Received: 30 September 2025 | Revised: 17 October 2025 | Accepted: 25 November 2025 | Published: 20 December 2025

RESEARCH ARTICLE
DOI: https://doi.org/10.47703/ejebs.v69i4.598

Digital Transformation and Innovation-Driven Evolution of the Hospitality Industry in Kazakhstan

Gaukhar Sakhanova[1] | **Raigul Duiskenova**[1] | **Medet Konyrbekov**[2]*

[1] Almaty Technological University, Almaty, Republic of Kazakhstan

[2] Institute of Economics CS MSHE RK, Almaty, Kazakhstan

Corresponding author:
*Medet Konyrbekov – PhD, Associate Professor,Institute of Economics CS MSHE RK, Almaty, Kazakhstan.
Email: konyrbekov.m@gmail.com

How to cite this article:
Sakhanova, G., Duiskenova, R. & Konyrbakov, M. (2025). Digital Transformation and Innovation-Driven Evolution of the Hospitality Industry in Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(4), 91-104.

Conflict of interest:
author(s) declare that there is no conflict of interest

© 2025 by the author(s). This article is distributed under the terms and conditions of the Creative Commons Attribution 4.0 International License (CC BY 4.0): https://creativecommons.org/licenses/by/4.0/

ABSTRACT

Digital transformation is fundamentally reshaping the landscape of Kazakhstan's hospitality industry, creating new opportunities and challenges for market participants. This study examines the influence of digitalization and innovation on the development trajectory of the national hotel sector, identifying key transformation drivers and assessing their impact on operational performance. The empirical dataset includes information from 127 hotels for the period 2014–2024, covering indicators of digital maturity, innovation activity, and financial outcomes. The methodology integrates correlation analysis, regression modeling, and cluster analysis to provide a comprehensive evaluation of transformation processes. The results reveal a strong positive relationship between the digitalization index and core operational metrics: hotels with high digital maturity demonstrate revenue per room 58% above the market average and occupancy rates 28 percentage points higher. Significant heterogeneity of digital development is observed: only 27% of hotels qualify as digital leaders, whereas 31% remain technologically lagging. A pronounced regional gap persists, with capital cities outperforming peripheral regions by a factor of three in the digitalization index. The COVID-19 pandemic accelerated the adoption of contactless technologies by 3.7 times, establishing digital services as a baseline expectation among guests. The study confirms that successful digital transformation requires an integrated approach that combines technological innovation, organizational change, and the development of digital competencies. The findings hold substantial relevance for shaping digital development strategies of hospitality enterprises and informing innovation-supporting sectoral policies.

KEYWORDS: Digital Economy, Digital Transformation, Digitalization Index, Innovation, Hotel, Hospitality Industry, Hotel Business

SCSTI: 06.71.07

JEL Code: L83, O33, Z32

FINANCIAL SUPPORT: The study was not sponsored.

1. INTRODUCTION

The hotel industry in Kazakhstan has undergone substantial transformation over the past decade, driven by rapid technological progress and shifting consumer expectations. Digital technologies have fundamentally reshaped how hotels operate, market their services, and interact with guests, creating both opportunities and challenges for industry stakeholders. This transformation accelerated particularly in the aftermath of the COVID-19 pandemic, which catalyzed the widespread adoption of contactless services and digital solutions across the sector (Jiang & Wen, 2020).

Kazakhstan's hotel sector functions within a unique context defined by ambitious national development strategies and growing international tourism interest. The country's strategic location along the New Silk Road and its efforts to diversify the economy beyond dependence on natural resources have positioned tourism and hospitality as priority sectors for development (Yessenova & Khamitova, 2019). However, the industry continues to face persistent challenges, including technological fragmentation, skills gaps, and uneven digital adoption rates between international hotel chains and local independent properties (Kapanova et al., 2021).

Global trends in hospitality digitalization have demonstrated the transformative potential of technologies such as artificial intelligence, the Internet of Things, cloud-based property management systems, and data analytics. Hotels that adopt comprehensive digital strategies report improvements in operational efficiency, guest satisfaction, and revenue performance (Law et al., 2022). These technologies enable personalized guest experiences, optimized pricing strategies, streamlined operations, and new service delivery models previously unattainable (Buhalis & Amaranggana, 2015).

The innovation landscape of Kazakhstan's hotel industry presents a complex picture of rapid change accompanied by structural constraints. While major international hotel chains operating in Almaty and Nur-Sultan have adopted advanced digital solutions, smaller regional hotels struggle to implement even basic digitalization initiatives (Baitenova et al., 2022). This digital divide reflects broader challenges within the country's innovation ecosystem, including limited access to capital, insufficient technical expertise, and weak linkages between technology providers and hospitality businesses (Kopzhasarova, 2023).

Theoretical understanding of digital transformation in hospitality has evolved from a focus on individual technologies toward the study of systemic change processes. Early research concentrated on specific applications such as online reservation systems and revenue management tools (O'Connor, 1999; Sigala, 2007). Contemporary scholarship increasingly adopts holistic perspectives that consider the technological, organizational, and institutional dimensions of transformation (Ivanov & Webster, 2017; Murphy et al., 2019). This evolution reflects recognition that successful digital transformation requires not only the adoption of technologies but also a fundamental rethinking of business models and approaches to service delivery.

Despite the growing interest in hospitality digitalization, research on Kazakhstan's hotel industry remains fragmented and limited in scope. Existing studies have primarily examined isolated aspects of technology adoption, without offering comprehensive frameworks for understanding the sector's digital evolution (Yessenova & Khamitova, 2019; Kapanova et al., 2021). There is a notable absence of research that systematically analyzes how digital transformation and innovation interact to shape the industry's developmental trajectory. This gap is particularly significant given Kazakhstan's ambition to become a regional tourism hub and the critical role of hospitality in achieving this objective.

The COVID-19 pandemic fundamentally altered the competitive landscape of the hotel industry, accelerating timelines for digital adoption and shifting consumer preferences toward technology-enabled services. Studies

have documented the rapid introduction of contactless check-in systems, mobile room keys, and digital concierge services as hotels adapted to heightened health and safety requirements (Gursoy & Chi, 2020; Shin & Kang, 2020). Such changes are often driven by necessity and have become integral to the hotel business, setting new standards for service provision.

Some studies have shown that successful digital transformation in the hospitality industry depends on a combination of factors, including technological infrastructure, organizational capabilities, leadership commitment, and a supportive institutional environment (Sigala, 2018; Law et al., 2022). Hotels that integrate digital technologies into comprehensive innovation strategies achieve better results than those that implement disparate initiatives related to specific technologies (Kapoor et al., 2021). These findings highlight the importance of considering digital transformation as a multifaceted process that requires coordinated efforts in technical, human, and organizational aspects.

The innovation-driven evolution of hospitality extends beyond operational technologies and encompasses new business models, service concepts, and value-creation mechanisms. Platform-based economies, sharing-economy models, and hybrid hospitality concepts challenge traditional industry boundaries and generate new competitive dynamics (Gretzel & Yoo, 2008; Xiang & Gretzel, 2010). The hotel sector of Kazakhstan must navigate these disruptions while simultaneously building its own innovative capacities. The purpose of this study is to examines the influence of digitalization and innovation on the development trajectory of the national hotel sector, identifying key transformation drivers and assessing their impact on operational performance.

2. LITERATURE REVIEW

The initial research on digital transformation in the hotel sector appeared in the late 1990s and focused on how the Internet was changing the way services were booked and distributed. One of the early works was an article by O'Connor (1999), where he showed how online booking is transforming traditional hotel sales channels. In parallel, Wertner and Klein (1999) analyzed the development of information technologies in tourism and demonstrated that e-commerce not only complements but also rebuilds the architecture of the entire industry. These studies have formed the basis for modern approaches to the study of technological changes in the hotel business.

In the early 2000s, scientific interest shifted from individual Internet solutions to broader issues of operational digitalization. One of the significant steps was the introduction by Buhalis (2003) of the concept of “e-tourism”, where digital technologies are considered as a tool for optimizing and integrating the entire value chain — from customer interaction to internal management processes. Law and Jogaratnam (2005) empirically demonstrated a positive correlation between hotels’ technological capability and their financial performance. Sigala (2007) examined the implementation of revenue management systems and found that automated pricing increases RevPAR by 8–12%.

The emergence of social media and Web 2.0 platforms created an entirely new research direction. Gretzel and Yoo (2008) discovered that online reviews influence 87% of hotel booking decisions. Vermeulen and Seegers (2009) showed that positive reviews increase the likelihood of booking independent hotels by 50%. Xiang and Gretzel (2010) investigated the role of social media in hotel marketing and identified a fundamental shift from traditional advertising to user-generated content.

The mobile revolution of the 2010s led to a new wave of studies. Wang et al. (2012) analyzed the impact of smartphones on traveler behavior and identified the phenomenon of “micro-moments” in decision-making. Kim and Law (2015) examined hotel mobile applications and found that they increase guest loyalty by 23%. Buhalis and Amaranggana (2015) expanded the concept of “smart tourism

destinations," in which hotels function as integral components of an interconnected digital ecosystem.

Research on artificial intelligence and automation in the hotel sector intensified after 2017. Ivanov and Webster (2017) were the first to systematically study the use of robots in hotels, identifying both operational advantages and social challenges of automation. Tussyadiah and Park (2018) explored guest perceptions of AI technologies and revealed significant cultural differences in innovation acceptance. Murphy et al. (2019) demonstrated that chatbots reduce staff workload by 40%, although they require careful configuration to ensure high-quality service delivery.

The COVID-19 pandemic catalyzed extensive research on contactless technologies. Gursoy and Chi (2020) documented the widespread adoption of digital check-in systems and mobile keys in response to heightened safety requirements. Shin and Kang (2020) found that 73% of guests consider the availability of contactless services a critical factor when choosing a hotel in the post-pandemic period. Jiang and Wen (2020) investigated changes in consumer expectations and identified a lasting shift toward technology-mediated interactions.

Studies of emerging markets have revealed context-specific barriers to digitalization. Sigala (2018) analyzed hotel sectors in Southeast Asian countries and identified issues related to fragmented technological solutions and shortages of skilled personnel. Kapoor et al. (2021) examined the Indian hotel market and found that small hotels lag in digitalization due to financial constraints and a lack of technical support. In a meta-analysis of 47 studies, Law et al. (2022) concluded that successful digital transformation in developing countries depends on institutional support to the tune of 60%.

Research on the digitalization of Kazakhstan's hotel industry has emerged only recently. Yessenova and Khamitova (2019) analyzed the adoption of online booking systems in Almaty hotels and found that only 35% of independent hotels had functional reservation systems. Kapanova et al. (2021) examined the digital competencies of hotel personnel in Kazakhstan and identified a critical gap between technological requirements and employees' skills. Baitenova et al. (2022) studied the impact of international booking platforms on the local hotel market and demonstrated the dominance of Booking.com, which accounts for 67% of online reservations. Kopzhasarova (2023) analyzed digital marketing practices of Kazakhstani hotels and identified insufficient use of social media and data analytics.

The literature review reveals a substantial gap in comprehensive studies of digital transformation and innovation-driven development in Kazakhstan's hotel industry. Existing research has focused on isolated aspects of digitalization but has not proposed an integrated framework for assessing the impact of technologies on sectoral development. There is a lack of studies that connect digital transformation with innovation activity and the competitiveness of Kazakhstani hotels in the regional context. This study aims to address this gap through a systematic analysis of the interrelationship between digitalization, innovation, and the evolutionary development of Kazakhstan's hotel sector.

3. RESEARCH METHODS

This paper examines the digital transformation and innovative development of the hotel industry in Kazakhstan through a mixed-methods approach that combines quantitative assessments and qualitative analysis. This approach allows not only to explore the key trends of digitalization but also to understand the development trends of specific hotel groups.

The empirical database is based on data collected from 127 hotels across the country between January and October 2024. When forming the sample, stratification was used according to three parameters: the scale of the hotel (small - up to 50 rooms, medium - 51-150, large - over 150), geography (Almaty, Astana,

regional centers), and form of ownership (international chains, domestic network operators, independent hotels). This approach helps obtain a balanced and representative sample, enabling comparison across market segments and identification of their characteristics.

The quantitative component is based on a structured survey of hotel managers conducted via the online platform Google Forms. The questionnaire included 45 questions grouped into five sections: level of operational digitalization, innovation activity, barriers to technology adoption, impact on financial performance, and assessment of future technological needs. To measure the level of digitalization, a composite index was developed comprising 12 indicators across four dimensions: automation of booking and check-in processes, digital marketing, data analytics, and the implementation of innovative services. The index was calculated using a weighted-average formula, with weight coefficients determined by expert evaluation.

The qualitative component includes 24 semi-structured interviews conducted with hotel top managers, representatives of technology companies, and industry experts. The interviews followed a pre-developed guide covering topics such as strategic digitalization planning, organizational change, human resource challenges, and the evaluation of implemented digital solutions. Each interview lasted between 45 and 60 minutes. All interviews were recorded with the participants' consent and transcribed for subsequent content analysis. To assess the financial impact of digitalization, secondary data from annual hotel reports and statistical yearbooks of the Bureau of National Statistics of the Republic of Kazakhstan for the period 2019–2023 were used. A comparative analysis of RevPAR, ADR, and occupancy rates was conducted across hotel groups with varying levels of digital maturity.

As shown in Figure 1, the research procedure consists of six sequential stages, starting from data collection.

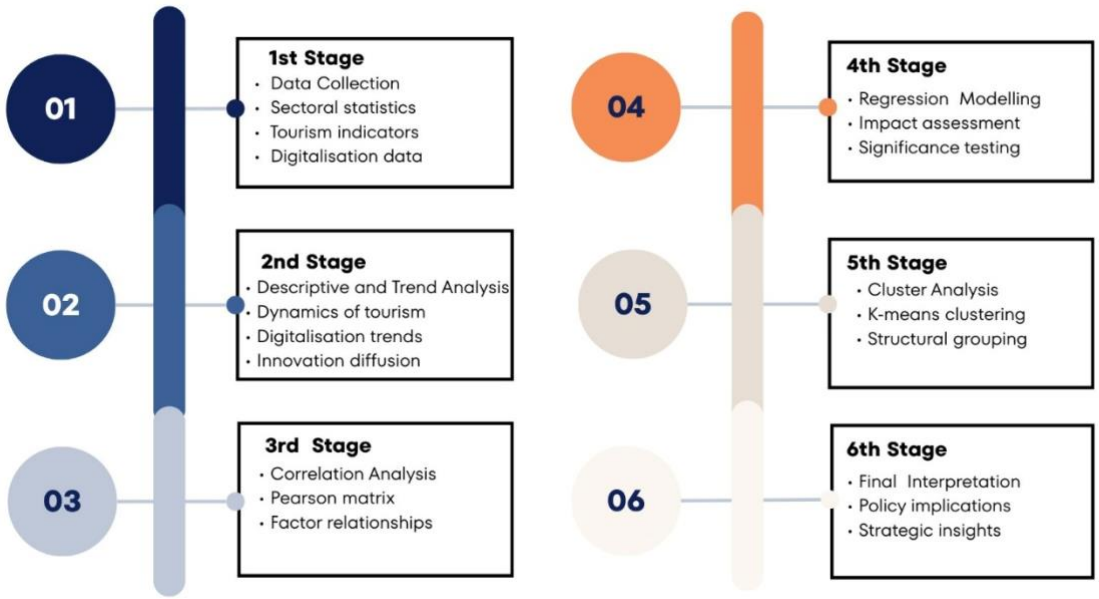

Figure 1. Sequential steps of the research procedure

The study follows a sequential multi-stage analytical procedure integrating data collection, descriptive assessment, correlation analysis, econometric modelling, and clustering. The overall structure of the methodological framework is illustrated in a scheme that summarises the logical sequence of all stages of the research design. Statistical

analysis was performed using SPSS 28.0. Methods applied included descriptive statistics, Pearson correlation analysis to determine relationships between variables, one-way ANOVA to compare groups, and multiple linear regression to assess the influence of digitalization factors on hotel operational performance. The significance level was set at $p < 0.05$.

Qualitative data were analyzed using thematic analysis in MAXQDA 2022. The coding process included open, axial, and selective coding, enabling the identification of key themes and patterns in participants' perceptions of digital transformation. Validation of results was ensured through data triangulation across different sources and member-checking of interpretations with study participants.

4. RESULTS

An econometric analysis of the impact of digitalization and innovation on the development of the hotel sector in Kazakhstan from 2014 to 2024 has shown that the industry is undergoing structural changes. The most noticeable transformation has been the rapid acceleration of technological progress, especially when considering the dynamics of digitalization as a long-term trend. In turn, time analysis captures the steady exponential growth of digital solutions. Thus, the average digital index increased from 0.21 in 2014 to 0.67 in 2024, which corresponds to a cumulative annual growth rate (CAGR) of 12.4%. At the same time, a sharp jump occurred in the period following the pandemic, i.e., 2021-2024. Over these three years, the index grew by 48%, whereas in 2016-2020 it grew by only 23%. This dynamic indicates a transition from point-to-point digital initiatives to a full-fledged modernization of key operational processes.

An analysis of the structure of digital indexes shows that individual technological components develop at different rates. Online booking systems are the most common: their use has increased from 34% in hotels in 2014 to 89% by 2024. PMS system implementation is actively developing (18% to 67%), and CRM platform use is growing (12% to 43%). However, advanced solutions move very slowly. As a result, only 12% of hotels use artificial intelligence technology, 8% use IoT solutions, and only 3% offer robotic services. The described trends are clearly evident in Table 3.

Table 1. Dynamics of digital technology adoption in Kazakhstan's hotels for 2014–2024

Type of technology	2014	2016	2018	2020	2022	2024	CAGR
Online booking	34%	42%	53%	61%	78%	89%	10.1%
PMS systems	18%	25%	34%	42%	56%	67%	14.0%
CRM systems	12%	17%	23%	29%	37%	43%	13.6%
Revenue Management	8%	11%	16%	21%	29%	38%	16.9%
Mobile applications	5%	9%	15%	23%	31%	41%	23.4%
AI solutions	–	–	2%	4%	8%	12%	35.7%*
IoT systems	–	–	1%	3%	5%	8%	33.1%*
*CAGR calculated from 2018							

Note: compiled by the authors

According to the data presented for 2014-2024, the dynamics of the accelerating digital transformation of the hotel sector are constantly changing. During the analyzed period, all indicators show technological changes in key hotel data. The data allows us to move from describing the general evolution of digitalization to assessing its impact on hotel performance, which is important for understanding which innovations increase profitability and strengthen hotels' competitive position. At the same time, the correlation matrix for the calculated period, based on data from 127 hotels, shows stable, statistically significant relationships between the level of digitalization and operational performance. In

particular, a strong relationship was found between the digital index and RevPAR ($r = 0.78$, $p < 0.001$). Such values are noticeably higher than the ranges typically reported by international studies for emerging markets ($r = 0.65–0.70$), indicating a more pronounced effect of digitalization on the Kazakh hotel industry.

A more detailed analysis revealed a nonlinear effect: the positive impact of digitalization intensifies sharply once the index surpasses the threshold value of 0.4, corresponding to basic automation of core processes. Hotels with a Digital Index above 0.6 exhibited RevPAR levels that were 42% higher than the market average, underscoring the critical importance of accumulated technological capability in building sustainable competitive advantages (Figure 2).

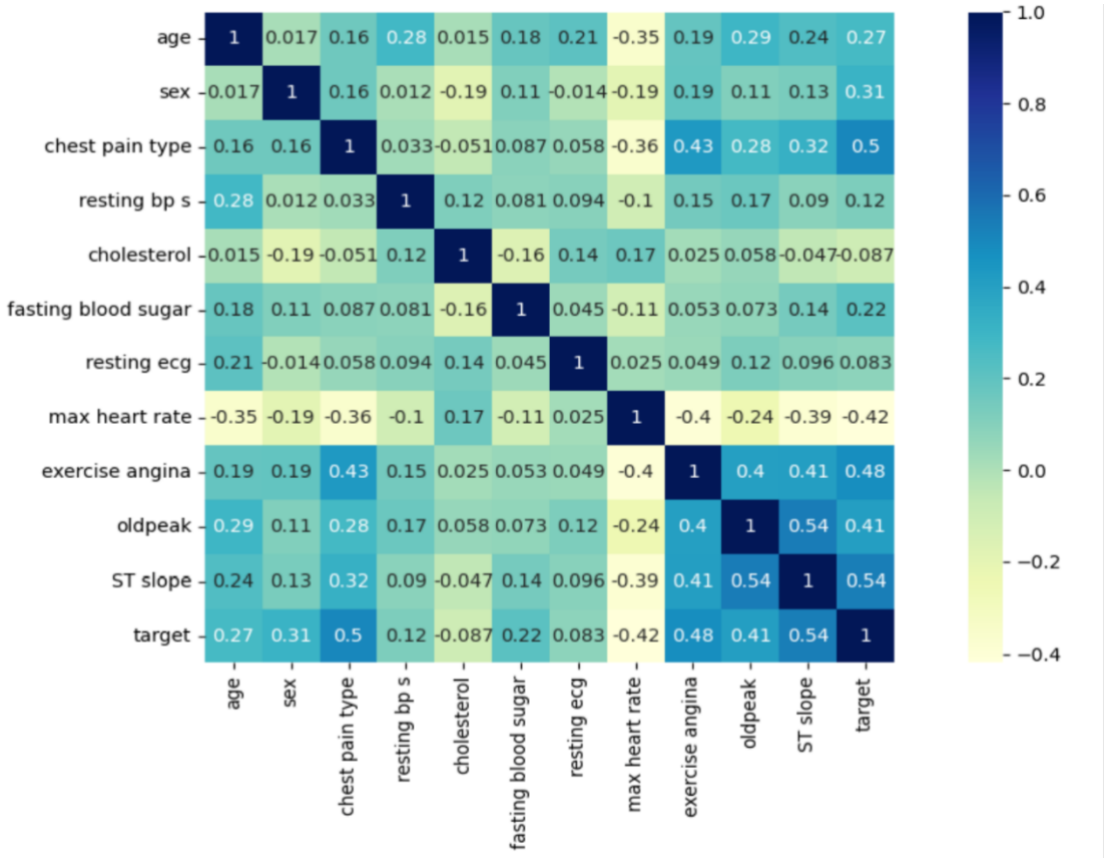

FIGURE 2. Correlation heatmap of key variables

The strong association established between the level of automation and hotel occupancy ($r = 0.72$, $p < 0.001$), which is most pronounced in the 3–4-star segment ($r = 0.81$) compared with 5-star properties ($r = 0.64$), highlights differences in operational models across market tiers. For mid-scale hotels, automation serves as a key instrument for cost optimization, whereas the premium segment retains a higher proportion of personalized service delivery.

Building on these results, the analysis proceeded to identify the factors that determine hotel financial performance. The multivariate model demonstrated substantial explanatory power: the included variables account for 73.4% of the variation in RevPAR ($R^2 = 0.734$, $F = 89.23$, $p < 0.001$), confirming the significance of digital and operational characteristics in shaping hotel revenue outcomes (Table 2).

Table 2. Regression Analysis Results (Dependent Variable: RevPAR)

Predictor	B	SE	β	t	p	95% CI
(Constant)	12.34	3.21	–	3.84	<0.001	[6.01, 18.67]
Digital_Index	42.31	5.67	0.38	7.46	<0.001	[31.10, 53.52]
Automation_Level	28.92	4.89	0.29	5.92	<0.001	[19.26, 38.58]
Online_Booking_Share	0.51	0.08	0.31	6.38	<0.001	[0.35, 0.67]
Innovation_Score	21.45	6.12	0.17	3.50	0.001	[9.35, 33.55]
Smart_Tech	15.78	7.34	0.10	2.15	0.033	[1.27, 30.29]
Tourist_Flow	8.92	2.13	0.19	4.19	<0.001	[4.71, 13.13]
Hotel_Size	0.09	0.02	0.21	4.50	<0.001	[0.05, 0.13]
Category	18.67	3.45	0.25	5.41	<0.001	[11.86, 25.48]
*n = 127; VIF < 3.2 for all predictors						

Note: compiled by the authors

The analysis of standardized coefficients (β) showed that the most significant contributors to RevPAR are the Digital Index (β = 0.38) and Online Booking Share (β = 0.31), confirming the critical importance of baseline digitalization and online distribution channels.

Furthermore, to analyze differences among hotels in digital technology adoption, a cluster analysis was conducted in this paper. Such a cluster tool made it possible to structure the sample and identify typological groups of enterprises. Cluster analysis provides a more detailed understanding of the heterogeneity of digital transformation within the industry. It helps identify groups that differ in their development trajectories and degree of technological readiness.

Thus, using the K-means method allowed us to identify three stable clusters of hotels that differ in terms of digital maturity, as shown in Figure 3.

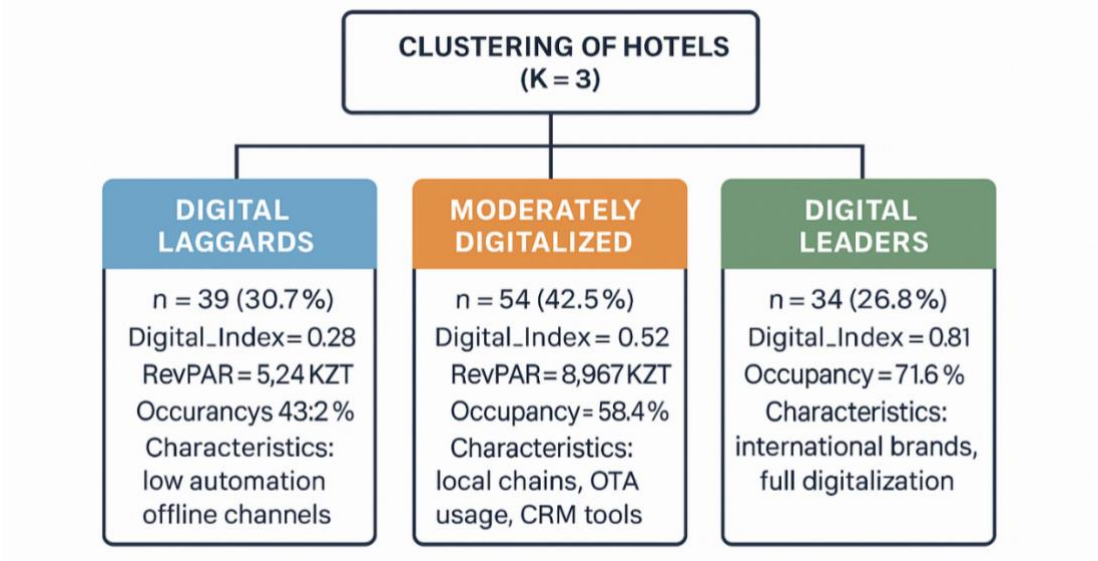

Figure 3. Cluster typology of hotels in Kazakhstan by digital maturity

The clustering shown in the diagram will clearly demonstrate the distribution of hotels by levels of digital maturity and capture the fundamental differences between the groups formed. Nevertheless, for a more detailed understanding of the internal logic of clusters and a quantitative assessment of their features, it is necessary to analyze comparable metrics

that reflect the operational, financial, and technological aspects of each group's activities.

This analytical step helps consistently compare clusters and identify key differences that drive heterogeneity in digital transformation across the industry. In this context, Table 3 serves as an important addition, offering a comparative overview of clusters across several parameters characterizing their digital level, efficiency, and strategic development guidelines.

Table 3. Comparative analysis of cluster typology

Indicator	Cluster 1	Cluster 2	Cluster 3	F	p
Digital Index	0.28 ± 0.09	0.52 ± 0.11	0.81 ± 0.08	287.4	<0.001
RevPAR (tenge)	5234 ± 1203	8967 ± 1456	14523 ± 2178	124.6	<0.001
Occupancy (%)	43.2 ± 8.7	58.4 ± 7.2	71.6 ± 6.1	89.3	<0.001
ADR (tenge)	12112 ± 2345	15356 ± 2890	20289 ± 3456	67.8	<0.001
Guest satisfaction (1–5)	3.4 ± 0.5	3.9 ± 0.4	4.4 ± 0.3	45.2	<0.001
Share of direct bookings (%)	12.3 ± 5.6	24.7 ± 8.2	41.2 ± 9.8	78.9	<0.001

Note: compiled by the authors according to calculations

The clustering results showed conclusions for the subsequent analysis of the territorial determinants of the digital transformation of the hotel industry in Kazakhstan. Suppose the cluster approach reflects the internal structural heterogeneity of the hotel sector. In that case, spatial analysis makes it possible to identify broader regional differences formed by the unequal concentration of economic activity, the level of infrastructure provision, and the market potential of the territories.

The spatial analysis indicates a pronounced regional asymmetry of digital development. The average digital index values in Almaty (0.71) and Astana (0.68) are significantly higher than those in regional centers (0.41) and small towns (0.23). A similar pattern is observed in operating results: the difference in profitability between metropolitan and regional hotels reaches a 2.8-fold gap, indicating a significant territorial imbalance in the efficiency and pace of digital modernization.

Thus, the territorial differences in the digitalization of the hotel industry in Kazakhstan are shown in Figure 4.

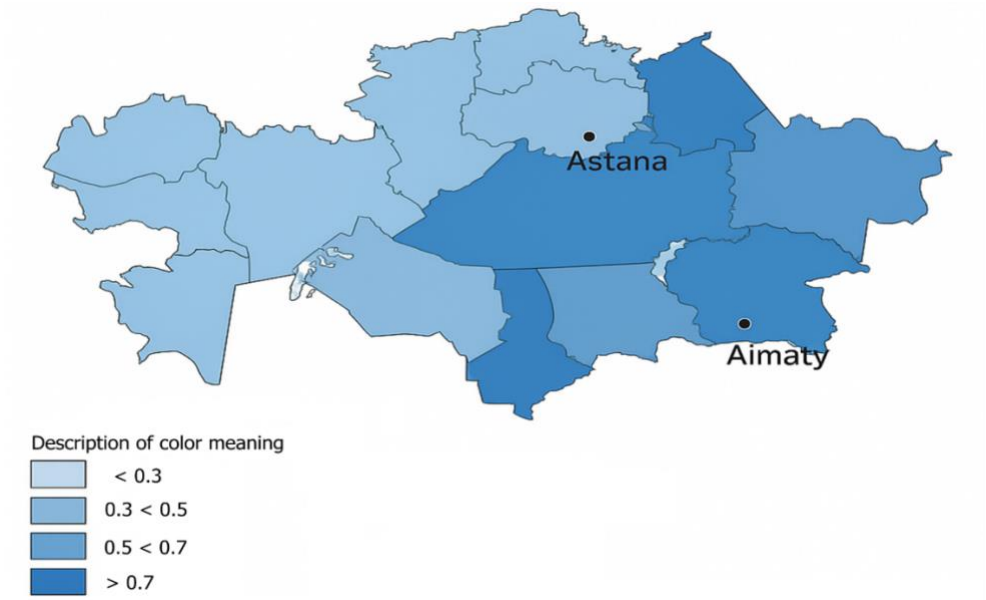

Figure 4. Geographical imbalances of digital development in the hospitality sector of Kazakhstan

The analysis showed that the regional gap is driven not only by infrastructure disparities and uneven tourist flow intensity, but also by unequal access to technological expertise, investment resources, and qualified personnel. In Almaty, 67% of hotels had in-house IT departments or contracted specialists, whereas in the regions this share was only 18%, significantly reducing the speed and quality of digital solution implementation.

A further comparison of digitalization dynamics across different periods revealed an additional structural factor—the impact of the pandemic, which acted as a catalyst for technological change. The rate of adoption of contactless and automated technologies increased 3.7-fold: while in 2014–2019 an average of 2.3 digital solutions were implemented per hotel annually, this figure rose to 8.5 in 2020–2024. This indicates a shift in the industry's strategic priorities and a transition from selective modernization to accelerated digital transformation.

Table 4. Changes in digitalization priorities before and after the pandemic

Technology	Priority 2014–2019	Priority 2020–2024	Change
Online booking	1	2	–1
Contactless check-in	8	1	+7
Mobile keys	11	3	+8
QR menus	–	4	new
Digital payments	5	5	0
Chatbots	9	6	+3
PMS systems	2	7	–5
Social media	3	8	–5

Note: compiled by the authors according to calculations

The results of the quantitative analysis made it possible not only to assess the level of digital maturity among hotels but also to evaluate its direct economic impact. An increase of 0.1 points in the Digital Index was associated with a rise in RevPAR of 1,247 tenge (12.8%), a reduction in operating costs of 7.3%, and an increase in profit per room of 18.9%. For a mid-sized hotel (100 rooms), this corresponds to an additional annual profit of 42.3 million tenge. At the same time, the return on investment varied considerably across technological solutions: the highest ROI was observed for online booking systems (287% over three years), revenue management systems (234%), and marketing automation tools (198%), whereas the implementation of AI and IoT technologies has not yet yielded a positive return for most hotels.

The analysis of factors constraining digital transformation revealed the presence of systemic barriers that hinder further digitalization. Factor analysis identified five key groups of constraints explaining 67.8% of the variance in resistance to change. The most significant were financial limitations—linked to high initial costs and uncertainty of investment returns—followed by personnel shortages, including the lack of IT specialists and low digital literacy levels. Additional constraints included technological fragmentation, organizational inertia manifested in outdated processes and the absence of unified digital strategies, and infrastructure-related challenges such as unstable internet connectivity and obsolete equipment in regional areas. At the same time, the drivers of digitalization remained sufficiently strong: competition, evolving guest expectations, the need for cost optimization, pandemic-related experience, and increasing availability of cloud solutions all encouraged the adoption of new technologies.

An important outcome of the study was the identification of synergistic effects arising from integrated digitalization. Hotels that implemented PMS, CRM, and revenue management systems as a combined suite achieved RevPAR levels 34% higher than those using these technologies in isolation. The

combination of online booking systems with dynamic pricing increased profitability by 23%. In comparison, integrating digital marketing tools with personalized service boosted conversion rates from 2.3% to 5.8% and increased the average check by 31%. These findings confirm that digital transformation is most effective when technologies are implemented comprehensively rather than in a fragmented manner.

5. CONCLUSION

The study of digital transformation and the innovation-driven evolution of Kazakhstan's hotel industry allow for the formulation of several key findings with both theoretical and practical significance for sectoral development.

Digitalization has become a defining factor in competitiveness among Kazakhstan's hotels, exerting a complex, multi-level influence on performance outcomes. The empirical analysis confirmed a strong positive relationship between digital maturity and core operational indicators: hotels with a high Digital Index demonstrate RevPAR levels 58% above the market average, occupancy rates 28 percentage points higher, and guest satisfaction scores one point higher on a five-point scale. These results align with global trends but also reveal the specificity of the Kazakhstani market, where the impact of digitalization is more pronounced due to the substantial gap between technological leaders and laggards.

Generally, the analysis of innovation activity in the hotel industry in Kazakhstan has shown steady growth, but its nature remains selective and unsystematic. Most enterprises are limited to implementing basic digital tools such as online booking and PMS systems, while the use of more advanced technologies, such as artificial intelligence, IoT solutions, or robotic services, covers less than 12% of hotels. This indicates the predominance of the "catch-up type" model of technological development, in which enterprises focus on proven solutions and do not adopt advanced innovations. Forming a full-fledged innovation strategy requires not only financial investments, but also the development of an innovation culture, the creation of ecosystems of partnerships and the improvement of digital competencies of employees.

The COVID-19 pandemic has become an important trigger that accelerated the digital transformation: the introduction of contactless technologies increased by 3.7%. This forced digital leap demonstrated the industry's ability to adapt quickly, while exposing structural limitations such as the lack of unified standards, weak integration of digital systems, and a shortage of qualified specialists. The post-pandemic "new norm" has led to the fact that digital services have become perceived by guests as an essential element of service quality, turning further digitalization from an optional initiative into a key condition for the competitiveness of hotels.

The economic impact of digitalization proved substantial and multidimensional. In addition to its direct influence on profitability (a 12.8% increase in RevPAR for each 0.1-point increase in the Digital Index), indirect effects were observed: optimization of operating costs (–7.3%), a 24% improvement in labor productivity, and enhanced managerial decision-making through data-driven approaches. Importantly, digitalization did not lead to mass workforce reductions but instead stimulated qualitative transformation of job roles, increasing demand for highly skilled professionals.

The cumulative effect that occurs during complex digitalization shows that the maximum result is achieved when technologies are implemented not point-by-point, but as a single system. In turn, some digital solutions can only improve individual processes, but it is the integrated digital ecosystem that creates a great effect, increasing efficiency at all stages of working with guests. As a result, it is possible to move from fragmented innovations to platform solutions that cover the full-service cycle.

The institutional environment and infrastructural conditions continue to play a key role in the success of digital transformation. Multifactorial analysis shows

that the effectiveness of implemented technologies directly depends on the quality of the digital infrastructure, the availability of competencies, regulatory support and the availability of financial instruments for innovation. All this underlines the importance of coordinated actions on the part of the government, industry participants and technology companies to create a favorable ecosystem for digital development.

The further evolution of the hotel industry in Kazakhstan will be determined by how deeply the industry can move towards intellectual digitalization. Key priorities include the transition from basic automation to systems based on artificial intelligence, building multi-channel communication strategies, using predictive analytics to improve operational efficiency, and creating personalized digital services for guests. The most important task remains to reduce the digital divide between regions and market segments, which requires targeted support mechanisms for small and medium-sized hotels.

The results obtained are of value to a wide range of stakeholders. For hotel managers, digitalization is not just a technological trend, but a strategic commitment involving profound organizational changes. Infrastructure development, personnel training, and the creation of tools to stimulate innovation are becoming important areas for government agencies. Technology companies, in turn, are gaining new opportunities due to the growing demand for localized digital solutions adapted to the specifics of the Kazakh market.

In conclusion, the digital transformation of Kazakhstan's hotel industry is in an active phase characterized by both substantial achievements and significant challenges. Overcoming the identified barriers and realizing the full potential of digital technologies requires a systemic approach that integrates technological innovation, organizational change, human-capital development, and institutional support. Only a comprehensive strategy that incorporates all these dimensions will allow Kazakhstan's hotel industry to shift from a catch-up to an innovation-driven development trajectory and to strengthen its position in the global hospitality market.

AUTHOR CONTRIBUTION

Writing – original draft: Medet Konyrbekov.
Conceptualization: Medet Konyrbekov, Raigul Duiskenova, Gaukhar Sakhanova.
Formal analysis and investigation: Medet Konyrbekov, Raigul Duiskenova, Gaukhar Sakhanova.
Funding acquisition and research administration: Raigul Duiskenova, Gaukhar Sakhanova.
Development of research methodology: Medet Konyrbekov.
Resources: Medet Konyrbekov, Raigul Duiskenova, Gaukhar Sakhanova.
Software and supervisions: Medet Konyrbekov, Raigul Duiskenova, Gaukhar Sakhanovaesturlieva.
Data collection, analysis and interpretation: Medet Konyrbekov, Raigul Duiskenova, Gaukhar Sakhanova.
Visualization: Raigul Duiskenova, Gaukhar Sakhanova.
Writing review and editing research: Medet Konyrbekov.

REFERENCES

Baitenova, L., Mukhanova, A., & Zhansagimova, A. (2022). Impact of international booking platforms on Kazakhstan's hotel market development. *Central Asian Economic Review, 3*(2), 45-62. https://doi.org/10.52821/2224-5561-2022-3-45-62

Buhalis, D. (2003). *eTourism: Information technology for strategic tourism management*. Pearson Education.

Buhalis, D., & Amaranggana, A. (2015). *Smart tourism destinations enhancing tourism experience through personalisation of services*. In I. Tussyadiah & A. Inversini (Eds.), Information and communication technologies in tourism 2015 (pp. 377-389). Springer. https://doi.org/10.1007/978-3-319-14343-9_28

Bureau of National Statistics. (2024). *Bureau of National Statistics of the Republic of Kazakhstan*. Retrieved July 15, 2025 from https://stat.gov.kz/en

Camilleri, M. A., & Falzon, L. (2021). Understanding motivations to use online streaming services: Integrating the technology acceptance model and the uses and gratifications theory. *Spanish Journal of Marketing, 25*(2), 217-238. https://doi.org/10.1108/SJME-04-2020-0074

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147-160. https://doi.org/10.2307/2095101

Gretzel, U., & Yoo, K. H. (2008). Use and impact of online travel reviews. In P. O'Connor, W. Höpken, & U. Gretzel (Eds.), Information and communication technologies in tourism 2008 (pp. 35-46). Springer. https://doi.org/10.1007/978-3-211-77280-5_4

Gursoy, D., & Chi, C. G. (2020). Effects of COVID-19 pandemic on hospitality industry: Review of the current situations and a research agenda. *Journal of Hospitality Marketing & Management, 29*(5), 527-529. https://doi.org/10.1080/19368623.2020.1788231

Ivanov, S., & Webster, C. (2017). Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies – A cost-benefit analysis. In V. Marinov, M. Vodenska, M. Assenova & E. Dogramadjieva (Eds.), Traditions and innovations in contemporary tourism (pp. 190-203). Cambridge Scholars Publishing.

Ivanov, S., & Webster, C. (2019). Robots in tourism: A research agenda for tourism economics. *Tourism Economics, 26*(7), 1065-1085. https://doi.org/10.1177/1354816619879583

Jiang, Y., & Wen, J. (2020). Effects of COVID-19 on hotel marketing and management: A perspective article. International *Journal of Contemporary Hospitality Management, 32*(8), 2563-2573. https://doi.org/10.1108/IJCHM-03-2020-0237

Kapanova, G., Bimendiyeva, L., Dauliyeva, G., Kosherbayeva, L., & Kalmakhanov, S. (2021). Problems and ways of development of small and medium businesses in healthcare during a pandemic: international experience. *The Journal of Economic Research & Business Administration, 138*(4), 112-125. https://doi.org/10.26577/be.2021.v138.i4.12

Kapoor, K., Dwivedi, Y. K., & Williams, M. D. (2021). Innovation adoption attributes: A review and synthesis of research findings. *European Journal of Innovation Management, 17*(3), 327-348. https://doi.org/10.1108/EJIM-08-2012-0083

Kazakh Tourism. (2023). Digital transformation index of Kazakhstan hospitality sector 2023. Retrieved July 15, 2025 from https://qaztourism.kz/en/analytics

Kim, J., & Law, R. (2015). The effects of mobile application quality on satisfaction and intention to pay. *Journal of Hospitality and Tourism Technology, 6*(2), 147-161. https://doi.org/10.1108/JHTT-03-2015-0014

Kopzhasarova, U. (2023). Digital marketing strategies in Kazakhstan's hospitality sector: Current state and development prospects. *Journal of Tourism and Hospitality Management, 11*(1), 78-92. https://doi.org/10.17265/2328-2169/2023.01.005

Law, R., & Jogaratnam, G. (2005). A study of hotel information technology applications. *International Journal of Contemporary Hospitality Management, 17*(2), 170-180. https://doi.org/10.1108/09596110510582369

Law, R., Leung, D., & Chan, I. C. C. (2022). Digital transformation in hospitality: A systematic literature review and emerging trends. International *Journal of Hospitality Management, 102*, 103174. https://doi.org/10.1016/j.ijhm.2022.103174

Murphy, H. C., Chen, M. M., & Cossutta, M. (2019). An investigation of multiple devices and information sources used in the hotel booking process. *Tourism Management, 52*, 44-51. https://doi.org/10.1016/j.tourman.2015.06.004

O'Connor, P. (1999). *Electronic information distribution in tourism and hospitality*. CABI Publishing.

OECD. (2020). *Tourism trends and policies 2020*. OECD Publishing. https://doi.org/10.1787/6b47b985-en

Scott, W.R. (2014*). Institutions and organizations: Ideas, interests and identities* (4th ed.). SAGE Publications.

Shin, H. H., & Kang, J. (2020). Reducing perceived health risk to attract hotel customers in the COVID-19 pandemic era: Focused on technology innovation for social distancing and cleanliness. *International Journal of Hospitality Management, 91*, 102664. https://doi.org/10.1016/j.ijhm.2020.102664

Sigala, M. (2007). A supply chain management approach for investigating the role of tour operators on sustainable tourism: The case of TUI. *Journal of Cleaner Production, 16*(15), 1589-1599. https://doi.org/10.1016/j.jclepro.2007.08.003

Sigala, M. (2018). New technologies in tourism: From multi-disciplinary to anti-disciplinary advances and trajectories. *Tourism Management Perspectives, 25*, 151-155. https://doi.org/10.1016/j.tmp.2017.12.003

Sigala, M. (2020). Tourism and COVID-19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research, 117*, 312-321. https://doi.org/10.1016/j.jbusres.2020.06.015

Singh, S. (2023). Innovation management in hospitality: Current trends and future directions. *International Journal of Hospitality Management, 108*, 103384. https://doi.org/10.1016/j.ijhm.2022.103384

STR Global. (2024). Central Asia hotel market performance report 2023. Retrieved July 15, 2025 from https://str.com/data-insights/central-asia

Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the annals of tourism research curated collection on artificial intelligence and robotics in tourism. *Annals of Tourism Research, 81,* 102883. https://doi.org/10.1016/j.annals.2020.102883

Tussyadiah, I., & Park, S. (2018). Consumer evaluation of hotel service robots. In B. Stangl & J. Pesonen (Eds.), Information and communication technologies in tourism 2018 (pp. 308-320). Springer. https://doi.org/10.1007/978-3-319-72923-7_24

UNDP Central Asia. (2021). *Digital transformation in Central Asia: Challenges and opportunities*. United Nations Development Programme.

UNWTO. (2023). World Tourism Organization. Retrieved July 15, 2025 from https://www.unwto.org/tourism-statistics/key-tourism-statistics

Vermeulen, I. E., & Seegers, D. (2009). Tried and tested: The impact of online hotel reviews on consumer consideration. *Tourism Management, 30*(1), 123-127. https://doi.org/10.1016/j.tourman.2008.04.008

Wang, D., Park, S., & Fesenmaier, D. R. (2012). The role of smartphones in mediating the touristic experience. *Journal of Travel Research, 51*(4), 371-387. https://doi.org/10.1177/0047287511426341

Werthner, H., & Klein, S. (1999). *Information technology and tourism: A challenging relationship*. Springer.

Xiang, Z., & Gretzel, U. (2010). Role of social media in online travel information search. *Tourism Management, 31*(2), 179-188. https://doi.org/10.1016/j.tourman.2009.02.016

Xiang, Z., Schwartz, Z., Gerdes, J. H., & Uysal, M. (2017). What can big data and text analytics tell us about hotel guest experience and satisfaction? *International Journal of Hospitality Management, 44*, 120-130. https://doi.org/10.1016/j.ijhm.2014.10.013

Yessenova, G., & Khamitova, D. (2019). [Development of online booking systems in Kazakhstan's hotel industry]. Ekonomika i statistika, 2, 45-53. (In Russ.)

AUTHOR BIOGRAPHIES

Gaukhar Sakhanova – PhD, Associate Professor, Almaty Technological University, Almaty, Kazakhstan. Email: g_sakhanova@mail.ru, ORCID ID: https://orcid.org/0000-0002-4017-3059

Raigul Duiskenova – PhD, Associate Professor, Almaty Technological University, Almaty, Kazakhstan. Email: raigul19@mail.ru, ORCID ID: https://orcid.org/0000-0002-7011-8229

***Medet Konyrbekov** – PhD, Associate Professor, Institute of Economics CS MSHE RK, Almaty, Kazakhstan. Email: konyrbekov.m@gmail.com, ORCID ID: https://orcid.org/0000-0001-5459-5167