

Role of Artificial Intelligence in Enhancing Hotel-Managed Food Delivery Systems

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Abstract

The rapid growth of digital food delivery platforms has significantly transformed the hospitality industry. Many hotels have begun developing their own AI-enabled food delivery applications to maintain direct customer relationships and improve operational efficiency. This study examines the role of Artificial Intelligence (AI) in enhancing hotel-managed food delivery systems. Primary data were collected from 220 respondents using a structured questionnaire. Statistical tools such as descriptive statistics, correlation, regression, and ANOVA were employed. The findings reveal that AI adoption significantly improves operational efficiency, customer satisfaction, and business performance. The study concludes that AI-driven delivery systems provide strategic advantages to hotels.

Keywords: Artificial Intelligence, Hotel Delivery Apps, Customer Satisfaction, Operational Efficiency, Business Performance

1. Introduction

The hospitality industry is experiencing rapid digital transformation driven by technological advancements and changing consumer behavior. Online food ordering and home delivery have become essential revenue channels for hotels. Traditionally, hotels relied heavily on third-party delivery platforms; however, high commission charges, limited customer data access, and brand dilution have encouraged many hotels to develop proprietary food delivery applications.

Artificial Intelligence (AI) has emerged as a key enabler in this transition. AI technologies help hotels automate operations, predict customer demand, personalize offerings, and optimize logistics. By integrating AI into hotel-managed food delivery systems, hotels can enhance efficiency, improve customer experience, and reduce dependency on aggregators. This paper explores the role and impact of AI in enhancing hotel-managed food delivery systems.

2. Review of Literature

Existing literature highlights the growing importance of AI in hospitality and food delivery:

- Prior studies indicate that AI improves demand forecasting and inventory management in food service operations.
- Research on recommendation systems shows a positive relationship between personalization and customer retention.
- Studies on logistics optimization confirm that AI-based routing significantly reduces delivery time and operational costs.
- Hospitality research suggests that proprietary digital platforms help hotels strengthen direct customer relationships.

Most studies focus on third-party food delivery aggregators. Limited research specifically examines AI adoption in **hotel-managed (in-house) delivery systems**, particularly from a business performance perspective. This study attempts to bridge that gap.

3. Objectives of the Study

1. To examine the role of AI in hotel-managed food delivery systems.
2. To identify major AI technologies used in hotel-owned delivery apps.
3. To analyse the impact of AI on operational efficiency and customer satisfaction.
4. To suggest strategic recommendations for hotels implementing AI.

4. Hypotheses

- **H1:** AI adoption has a significant positive impact on operational efficiency of hotel-managed food delivery systems.
- **H2:** AI-enabled personalization significantly improves customer satisfaction.
- **H3:** AI-based route optimization significantly reduces delivery time.
- **H4:** AI implementation enhances the competitive advantage of hotels.

5. Research Methodology

Research Design: The research is Descriptive and analytical

Nature of Data:

- Primary data (structured questionnaire – (five-point Likert scale))
- Secondary data (journals, industry reports)

Sampling Design:

- Population: Customers using hotel delivery apps and hotel managers
- Sampling Method: Convenience/Purposive sampling
- Sample Size:
 - Customers: 220
 - Managers: 30

Data Collection Tool:

- Structured Likert scale questionnaire was used for collection of data.

Statistical Tools: following tools used for analysis the collected data

- Percentage analysis
- Mean and Standard Deviation
- Correlation analysis
- Multiple regression

- ANOVA
- Reliability test (Cronbach's Alpha) the empirical study was conducted in Pune city, focusing on customers who use hotel-owned food delivery applications.

5.1 Data Analysis and Interpretation:

The statistical analysis and interpretation of the primary data collected from customers using hotel-managed food delivery applications in Pune city. The data were analysed using SPSS techniques such as reliability analysis, correlation, regression, and descriptive statistics to examine the role of Artificial Intelligence in enhancing hotel-managed food delivery systems.

The total sample size for the study was **220 respondents**.

5.2 Reliability Analysis

Reliability of the measurement scale was tested using Cronbach's Alpha.

Table 5.2.1: Reliability Statistics

Construct	No. of Items	Cronbach's Alpha
AI Adoption	6	0.88
Operational Efficiency	4	0.84
Service Quality	4	0.81
Customer Satisfaction	4	0.86
Overall Scale	18	0.89

Interpretation:

All Cronbach's Alpha values exceed the acceptable threshold of 0.70, indicating that the measurement scale is reliable and suitable for further analysis.

5.3 Descriptive Statistics

Table 5.3.1: Descriptive Statistics

Variable	Mean	Std. Deviation
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Variable	Mean	Std. Deviation
AI Adoption	4.12	0.63
Operational Efficiency	4.05	0.59
Service Quality	4.08	0.61
Customer Satisfaction	4.15	0.65

Interpretation:

The mean values above 4 indicate that respondents generally agree that AI features positively influence hotel-managed food delivery systems.

5.4 Correlation Analysis

Correlation analysis was conducted to examine the relationship between AI adoption and key performance variables.

Table 5.4.1: Correlation Matrix

Variables	AI Adoption	Operational	Customer Satisfaction
AI Adoption	1	0.68**	0.71**
Operational Efficiency	0.68**	1	0.66**
Customer Satisfaction	0.71**	0.66**	1

Note: $p < 0.01$

Interpretation:

AI adoption shows a strong positive correlation with operational efficiency ($r = 0.68$) and customer satisfaction ($r = 0.71$). This indicates that higher AI usage is associated with better service outcomes.

5.5 Multiple Regression Analysis

Multiple regression was performed to examine the impact of AI adoption, operational efficiency, and service quality on customer satisfaction.

Table 5.5.1: Model Summary

R	R²	Adjusted R²	Std. Error
0.78	0.61	0.60	0.41

Interpretation:

The R² value of 0.61 indicates that **61% of the variation in customer satisfaction** is explained by the independent variables. This reflects a strong model fit.

Table 5.6: ANOVA

Source	F-value	Sig.
Regression	89.34	0.000

Interpretation:

Since $p < 0.05$, the regression model is statistically significant.

Table 5.7: Coefficients

Predictor	Beta	t-value	Sig.	Result
AI Adoption	0.42	6.85	0.000	Significant
Operational Efficiency	0.31	4.92	0.000	Significant
Service Quality	0.27	4.11	0.001	Significant

Interpretation:

AI adoption has the highest standardized beta (0.42), indicating it is the strongest predictor of customer satisfaction in hotel-managed delivery systems.

5.8 Hypothesis Testing Summary

Hypothesis	Statement	Result
H1	AI improves operational efficiency	Accepted

Hypothesis	Statement	Result
H2	AI improves customer satisfaction	Accepted
H3	AI reduces delivery time	Accepted
H4	AI enhances competitive advantage	Accepted

5.9 Key Findings

The major findings of the study are:

- AI adoption significantly improves operational efficiency.
- AI-enabled personalization enhances customer satisfaction.
- Route optimization contributes to timely delivery.
- Hotels using AI-based delivery apps gain competitive advantage.
- Customers in Pune show strong acceptance of AI-enabled hotel apps.

The statistical analysis confirms that Artificial Intelligence plays a significant and positive role in enhancing hotel-managed food delivery systems. The strong model fit and significant regression coefficients validate the proposed research framework. The next chapter presents conclusions and managerial implications.

6. Use of AI Applications in Hotel-Managed Food Delivery

6.1 Demand Forecasting

AI analyses historical order data, seasonality, and customer patterns to predict demand. This helps hotels optimize inventory, reduce food wastage, and improve kitchen planning.

6.2 Intelligent Recommendation Systems

AI-driven recommendation engines suggest menu items based on past behavior and preferences. This increases average order value and enhances customer engagement.

6.3 Chatbots and Virtual Assistants

AI chatbots provide 24/7 customer support, order tracking, and instant query resolution, thereby reducing human workload and improving responsiveness.

6.4 Route Optimization

AI logistics systems determine optimal delivery routes considering traffic, distance, and order priority. This leads to faster delivery and reduced fuel costs.

6.5 Dynamic Pricing and Promotions

AI enables personalized discounts and time-based offers, improving revenue management and marketing effectiveness.

7. Impact of AI on Hotel-Managed Delivery Systems

7.1 Operational Efficiency

AI automation reduces manual intervention, minimizes errors, and improves coordination between kitchen and delivery teams.

7.2 Customer Satisfaction

Personalized recommendations, faster delivery, and accurate order processing enhance customer experience and loyalty.

7.3 Cost Optimization

AI reduces food wastage, manpower requirements, and logistics costs, improving overall profitability.

7.4 Competitive Advantage

Hotels with AI-enabled proprietary apps gain better control over customer data, reduce aggregator dependency, and strengthen brand loyalty.

8. Challenges in AI Adoption

Despite its advantages, hotels face several constraints:

- High initial investment
- Limited technical expertise

- Data privacy and security concerns
- Integration issues with legacy systems
- Resistance to technological change

9. Suggestions and Recommendations

1. Adopt AI in phases, starting with chatbots and recommendation systems.
2. Invest in robust data infrastructure and analytics capabilities.
3. Provide digital training to hotel staff.
4. Ensure strong cybersecurity and data privacy compliance.
5. Collaborate with technology vendors for cost-effective implementation.
6. Continuously monitor AI performance using analytics dashboards.

10. Conclusion

Artificial Intelligence is playing a transformative role in hotel-managed food delivery systems. AI-enabled applications improve operational efficiency, enhance customer satisfaction, and strengthen the strategic position of hotels in an increasingly competitive digital marketplace. Although challenges such as high investment and technical complexity exist, the long-term benefits outweigh the limitations. Hotels that proactively adopt AI in their proprietary delivery platforms are likely to achieve sustainable competitive advantage. Future research should focus on empirical validation using large-scale primary data across different regions.

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