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OPTIMISATION OF RESTAURANT OPERATIONS THROUGH THE USE OF AI TECHNOLOGY: A CASE STUDY OF THE GASTROPOINT RESTAURANT

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Abstract: *This paper analyses the potential for improving restaurant operations through the implementation of AI technology based on a case study of the restaurant Gastro Point. The purpose of this paper is to analyse the operations before and after the implementation of Artificial Intelligence (AI). Therefore, the aim is to prove that the application of AI enables business improvement through automation, data analysis, trend prediction, and enhancement of the customer experience. Both qualitative and quantitative methods were used to analyse key parameters. The data were collected by semi-structured interviews with the restaurant staff and a few restaurant guests. The research results show that the introduction of AI in the restaurant contributed to an increase in the average daily number of guests, the average order value, the number of regular customers, and the average rating on Google/Trip Advisor. The results also indicate that the implementation of AI contributed to a reduction in food waste, waiting time for orders, and the number of monthly customer complaints.*

Keywords: *artificial Intelligence (AI), hospitality industry automation, optimisation of restaurant operations*

JEL classification: *M00, Z3*

INTRODUCTION

In modern hospitality, the introduction of digital technologies has become a key component of successful business operations. Among them, AI stands out as one of the most powerful tools for enhancing customer experience, optimising business processes, and strengthening a restaurant's competitiveness (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). Restaurants that have implemented AI technologies have seen significant progress in various aspects of their operations - from personalised service and faster response to customer needs, to more efficient inventory management and better staff organisation. By using AI systems to analyse consumer behaviour and monitor guest preferences, it is possible to create a unique, tailored experience for each visitor (Deloitte, 2005). The results speak for themselves: an increase in the number of regular customers,

higher customer satisfaction, and a greater likelihood of guests recommending the restaurant to others. Automated recommendation systems, chatbots for quick reservations, digital menus that adapt in real time, and intelligent analysis of customer feedback - these are all concrete ways AI contributes to better service and increased revenue. Implementing AI technology not only improves operational efficiency but also transforms the way a restaurant communicates with its guests, turning everyday visits into personalised and memorable experiences. At a time when competition in the hospitality industry is constantly increasing, restaurants are seeking innovative ways to improve service quality, optimise business processes, and build stronger relationships with guests. One of the most advanced approaches that is increasingly being adopted is the integration of AI into daily operations. In the specific case of the restaurant Gastro Point, there are hypotheses that the implementation of AI technology will bring as follows:

H_1 –faster and more accurate orders
H_2 – more efficient inventory and staff management
H_3 – a higher number of returning customer
H_4 – reduced wait time, and
H_5 – overall improvement in customer satisfaction.

LITERATURE OVERVIEW

Artificial Intelligence in Business

Technological innovations are a key driver of economic growth and competitive advantage, enabling organisations to respond more effectively to market changes and customer needs (Porter & Heppelmann, 2014). As a rapidly growing field in modern technology, AI is widely applied across various industries, including hospitality. According to (Brynjolfsson & McAfee, 2014), AI has launched a new industrial revolution that enables companies to automate and optimise many operations. The integration of AI allows for a shift from simple automation of routine tasks to more complex adaptive and cognitive automation of business processes (Dalsaniya & Patel, 2022). Hence, AI enables businesses to improve efficiency, accuracy in data analysis, forecasting, logistics, customer relationship management (CRM), and project management (Investopedia, 2023). AI in business process management represents a new class of information systems that enable more adaptive, proactive, and explainable business processes (Dumas, et al., 2022). In predictive business process management, AI enhances processes through predictive approaches (Abassi, et al., 2024). Also, according to some leading authors in this field, firms are using AI primarily to improve efficiency through automation, enhance decision-making, and provide better customer experiences (Davenport & Ronanki, 2018). The adoption of AI in business is influenced by technological readiness, organisational support, and perceived benefits (Chatterje, Rana, Dwivedi, & Baabdullah, 2021)

In their research, (Lemon & Verhoef, 2016) argue that AI enables hyper-personalisation, allowing companies to tailor experiences and interactions to individual customer preferences in real-time. Therefore, a successful service automation depends on balancing technical functionality with the user experience, supported by ongoing research and adaptation to customer needs (Wu, Sorokina, & Putra, 2023). This leads to statement that artificial intelligence empowers entrepreneurs to deliver highly personalised experiences by analysing guests' preferences and behaviours, ultimately

increasing customer satisfaction and loyalty (Ivanov & Webster, 2017). Automation through AI doesn't necessarily eliminate jobs, but it changes the nature of work and reallocates human efforts toward more strategic tasks (Bessen, 2019).

Application of AI in Hospitality

The future of AI in the hospitality industry is promising, especially with advancements in technologies such as service robots, automated payment systems, and AI-powered guest solutions. (Mihaila & Toma, 2021) state that it will become increasingly easy for restaurants to implement technology-based competitive strategies. AI technologies, such as service robots and smart assistants, help restaurants reduce operational costs while improving service speed and accuracy (Sorour, 2023). According to (Ivanov & Webster, 2017), technologies such as chatbots and predictive analytics for shift optimisation have already become standard in the industry. AI-powered chatbots and virtual assistants are improving customer service by offering instant 24/7 support and reducing response times (Columbus, 2020). Sentiment analysis and opinion mining powered by AI allow restaurant managers to monitor and improve service quality through real-time feedback interpretation (Meharaliyev, Chang Chu Chang, & Kirilenko, 2021). Machine learning models can predict customer needs and tailor recommendations, helping businesses upsell and cross-sell more effectively (Shah & Kumar, 2024). Some researchers have introduced a new classification of AI in hospitality, distinguishing between mechanical AI, thinking AI, sensing AI, and service AI (Pan & Fu,, 2024). These systems can significantly enhance operational efficiency in restaurants and improve guest satisfaction since AI enables personalised guest experiences by analysing past guest behaviour and preferences, significantly increasing customer satisfaction and loyalty. Besides, AI tools help reduce the load on overburdened teams and address efficiency challenges by taking over mundane, repetitive, and time-consuming tasks (Kumawat, Datta, Prentice, & Leung, 2025). Some authors explored how artificial intelligence impacts work in the hospitality industry. Based on their research, AI brings changes to internal operations, partner relations, organisational networking, and customer services. Their study highlights AI's great potential for personalisation, process optimisation, and customer relationship improvement (Bulchard-Gidumal, Secin, O"Connor, & Buhalis, 2023)

Digital transformation is no longer optional but essential for tourism and hospitality businesses (Gretzel, Koo, & Law, 2020). The integration of new technologies is transforming communication methods in hospitality and reshaping service offerings (Ivanov & Webster, 2017). Besides, technological innovation enables entrepreneurs in hospitality to increase efficiency, improve the customer experience, and become more competitive (Buhalis & Law, 2008). AI technologies allow restaurateurs to deliver real-time personalised services, enhancing guest satisfaction and loyalty. The application of artificial intelligence in hospitality can significantly reduce operational costs and optimise processes (Ivanov & Webster, 2017). AI has the potential to transform the hospitality industry through predictive analytics, chatbots, and robotic process automation (Lu, Cai, & Gursoy, 2019). However, although AI offers numerous benefits, there are serious concerns regarding its ethical use, potential replacement of human staff with AI-powered tools, customer and employee discomfort, and overall trust in AI (Gursoy & Cai, 2024).

Cost-Effectiveness of AI Implementation in the Restaurant Industry

The financial aspects of implementing AI in the hospitality industry - such as return on investment (ROI) and reduction of operational costs - are crucial for long-term success. (Yang & Li, 2018) explore how AI can reduce operating costs in restaurants and increase revenue through better demand forecasting and resource optimisation. According to their research, entrepreneurs who utilise AI to improve procurement processes, inventory management, and consumption prediction report cost reductions of 10 - 15%. Several case studies explore specific applications of AI in restaurants. (Cheng, Xie, & Hu, 2019) provide concrete examples of how demand forecasting AI systems can help optimise inventory and reduce costs. Their study showed that AI implementation in Beijing-based restaurants led to a 28% reduction in food waste and a 12% increase in profitability within the first six months.

(Gretzel, Sigala, Xiang, & Koo, 2020) note that AI enables personalised recommendations, better customer data analysis, and resource optimisation, all of which contribute to cost savings and increased revenue. (Kadagidze & Ugrelidze, 2023) emphasise in their research that "AI has a significant impact on operational efficiency, cost savings, and service quality," highlighting how AI technology contributes to reducing operational expenses and increasing revenue in hospitality businesses. (Bisoi, Roy, & Samal, 2020) state that "smart" restaurateurs are increasingly adopting integrated hospitality management systems that apply predictive analytics for pricing and service promotions, which leads to more efficient revenue management and lower costs. (Karagiannis, 2024) analyses quantitative indicators of ROI in AI, noting that "AI enables revenue growth through personalised services and dynamic pricing, while simultaneously reducing costs through process automation and inventory optimization." (Saydam. & Koseoglu, 2022) indicate that "AI significantly impacts operational efficiency and service improvements in hospitality, leading to higher profitability," underlining the necessity of integrating AI into business strategies.

METHODOLOGY

Sample and Instrument

This study was conducted as single-case research focusing on one full-service restaurant that has integrated AI technologies into its operations. According to some authors, a single case study can be a very powerful example (Sigelcow, 2007). The restaurant, located in an urban area, employs AI tools such as an automated reservation system, a recommendation engine based on customer preferences, and AI-assisted kitchen management.

The sample included 12 participants selected through purposive sampling to ensure coherent and reliable data (Ahmad & Wilkins, 2024). Participants consisted of the restaurant manager, two chefs, three waitstaff, one IT technician responsible for AI system maintenance, and five regular customers who have interacted with the AI tools (Table 1). Their roles provided diverse perspectives on the implementation and impact of AI in daily operations and customer experience.

Table 1. Single-case research sample

Respondents	No.	%
Restaurant manager	1	8.33
Chef	2	16.67
Waitstaff	3	25
IT technician	1	8,33
Customers	5	41.67
Total:	**12**	**100**

Source: Prepared by the author based on research data

Data were collected using semi-structured interviews, supported by observation and document analysis. (Megaldi & Berler, 2020) argue that semi-structured interview enables a researcher to go deep for a discovery. The interview guide was designed to explore themes such as perceived usefulness of AI systems, ease of integration, impact on service quality, impact on kitchen management, changes in workflow, and customer satisfaction. Interviews lasted between 30 and 60 minutes and were audio-recorded with participants' consent. To ensure credibility and trustworthiness, the interview questions were reviewed by two experts in hospitality and information technology. A pilot interview was conducted with a restaurant worker from a different establishment to refine the questions. Triangulation was applied by comparing interview data with observational notes and internal documents (e.g., feedback reports and usage logs), enhancing the validity of the findings.

EMPIRICAL EVIDENCE

Results and Discussion

Gastro Point is a modern restaurant that combines fast service with high-quality food. It was established in 2020 and quickly gained popularity among younger people and business professionals. The owner aimed to improve business operations and decided to implement AI solutions. The goal was to increase efficiency, reduce resource waste, and boost guest loyalty.

The Problems that were initially identified were:

1. Inefficient staff planning during peak hours - unpredictable fluctuations in guest numbers often led to either overworked or underutilised staff.
2. Food waste due to poor demand forecasting - incorrect estimates resulted in surplus perishable items.
3. Low guest retention - lack of personalised experiences and loyalty programs.
4. No digital engagement with guests - limited analytics and weak interaction outside the restaurant.

Therefore, the restaurant management was exploring ways to automate routine tasks, personalise offers, optimise the supply chain, enhance customer service and monitor customer satisfaction. By introducing AI technology, it would become possible to make faster and more accurate business decisions, increase productivity, and reduce costs.

RESULTS AND DISCUSSION

To evaluate the actual effects of AI implementation, key business performance indicators of the restaurant were measured over two periods: (Table 1, Graph 1)

- *Period 1 (Before AI):* January – March 2024
- *Period 2 (After AI):* April – June 2024

Table 2. Results: The key indicators

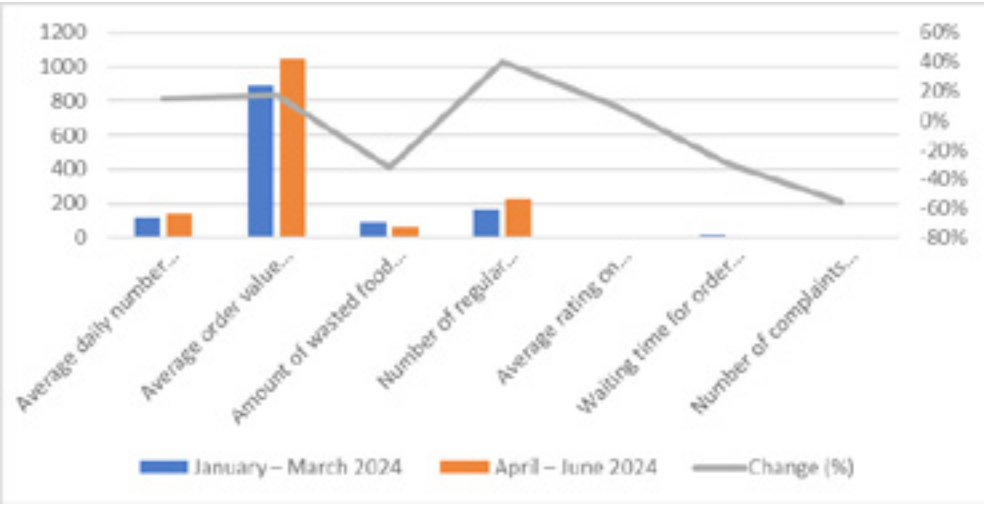
Indicator	January – March 2024	April – June 2024	Change (%)
Average daily number of guests	120	138	+15%
Average order value (RSD)	890	1.045	+17.4%
Amount of wasted food (kg/month)	92	62	-32.6%
Number of regular guests (monthly)	160	224	+40%
Average rating on Google/TripAdvisor	4.2	4.6	+9.5%
Waiting time for order (minutes)	17	12	-29.4%
Number of complaints per month	9	4	-55.5%

Source: Prepared by the author based on research data

Based on the analysis of the main KPIs measured after the introduction of AI technology, the following improvements were observed:

1. *Efficiency:* The use of AI contributed to reduced waiting times and a lower number of complaints, thanks to better organisation of the kitchen and staff; 2. *Resource utilization:* AI helped improve demand forecasting, which significantly reduced food waste; 3. *Revenue:* The application of AI led to an increase in both order value and the number of guests, positively impacting total revenue; 4. *Customer satisfaction:* All improvements driven by AI implementation resulted in higher ratings on online platforms and an increased number of returning guests, which further strengthens overall revenue.

Chart 1: The key indicators



Source: Prepared by the author based on research data

A more detailed analysis of the measured KPIs follows below:

i. Increased staff efficiency

By using AI for guest number prediction and shift optimisation, the number of shifts was reduced by 12.5% while working hours per shift were reduced by 6.25%. This enabled the restaurant owner to organise work hours more efficiently and reduce unnecessary overtime costs (Table 3).

Table 3. Number of shifts per month (before and after AI implementation)

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of shifts (monthly)	240	210	-12.5%
Average working hours (per shift)	8	7.5	-6.25%

Source: Prepared by the author based on research data

Additionally, employees reported improved job satisfaction due to more predictable schedules and a better work-life balance. The reduction in labour-related expenses also allowed the management to reallocate part of the budget to staff training and customer service improvements, further enhancing the overall dining experience.

ii. Reduction of labour costs

The reduction in the number of shifts and improved staff allocation contributed to a 16.9% decrease in labour costs. This was the result of better planning enabled by the AI system, which optimised employee scheduling (Table 4)

Table 4: Labour costs (monthly)

Period	Before AI Implementation	After AI Implementation	Change (%)
Labour cost (RSD)	650,000	540,000	-16.9%

Source: Prepared by the author based on research data

In addition to financial savings, the restaurant also experienced increased operational efficiency, as tasks were more evenly distributed and peak hours were better staffed. This led to shorter wait times for customers and improved service quality. Over time, these improvements positively impacted customer satisfaction and repeat visit rates, contributing to overall business growth.

iii. Guest satisfaction and loyalty

The implementation of a personalised approach (through AI systems for loyalty and recommendations) has increased the number of regular guests by 40% and the frequency of their visits by 32%, indicating a growing level of loyalty and satisfaction (Table 5). The rise in online ratings and the number of returning guests confirms the success of the personalised approach.

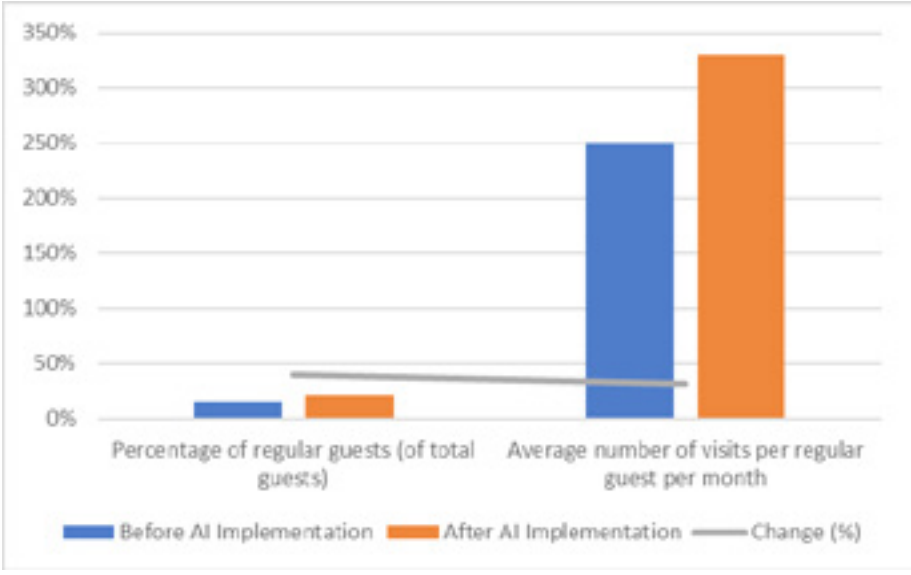
Table 5: Percentage of regular guests and frequency of their visits

Period	Before AI Implementation	After AI Implementation	Change (%)
Percentage of regular guests (of total guests)	15%	21%	+40%
Average number of visits per regular guest per month	2.5	3.3	+32%

Source: Prepared by the author based on research data

Besides, the rise in online ratings and the number of returning guests confirms the success of the personalised approach. Positive reviews frequently mentioned the relevance of personalised offers, faster service, and tailored menu suggestions, all made possible by the AI system's ability to analyse individual preferences and previous orders.

Chart 2: Regular guests and their visits



Source: Prepared by the author based on research data

Furthermore, the AI-driven loyalty program incentivised repeat visits by offering dynamic rewards based on guest behaviour, which further strengthened the emotional connection between customers and the brand. This approach not only improved customer retention but also increased the average spending per visit, as guests were more likely to respond to targeted promotions. Overall, the integration of personalisation through AI tools has proven to be a key factor in building a more engaged and satisfied customer base, contributing directly to long-term revenue growth and competitive differentiation.

iv. Revenue increase

Quantitative data confirm that the application of AI technology at Gastro Point

restaurant has a significant positive impact on business operations. In addition to a clear improvement in customer experience, cost savings and increased revenue strengthens the restaurant's competitive position in the long term. An increase in daily revenue by 16.8% indicates that personalised offers, better shift optimisation, and demand forecasting have led to a higher number of guests and an increased average order value (Table 6).

Table 6: Average Daily Revenue

Period	Before AI	After AI	Change (%)
Average daily revenue (RSD)	107,000	125,000	+16.8%

Source: Prepared by the author based on research data

The use of AI allowed the restaurant to anticipate customer preferences and peak times more accurately, enabling targeted promotions that encouraged upselling and cross-selling. For example, customers who previously ordered vegetarian dishes received personalised recommendations for newly added plant-based meals, which boosted overall sales. Additionally, improved scheduling ensured that staff were more available during busy hours, reducing wait times and increasing table turnover rates without compromising service quality. This combination of enhanced customer experience and operational efficiency created a favourable environment for both first-time and returning guests to spend more during their visits. As a result, the restaurant not only improved its short-term revenue but also laid the groundwork for sustainable growth driven by data-informed decision-making.

v. Increase in Reservations via Digital Channels

By introducing AI into the reservation process - through personalised offers, better promotion, and user recommendations - the number of online reservations increased by 52.4%. Customers were able to more easily access and book their spots via the app, which reduced pressure on phone lines and allowed for easier management of the restaurant's capacity.

Table 7: Number of reservations through apps and online systems

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of Monthly Reservations	210	320	+52.4%

Source: Prepared by the author based on research data

Customers were able to more easily access and book their spots via the app, which reduced pressure on phone lines and allowed for easier management of the restaurant's capacity. The AI system also enabled dynamic adjustments in reservation availability based on real-time data, minimising overbooking and optimising table utilisation. Additionally, personalised notifications and reminders helped reduce no-shows, ensuring a more reliable flow of guests. This digital transformation not only improved operational efficiency but also enhanced the overall customer experience by providing convenience and tailored communication, leading to increased customer loyalty and higher repeat business.

vi. Interaction with guests through digital channels

The introduction of AI-powered digital channels, such as chatbots and interactive digital menus, significantly enhanced the restaurant's communication with its guests. Prior to implementation, there were no digital interactions recorded, but after deployment, the number of monthly interactions increased rapidly to 750. This growth reflects both the guests' growing comfort with using digital tools and the effectiveness of the AI systems in engaging customers.

Table 8: Average number of interactions (chatbot and digital menu)

Period	Before AI Implementation	After AI Implementation	Change (%)
Number of monthly interactions (chatbot, digital menu)	0	750	N/A

Source: Prepared by the author based on research data

The chatbot provided instant responses to common queries, including menu details, reservation status, and special promotions, reducing the workload on staff and improving response times. Meanwhile, the digital menu offered personalised recommendations based on customer preferences and previous orders, creating a more interactive and engaging dining experience. Together, these channels not only streamlined communication but also contributed to higher customer satisfaction and loyalty by providing convenient, accessible, and timely support.

vii. Increased Efficiency in Payment Processing

The use of AI systems for payment automation (including integration with digital measurement) enabled faster order payments and reduced waiting time for bills. This decreased the average payment time per table by 40%, improving efficiency and reducing congestion at the restaurant exit.

Table 9: Average payment time per table (in minutes).

Period	Before AI Implementation	After AI Implementation	Change (%)
Average payment time (minutes)	10	6	-40%

Source: Prepared by the author based on research data

The use of AI systems for payment automation (including integration with digital measurement) enabled faster order payments and reduced waiting time for bills. This decreased the average payment time per table by 40%, improving efficiency and reducing congestion at the restaurant exit. Additionally, the streamlined payment process enhanced the overall customer experience by minimising one of the most common pain points during dining. With faster table turnover, the restaurant was able to accommodate more guests during peak hours, directly contributing to increased daily revenue. The AI system also facilitated accurate real-time tracking of sales and inventory, allowing management to make data-driven decisions promptly. Moreover, automated payment processing reduced human errors and the need for manual reconciliation, saving valuable staff time and lowering operational costs.

viii. Procurement Costs and Inventory Optimisation

The AI system for demand prediction and inventory analysis enabled procurement optimisation, reducing unnecessary costs. Predictive models helped better manage procurement volumes, lowering inventory costs by 10.8%.

Table 9: Average monthly procurement cost (before and after AI implementation)

Period	Before AI Implementation	After AI Implementation	Change (%)
Procurement cost (RSD)	1,200,000	1,070,000	-10.8%

Source: Prepared by the author based on research data

The AI system for demand prediction and inventory analysis enabled procurement optimisation, reducing unnecessary costs. Predictive models helped better manage procurement volumes, lowering inventory costs by 10.8%. By accurately forecasting ingredient usage based on historical sales data and upcoming reservation trends, the restaurant minimised food waste and avoided overstocking perishable items. This led to fresher ingredients being used in meal preparation, which enhanced food quality and customer satisfaction. Furthermore, the streamlined procurement process improved supplier relationships by enabling timely orders and reducing last-minute purchases at higher costs. Overall, the integration of AI into inventory management contributed to a more sustainable and cost-effective operation, supporting both financial goals and environmental responsibility.

CONCLUSION

The application of AI in small businesses, such as the Gastro Point restaurant, demonstrates that AI is not reserved solely for large systems. In the specific case of the restaurant Gastro Point, the implementation of AI technology has brought a number of significant benefits - from faster and more accurate ordering processes, to personalised menu recommendations, guest feedback analysis, and more efficient inventory and staff management. The following results achieved after four months of AI implementation confirms the postulated hypotheses: 1) 32% reduction in food waste; 2) 40% increase in the number of regular customers; 3) reduced operational costs and improved staff organisation; 4) optimised staff scheduling - fewer overtime hours and better task distribution; 5) Improved online restaurant rating (from 4.2 to 4.6); 6) Increased average order value – due to personalised recommendations. The results have become evident in a short period of time: increased foot traffic and a higher number of returning customers, reduced wait times, and an overall improvement in customer satisfaction. AI tools have enabled the restaurant to better understand the habits and expectations of its guests and, in turn, to deliver a service that exceeds those expectations. This example demonstrates how the smart integration of technology not only transforms the way a restaurant operates, but also elevates the entire customer experience to a higher level. The use of AI in hospitality is rapidly developing, as restaurants increasingly recognise the benefits AI can bring in terms of improved service, personalised customer experiences, inventory optimisation, and reduced operational costs. The limitations of this study lie in the fact that it was conducted on a single restaurant, taking into account a small set of variables for testing. Accordingly, future research should include a larger sample and test a greater number of comparative variables.

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