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OPTIMISATION OF FOOD DELIVERY SYSTEM USING ARTIFICIAL INTELLIGENCE IN MUMBAI REGION

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Keywords	***Abstract***
Food Delivery System, Artificial Intelligence, Operation optimization, Customer experiences.	The food delivery business in Mumbai is a vibrant and quickly expanding sector that serves the city's fast-paced and diverse population. The role of artificial intelligence in food delivery systems to optimize operations and improve customer experiences is becoming more and more demanded by customers who want faster, more individualized, and more efficient food delivery services. Predictive analytics for customer retention, dynamic menu customization, predictive delivery time estimation, AI chatbots for food ordering, and automated customer query resolution are some of the factors that are the subject of this paper. The difficulties and elements that affect food delivery system optimization and improve customer experiences are further examined in the paper. The creation of food delivery applications in Mumbai and future improvements to food delivery services would benefit from these findings.

1. INTRODUCTION

A food delivery system is a service where restaurants or food providers deliver food to customers, typically through a website, mobile app, or by phone, offering convenience and real-time order tracking. Rapid digitalization, rising internet and smartphone usage, and shifting lifestyles that favor

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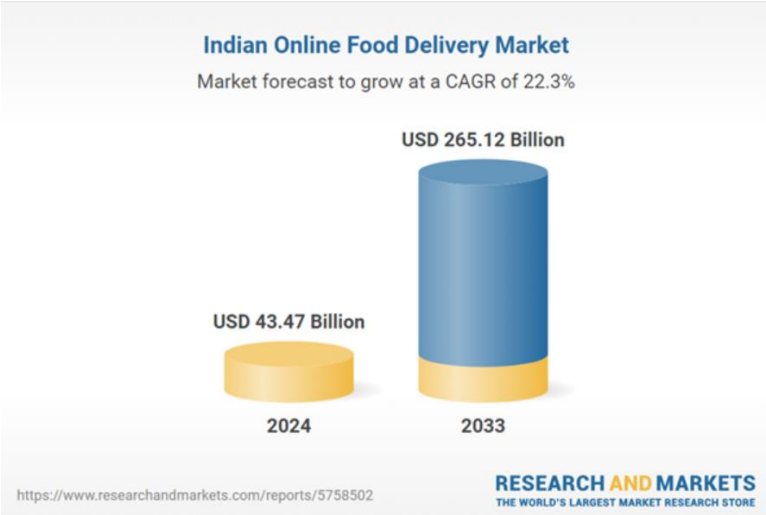
online food delivery are all contributing factors to the growth of the Indian online food delivery industry. India online food delivery market is expected to reach US$ 43.47 billion in 2024 and US$ 265.12 billion by 2033 with a CAGR of 22.25% from 2025 to 2033.

Food items can be ordered online and delivered right to a person's home, simplifying the process. It provides the convenience of several payment methods and a range of cuisines. The customer can find out how long food preparation and delivery should take on the website or application. The demand for these services is rising as a result of these features as well as.



1.1 Origin and Background

In the beginning, food delivery was simple and straightforward. Customers would have their food delivered straight to their door after placing an order over the phone with their local pizza or Chinese restaurant. Online ordering platforms emerged with the internet's introduction in the late 1990s and early 2000s, allowing customers to place orders through restaurant websites. During that period, the first significant shift toward digital meal delivery took place. In 1994, Pizza Hut launched Pizzanet, one of the first websites for ordering meals online. In 1995, World Wide Waiter (now Waiter.com) launched the first restaurant food delivery service in the US.

TastyKhana was one of the first online meal delivery services in India. It was one of the first businesses to distribute food online before Swiggy and Zomato, having been founded in Pune, India, in 2007 by Shachin Bharadwaj. It started out as a website that connected users with local restaurants and let them place online food orders. The platform's website and mobile app allow users to peruse menus, place orders, and have food delivered. In 2011, TastyKhana partnered with Delivery Hero, a German food delivery giant, which helped it expand operations across multiple cities in India. It operated in cities like Mumbai, Pune, Delhi, Bangalore, and Hyderabad before competition intensified. In 2014, Delivery Hero acquired TastyKhana entirely, marking one of the first major

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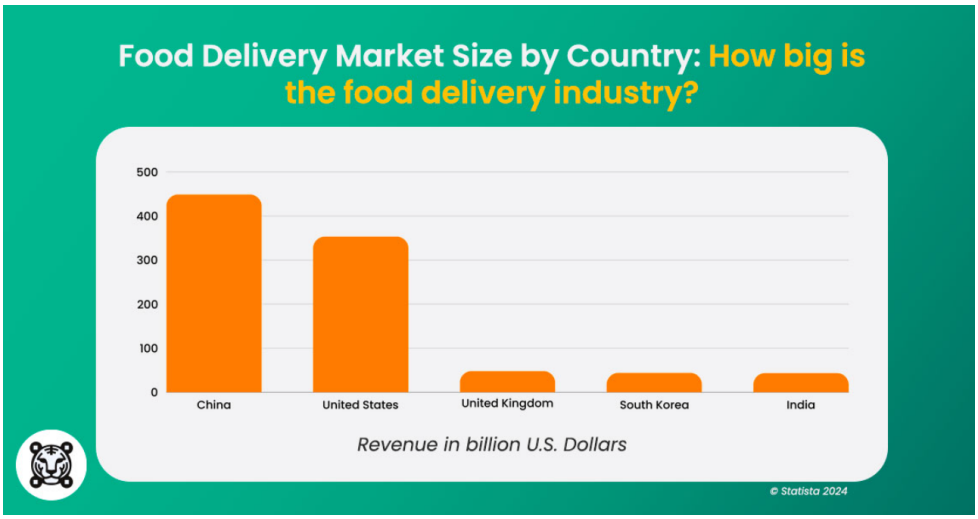
consolidations in the Indian food tech space. Eventually, in 2015, TastyKhana was shut down, and its operations were merged with Foodpanda, another Delivery Hero-backed platform. Later, Ola acquired Foodpanda India in 2017, but it also struggled and eventually exited the food delivery business.

TastyKhana played a crucial role in shaping the food delivery ecosystem in India, paving the way for Swiggy, Zomato, and other players.

2. REVIEW OF LITERATURE

Studies by Zhang et al. (2018) reveal that traditional forecasting models often fail to capture rapid changes in consumer behavior, external disruptions, or emerging market trends, leading to inaccuracies that affect overall supply chain performance. According to Khan et. Al (2025) AI technologies like predictive analytics and machine learning enhance accuracy and responsiveness but face challenges such as data quality, system integration, and high costs. According to Anisha et. al (2024) study emphasis on incorporating AI-driven supply chain optimization in the food sector that results in increased consumer happiness, better demand forecasting, decreased waste, and greater operational efficiency.

According to Statista 2024, India's online food delivery market is experiencing phenomenal growth, with a projected revenue of $43.78 billion by 2024. This momentum is expected to be sustained, with a robust CAGR exceeding 16.95% between 2024 and 2028, resulting in a potential market value of $81.91 billion by 2028.



3. OBJECTIVES

To study role of Artificial Intelligence in optimising Food Delivery System.

To determine advantages of optimising Food Delivery System on customer (user) experiences.

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To identify future trends in optimising Food Delivery System.

4. RESEARCH METHODOLOGY

The research is basely purely on Secondary data. The data is collected through various internet portals, research journals, magazines etc.

5. ROLE OF ARTIFICIAL INTELLIGENCE IN OPTIMISATION OF FOOD DELIVERY SYSTEM

The food delivery industry has seen significant transformation in recent years as a result of advancements in automation, machine learning, and artificial intelligence (AI). By incorporating artificial intelligence into food delivery apps, businesses have been able to improve the quality of delivery services, lower operating costs, and increase process efficiency. Calls for the use of AI in food delivery to improve customer satisfaction, expedite procedures, and increase revenue are being driven by consumers' increasing demand for faster, more individualized, and more effective food delivery services.

Food apps like Uber Eats, Swiggy, Zomato, and others use AI to boost operational effectiveness and efficiency.

6. AI-POWERED ORDER MANAGEMENT & DEMAND FORECASTING

Demand forecasting is one of the most crucial uses of AI for food delivery services. Food delivery services use these machine learning models to analyze historical order data, local events, and meteorological data in order to predict demand changes based on customer behavior in advance. Examples of AI technologies that increase accuracy and responsiveness include machine learning and predictive analytics, but they also come with drawbacks in terms of cost, system integration, and data quality.

7. WORK METHODOLOGY

AI Algorithm Processing: AI algorithms examine enormous volumes of historical and current data to find trends and peak periods. In the food delivery industry, artificial intelligence (AI) helps

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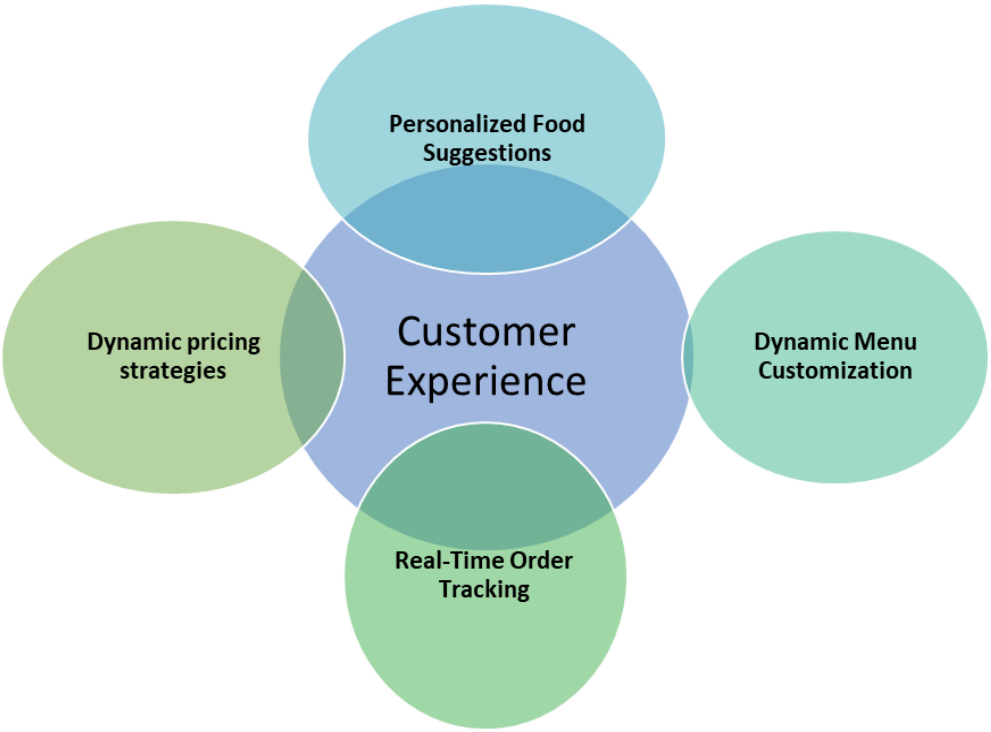
businesses predict periods of high demand by analysing historical data, seasonal trends, and local events.

Automatic inventory management suggestions are sent to restaurants to reduce waste and guarantee that supplies are available when needed.

Optimal resource allocation: Delivery platforms use dynamic resource allocation to avoid delays during peak hours. Based on current demand, this helps restaurants better plan their product purchases. The optimal resource allocation for delivery partners and restaurant inventories is ensured by Waste Reduction through Smart Inventory Management.

8. PERSONALIZATION & AI AASSISTED CUSTOMER SUPPORT

By giving consumers relevant recommendations, personalized promotions, and behavioral insights, artificial intelligence (AI) has been utilized to enhance the customer experience in food delivery applications.



Customized meal suggestions: One of the greatest applications of AI in meal delivery apps is the creation of tailored suggestions based on user preferences, order history, and behavioral data. Machine learning algorithms look at past orders and browsing patterns to suggest recipes that fit customer preferences.

Dynamic Menu Customization: Restaurants can use AI to instantly change their menus based on

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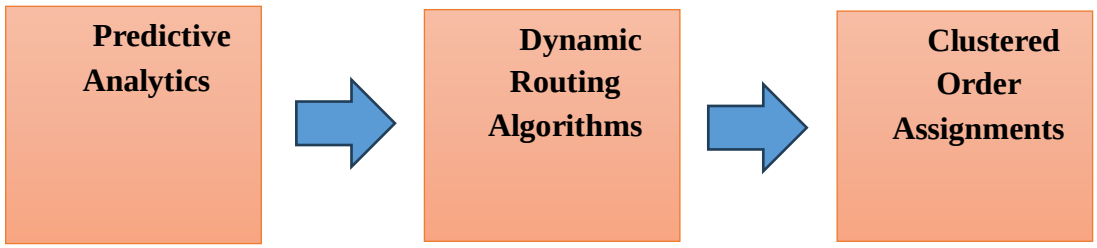
customer preferences, popular dishes, and stock levels.

Dynamic pricing strategies: AI can recommend the best pricing plans and adjust menu prices based on demand, customer loyalty, and even competitor activity by using demand forecasts.

Real-time order tracking: AI enables real-time order tracking with estimated time of arrival (ETA) predictions, easing customer anxiety about delays.

9. ROUTE OPTIMIZATION AND LOGISTICS

Effective route optimization is necessary to cut down on delivery times and fuel costs. Using GPS, machine learning, and real-time traffic data, AI-powered food delivery apps dynamically identify the fastest delivery routes.



Predictive analytics: Machine learning algorithms can be used by food delivery applications to predict expected delivery times based on variables such as order volume, restaurant preparation time, rider availability, and traffic conditions. Predictive Delivery Time Estimation, which makes use of real-time data to estimate delivery timings, is one application of AI.

Dynamic Routeing Algorithms: AI uses traffic data APIs and GPS to find the fastest delivery route, avoid delays, and maximize fuel efficiency—all of which are essential for delivering fresh and on-time food. AI-powered real-time rerouting helps cars avoid congested areas and maximize fuel economy.

Clustered Order Assignments: AI clusters orders that are near to one another in order to reduce the number of visits per dryer.

10. AUTOMATED CUSTOMER QUERY RESOLUTION

Many food delivery apps now feature AI-driven chatbots to handle customer support queries, order modifications, and complaints.

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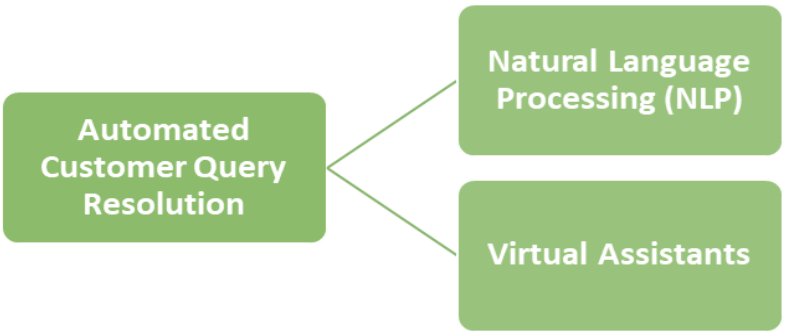


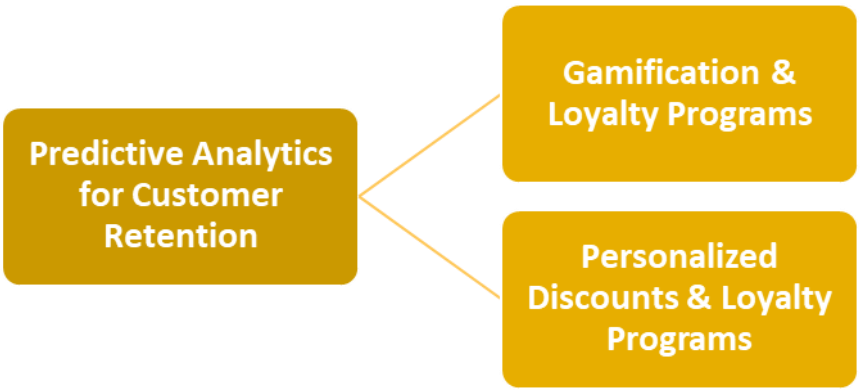
Natural Language Processing (NLP): AI chatbots use Natural Language Processing (NLP) to handle common customer queries such as order tracking, refund status, and complaint registration, reducing the need for human intervention and improving response times.

10.1 Virtual Assistants

AI provides real-time support, reducing wait times for human agents. It also assists in order tracking, refunds, and personalized promotions.

10.2 Predictive Analytics for Customer Retention

AI utilises predictive analytics to identify at-risk customers (those who haven't ordered for a while) and triggers targeted promotions or personalized discounts to bring them back.



Loyalty programs and gamification: AI keeps users engaged by offering challenges (like ordering from a variety of cuisines) and customizing loyalty perks.

Customized Loyalty Programs & Discounts: AI will customize loyalty programs based on user preferences, boosting engagement and attracting back at-risk customers.

11. Advantages of Artificial Intelligence in Food Delivery System

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ADVANTAGES OF ARTIFICIAL INTELLIGENCE IN FOOD DELIVERY SYSTEM

AI-POWERED DEMAND FORECASTING & ORDER MANAGEMENT	Reduced food wastage through smarter inventory planning.	Optimized staffing schedules to meet demand surges.	Improved order accuracy and customer satisfaction.
PERSONALIZATION & AI-DRIVEN CUSTOMER EXPERIENCE	Increased order frequency and customer retention.	Higher revenues by means of upselling and targeted promotions.	Improved customer satisfaction with tailored experiences.
ROUTE OPTIMIZATION & LOGISTICS	Faster deliveries with reduced wait times for customers.	Lower operational costs for food delivery platforms.	Enhanced driver efficiency and satisfaction.
AUTOMATED CUSTOMER QUERY RESOLUTION	24/7 customer support without the need for human intervention.	Faster response times and improved customer satisfaction.	Lower operational costs for food delivery platforms.

12. POTENTIAL FUTURE TRENDS IN AI-POWERED FOOD DELIVERY APPS

As can be seen, the food delivery sector is going through a technological revolution, primarily due to the development of AI in food delivery applications. AI-driven autonomous delivery methods, logistics, and a highly customized customer experience are predicted to shape the future of food delivery app services.

The development of food delivery apps will be impacted by AI trends.

12.1 Drone-Based Food Delivery: Autonomous drones and AI in food delivery apps will combine to provide lightning-fast delivery, particularly in congested urban areas. Drone routes will be optimized by AI-driven real-time air traffic monitoring to prevent obstructions and guarantee effective delivery.

12.2 AI-Powered Delivery Robots: In smart cities, last-mile deliveries will be handled by ground-

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based delivery robots outfitted with computer vision, LiDAR, and AI-based navigation. These robots will use facial recognition and chatbots driven by AI to securely transfer orders to customers.

12.3 Self-Driving Cars for Large-Scale Food Delivery: Autonomous vehicles are already being tested for food delivery by companies such as Domino's and Uber Eats. AI will use sensor fusion technology and real-time traffic data to optimize route planning, forecast delivery times, and guarantee safe navigation.

12.4 Voice-Activated Food Ordering: AI-powered voice assistants such as Google Assistant, Siri, and Amazon Alexa will be able to place food orders for users. Food delivery apps will be able to comprehend intricate voice commands and make meal recommendations based on advanced natural language processing (NLP).

12.5 Image-Based Food Identification: AI will allow users to upload pictures of food, and the app will use computer vision algorithms to recommend related dishes from restaurant menus. Real-time food recognition will help social media users and food bloggers by enabling them to place instant orders for dishes they see online.

12.6 Surge Pricing According to Demand: In order for restaurants and their delivery partners to turn a profit, it will dynamically adjust the delivery fee, menu price, and discount to correspond with the demand pattern.

12.7 AI-Driven Food Safety & Traceability: Blockchain and AI will work together to monitor the whole food supply chain, guaranteeing quality assurance and adherence to food safety laws. Consumers will be able to verify the provenance, freshness, and expiration date of food items by scanning their QR codes.

13. CONCLUSION

The use of AI in the food delivery industry greatly improves strategic decision-making, streamlines important procedures, and makes it easier to customize services. To stay ahead of the competition, entrepreneurs in this field must optimize their delivery platforms, especially by incorporating AI-enabled features. With advancements like AI-powered apps and self-driving delivery systems changing how restaurants, aggregators, and logistics companies operate, optimization is crucial to maintaining effectiveness, flexibility, and long-term viability.

14. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

15. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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16. PLAGIARISM POLICY

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