources, technology, processes, and knowledge to effectively identify opportunities and threats, such as market changes, customer requests, and new technologies (Mathiassen & Pries-Heje, 2006). Teece *et al.* (2016, 17) defined agility as „the ability of an organization to efficiently and effectively reallocate its resources to create and protect value and activities with higher returns, and in accordance with the external and internal environment. "Nold *et al.* (2018) argue that business agility has four dimensions: culture, leadership, systems, and people. The central point of business agility is innovation, which is often influenced by information technology (IT) (Tallon & Pinsonneault, 2011).

Business agility is not just a methodology, but a deep transformation of the way of thinking and functioning of the organization. Business agility consists of the following aspects: strategic agility (represents the organization's ability to quickly change its strategic direction in accordance with changes in the external environment. It implies continuous monitoring of market trends and consumer behavior, as well as developing the ability to anticipate future changes (Doz & Kosonen, 2010)); structural agility (flexible organizational structure enables rapid regrouping of teams and resources in accordance with changes. This implies decentralized decision-making, removal of rigid hierarchies and creation of multidisciplinary teams (Worley & Lawler, 2010)); technological agility (the adoption of new technologies becomes a key precondition for agile business. Organizations that have a developed technological infrastructure can more easily experiment, introduce innovations and respond to market challenges (Teece *et al.*, 2016)); agile culture and leadership (an agile organizational culture relies on values such as openness, collaboration, experimentation, and tolerance for mistakes. Leaders in agile organizations encourage team autonomy, quick decision-making, and continuous learning (Rigby *et al.*, 2018)); agile processes and operations (the implementation of agile methods (e.g. Scrum, Kanban) allows organizations to work in short cycles, quickly deliver value to customer and continuously improve processes (McKinsey

& Company, 2020)); organizational learning (organizations that learn quickly and effectively from previous experiences, both successful and unsuccessful, are better prepared for future challenges. Mechanisms such as retrospectives, feedback and performance evaluation are key to the development of agility (Worley & Lawler, 2010)) and orientation towards the customer (agile organizations are strongly focused on the needs of end customer. Through continuous communication and integration of feedback, they rapidly adapt products and services (Rigby *et al.*, 2018)).

2.2. ARTIFICIAL INTELLIGENCE (AI)

In today's competitive business environment, digitalization has emerged as a critical determinant of success across various areas of business (Mambetova *et al.*, 2021). The process of digital transformation entails the comprehensive integration of digital technologies into business activities, leading to enhanced efficiency, streamlined processes, and a higher customer experience (Zsarnoczky, 2018). A central component of this transformation is the implementation of artificial intelligence (AI) (Buhalis & Moldavska, 2022).

Artificial intelligence has recently transformed the way businesses operate. Artificial intelligence is a set of technologies that give machines the ability to analyze, understand, learn, act, and perform tasks like humans to successfully solve problems (Bowen & Morosan, 2018). Technologies such as machine learning, natural language processing (NLP), and recommendation systems are increasingly used to optimize operational processes and improve user experience (Chiu *et al.*, 2021).

The hospitality and tourism industry, often characterized as a people-dependent and labor-intensive industry (Acharya & Datta, 2023a), seems ideal for technological innovation. The conventional method of hospitality has always been prone to human error and often required people to work long hours, even for tasks that can now be easily automated. In hospitality, artificial intelligence can be used to optimize kitchen operations, personalize guest experiences, manage inventory, forecast demand, and analyze customer feedback, enabling more efficient operations and the provision of customized services (Milton, 2024).

2.3. ARTIFICIAL INTELLIGENCE (AI) AND AGILITY

In the modern hospitality industry, the market is characterized by a high level of uncertainty, fluctuating demands, high competition and constantly changing guest requirements. Agile transformation – the process of introducing agile principles, methods and practices into business processes - enables hotels to adapt more quickly to those changes, to improve efficiency and service quality, and to gain a competitive advantage. Artificial intelligence (AI) in this context is an important catalyst for agility, as it enables the collection and analysis of large amounts of data in real time, the automation of routine tasks, the prediction of trends and the making of data-driven decisions.

Artificial intelligence can drive agility in the following areas of hospitality business (Doborjeh *et al.*, 2022; Du *et al.*, 2025):

1. demand forecasting and dynamic pricing - artificial intelligence models (machine learning, predictive analytics) can analyze historical data, seasonal variations, events, competition and other factors to predict occupancy. Based on this, prices can be changed in real time, which enables optimal utilization of capacity and maximization of income;
2. operational efficiency (maintenance, costs, logistics) – artificial intelligence can detect issues at an early stage, thereby preventing their escalation into significant problems (for example, air conditioning, elevators). It also enables optimal planning of cleaning and resource utilization in the housekeeping sector, inventory management and facility maintenance. This reduces possible interruptions in work, reduces costs and enables a quick response;
3. interaction with guests and personalization - artificial intelligence systems enable personalized recommendations, automatic assistants (chatbots or virtual concierge), voice assistants and smart control functions in the rooms (lighting, heating and others). As a result, guest satisfaction is enhanced, waiting times are reduced, and services can be delivered more flexibly;
4. process automation and digitization - artificial intelligence enables contactless check-in and check-out, automated reservation management, automated communication with guests, feedback processing, enables the creation of digital platforms for managing internal tasks. This enables faster processing, reduces errors, enables scaling of the process with less human input;

5. sustainable development and energy efficiency - the combination of artificial intelligence and Internet of Things (IoT) technologies enables optimization of energy consumption (lighting, air conditioning, heating), regulation of resources (water, electricity), reduce waste, optimizes maintenance of facilities in accordance with periods when the hotel is less occupied. This achieves savings, as well as a reputational benefit among guests who are environmentally aware;
6. agile staff management and internal organization - artificial intelligence can help in optimizing work shifts and scheduling staff according to the expected occupancy of the hotel, as well as in identifying training needs and monitoring employee performance. This increases flexibility, reduces unnecessary costs and improves the ability to react to unexpected situations (for example, a larger inflow of guests, a unexpected event, etc.).

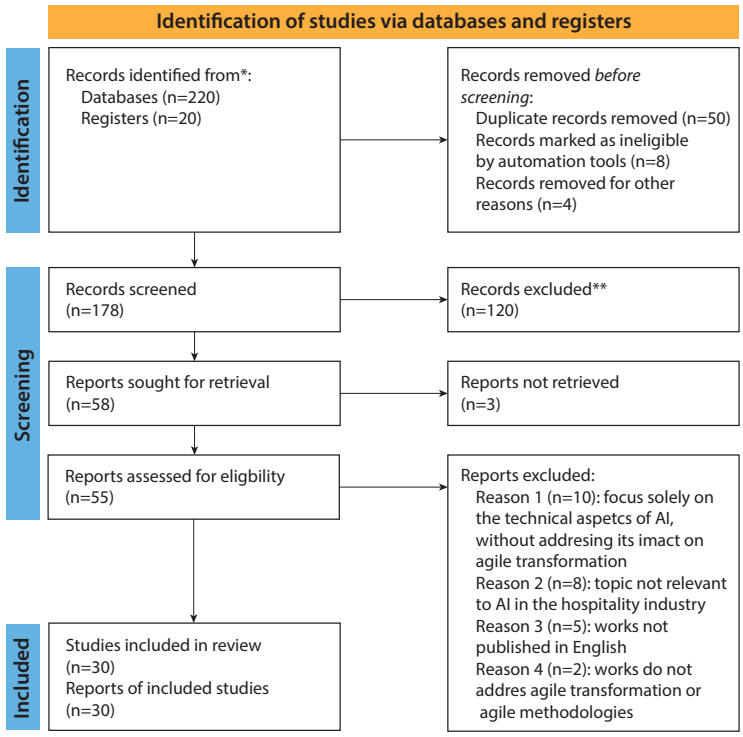
3. METHODOLOGY

In order to identify relevant scientific works, a systematic literature search (SLR) was conducted, with the aim of analyzing the role of artificial intelligence (AI) as a driver of agile transformation in the hospitality industry. This process involves the identification, collection and critical analysis of multiple systematic studies. The primary goal is to concisely present current and significant findings relevant to a given research topic. The main reasons for choosing this research model are that this approach synthesizes multiple studies on a specific topic and consists of certain phases such as defining the research topic, evaluating available data, synthesizing findings and drawing applicable conclusions.

All papers have been collected from reputable digital sources, including Google Scholar, Scopus, ScienceDirect and Web of Science, with the aim of obtaining accessible and reliable material. Over 240 papers were collected using this approach. The criteria for the selection of literature included: publications published in the last 20 years (2006–2025), studies directly addressing the application of artificial intelligence in the hospitality industry, along with publications exploring agile management approaches and digital transformation. When reviewing the relevant academic literature, the following keywords were used: „artificial intelligence“, „artificial intelligence in the hospitality industry“, „machine learning“, „machine learning in the hospitality industry“, „automation in the hospitality industry“, „agility“, „organizational agility“, „digital agility“, „agility in the hospitality industry“. The research included only papers published in English. The selected works were analyzed with the aim of extracting the most relevant data related to the mentioned research topics. The data extraction process was carried out for each paper individually, which ensured the quality of the research and the reliability of the collected data. For this purpose, only original papers published in reputable scientific journals were considered.

Figure 1 presents the PRISMA diagram, which ensures transparency in the research process by showing how many studies were identified, screened, assessed for full-text eligibility, and ultimately included in the paper.

Figure 1. PRISMA diagram



Source: Author

The selection of papers was guided by the following criteria: relevance to the topic, academic reliability of sources, focus on the hospitality industry, agile transformation and the role of AI. Literature dealing with AI topics in other industries without a relevant connection to tourism or hospitality was excluded from the review.

The analysis was conducted in stages, starting with identifying key literature segments on AI in hospitality (open coding), followed by grouping them into broader themes like automation, personalization, and organizational change. These were then examined to highlight the most recurring and relevant topics for further discussion. Coding and thematic analysis were done manually, with the help of a table in Microsoft Excel, where key codes and thematic units were listed for each source. The entire process of analysis was carried out by the author of the paper. Although only one coder participated in the analysis, in order to increase reliability, the following strategies were applied: multiple reading of sources, keeping a research diary, as well as regular consultations with a mentor regarding the interpretation of key codes and themes. This approach enabled consistent and reflective interpretation of key findings from the selected literature.

4. RESULTS

A review of the literature identified the main aspects of AI driving agile transformation in hospitality. The literature consistently indicates that AI enables a high level of service personalization through the analysis of large amounts of guest data, including preferences, habits, behavior patterns and booking history. The application of machine learning algorithms and recommendation systems results in the creation of customized offers, content and communications, which contributes to increasing guest loyalty and hotel competitiveness. Several authors emphasize the role of AI in optimizing internal processes, such as reservation management, pricing (revenue management), inventory control, predictive maintenance and automation of tasks through chatbots and robots. These systems contribute to increasing operational efficiency, reducing costs and enabling faster decision-making. AI enables hotels to adopt agile methodologies through the ability to quickly analyze market and internal data in real time. This ability enables timely adjustment of strategies, services and resources in accordance with changes in demand, guest behavior and competitive surroundings, which is a fundamental characteristic of an agile approach. The implementation of AI technologies in the hospitality industry is driving changes in the role of employees, whereby routine and manual tasks are automated, and the focus of employees is shifted towards creative, analytical and interpersonal skills. This transition requires the redefinition of organizational culture and the development of new competencies, which is recognized in literature as a necessary precondition for a successful agile transformation.

Hotels around the world are using AI-based tools to support agile transformation, improve guest experience and make faster, data-driven decisions in the dynamic hospitality environment. Following this section, there are successful examples from practice that show the combination of artificial intelligence and agile methodologies allows hotels to effectively respond to the needs of modern travelers and changes in market conditions.

Example 1: A medium-sized hotel in Barcelona decides to improve its pricing processes to better adapt to fluctuations in demand, seasonality and competition. An AI dynamic pricing system (revenue management software) has been introduced that analyzes hundreds of factors daily – including occupancy data, local events, weather and competitor pricing. As a result, it automatically proposes or applies optimal room prices. The agile aspect of introducing such a system is reflected in the fact that the management team uses this data in daily stand-up meetings to quickly make decisions about promotions or packages, which enables quick adaptation to the market. With the help of AI, the hotel increased its average daily room rate (ADR) by 12% within three months.

Example 2: A chain of hotels in Vienna introduces an AI chatbot that communicates with guests through a website, mobile application and social networks. The chatbot uses natural language to answer questions about room availability, check-in procedures, nearby restaurants and additional services. It learns from interactions and is increasingly accurate in responding. The agile aspect of the chatbot is reflected in the feedback collected through the chatbot. At weekly iterative meetings, the hotel team changes the content of the Frequently Asked Questions (FAQ) pages, introduces new services and improves the personalization of communication with guests. This reduces the workload of the reception desk and increases guest satisfaction - the satisfaction index increased by 18% in six months.

Despite numerous advantages, the literature also points to challenges in the implementation of AI technologies. Among the most commonly identified barriers are: high initial investment costs, lack of technical expertise, resistance to change, as well as ethical issues and concerns regarding user data privacy. These factors can slow down or hinder agile transformation if not addressed at a strategic level.

5. CONCLUSION

Artificial intelligence (AI) has significant potential to initiate and accelerate agile transformation in the hospitality industry. AI enables the automation of routine operations, improves customer support through chatbots and personalization, as well as the analysis of large amounts of data for decision-making. The introduction of AI in the hotel business encourages organizations to become more flexible, decentralized and oriented towards continuous learning – which are the key principles of agile approach. The integration of AI technologies into hotel operations not only improves internal processes, but also fosters an organizational culture focused on innovation and continuous learning – which are the core values of an agile approach. However, successful implementation requires a strategic approach, investing in the development of employees' digital competencies and changing the organizational structure in the direction of greater flexibility and decentralized decision-making.

This paper contributes to theoretical and practical applications, offering an integrative framework for understanding their interrelationship. The research encourages a multidisciplinary approach, bringing together IT, management and hospitality and tourism. In addition, it opens up space for further research on the role of digital technologies in the transformation of organizational structures and business models in service industries. The work suggests that agile transformation should not be seen exclusively as a methodological change, but as a deep organizational evolution in which technology plays a central role - which can be the basis for developing new theories about digital agility and technological adaptability.

Given the limitations of this work, which is based solely on a review of secondary sources, it is recommended to conduct empirical research in the future, namely case study analysis of hotels that have already implemented AI as part of an agile transformation, in order to analyze concrete results and challenges, quantitative research on the impact of AI on guest satisfaction, operational efficiency and hotel revenues, qualitative research including interviews with managers and employees, in order to gain a deeper understanding of the organizational changes initiated by AI, research at the local/regional level, examination of ethical challenges that arise in the application of AI, especially in the context of personalization of guest services and data processing.

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