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How Do Online Food Delivery Apps Work? An Analytical Insight

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Abstract

Online Food Delivery (OFD) apps have transformed the food industry by leveraging digital platforms to connect restaurants, delivery personnel, and consumers. This study explores the operational mechanisms of OFD apps, focusing on recommendation algorithms (collaborative and content-based filtering), real-time logistics, and user experience optimisation. The rise of such platforms, accelerated by smartphone penetration and pandemic-driven demand, has reshaped consumer behaviour while introducing challenges like manual order errors and delivery inefficiencies. Using a structured analysis, this paper examines the technical and functional aspects of OFD apps, highlighting their impact on restaurants, customers, and market dynamics. The paper adopted system flow chart to illustrate how the online food delivery apps work. Key findings suggest that AI-driven personalisation, efficient routing, and secure payment systems enhance service reliability. However, regulatory oversight and sustainability measures remain critical for long-term growth. The study provides insights for businesses, policymakers, and researchers on optimising OFD ecosystems.

***Keywords**:* logistics optimisation, online food delivery, recommendation algorithms

INTRODUCTION

Online food delivery (OFD) services enable customers to order meals from restaurants through a website or app, while food delivery apps (FDAs) allow consumers to get food from restaurants or third-party providers like Uber Eats (Ray et al., 2019). Online food delivery is just one of the many online-to-offline services (Tandon et al., 2021) that enable users to browse and purchase ready-to-eat meals, meal kits, or groceries. The simultaneous progress of technology, including computers, smartphones, and the internet, along with the enhancement of navigation capabilities, has led to a significant increase in the number of OFDs and FDAs (Tandon et al., 2021).

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Over the last two decades, numerous countries in Asia, Europe, and North America have implemented OFDs and FDAs. During the COVID-19 lockdowns, persons who were concerned about the possibility of coronavirus exposure opted for contactless delivery (Belarino et al., 2021; Tandon et al., 2021; Zanetta et al., 2021). In 2020, for example, internet food services in China served 419 million clients and fulfilled more than 17 billion orders (Wang et al., 2022).

The rise of online food delivery apps has transformed the way people order and consume food. In context to Nepalese market, platforms like Foodmandu, Bhojdeals, Pathao Food, Bhok Lagyo, Mero Lunch, Door To Door Tiffin, Bhokmandu, Ek Baje, Zomato, WL Food, FoodGanj and Foodmario connect customers, restaurants, and delivery drivers through seamless digital interfaces (https://english.onlinekhabar.com; https://english.ratopati.com). This system relies on real-time data, GPS tracking, and efficient logistics to ensure quick and convenient service. As demand grows, understanding the mechanics behind these apps provides valuable insight into modern food industry trends and consumer behaviour. Nevertheless, the rise of the online food ordering trend in Nepalese market, it has also some flaws. The current food ordering process in many restaurants lacks proper order-tracking system, mismatch between food ordered and food delivered, as well as connectivity issue between buyer and seller. Normally, a layman sees an app and press options and makes few clicks to order the food from the apps, but behind this simple step, there is a separate working mechanism which a layman buyer is completely unaware. The users only see the confirmation message from the seller side. These problems not only affect customer satisfaction and loyalty but also pose operational challenges for the restaurant. In this backdrop, the paper tries to give an insight on how the online food delivery apps work and connect the buyer to the seller by showing the flow chart diagram. The flowchart of the food apps in the paper elaborates the functional aspects of the apps from the viewpoint of admin and customer respectively.

Conceptual Review

This part of the paper reviews concept of food delivery apps (FDA) and the details on how the food delivery apps functionalities are being achieved. The technical aspects of the working format of the apps are discussed in this section.

Food Delivery Apps (FDAs)

The services provided by various Food Delivery Apps (FDAs) generally fall into four main categories: placing orders, monitoring progress, handling payments, and offering tracking features. However, they are not involved in the actual preparation of food (Pigatto et al., 2017). As intermediaries, FDAs must foster cross-side network effects to operate effectively (Kung & Zhong, 2017). With FDA applications installed on their smartphones, users can easily find nearby restaurants, browse menus, and make purchases without needing to interact directly with restaurant staff (Kapoor & Vij, 2018). This allows consumers to conveniently order meals from a variety of restaurants at any time and location that suits them (Alalwan, 2020). According to Shankar et al. (2022), FDAs offer customers several benefits, such as convenience (Shah et al., 2022), discounts and promotional offers (Wang et al., 2020), user-friendliness (Hong et al., 2021), perceived value (Troise et al., 2021), and access to information on new or upcoming menu items (Williams et al., 2020). Supporting this view, Sellappan and Shanmugam (2020) outlined six core dimensions of FDAs: primary functionality, business independence, order coordination, customer relationship management, competitive synergy, and business agreements. The widespread adoption of FDAs in both developed and developing nations is largely attributed to their ability to ensure quick and reliable delivery services, as well as the willingness of restaurant operators to boost revenue without the need to expand physical seating capacity (Xu, 2017; Xu & Huang, 2019).

Platform Economy and Algorithm Details of Food Delivery Apps

The phrase "platform economy" may refer to a relatively recent economic system that generates a wide range of value-creating transactions and activities using digital infrastructures of connectivity and the internet. Platforms' underlying networking technologies enable users to contribute, share, and consume digital material in addition to interacting, exchanging, and purchasing goods and services. Their primary goal is to unite and regulate so-called two-sided or multi-sided marketplaces, which consist of two or more users. One of the most widely used abstractions in business research today is the so-called platform economy, which is frequently seen as a signpost for the ongoing transition to a market society (Zander et al., 2025). The phrase 'platform economy' refers to a very recent economic structure that depends on internet connectivity and digital infrastructures to produce a wide range of value-generating interactions and activities (van Dijck et al., 2016). Platforms' underlying networking technologies enable users to contribute, share, and consume digital material in addition to interacting, exchanging, buying, and selling commodities and services. Their primary goal is to unite and regulate so-called two-sided or multi-sided markets, which consist of two or more users (Barns, 2020; Helmond, 2015). The evolution of food ordering systems from manual processes to sophisticated automated solutions has been well-documented in the literature. Early systems involved manual order taking, where customers would place orders by phone or in person, resulting in inefficiencies and errors due to manual data entry. These processes were not only time-consuming but also prone to inaccuracies, leading to customer dissatisfaction and operational challenges for restaurants (Setayesh et al., 2021). This section of review covers the algorithm details of the food delivery apps.

Collaborative Filtering (User-Based)

Collaborative Filtering is a well-liked recommendation method that gathers user preferences to predict a person's interests. It is predicated on the notion that users who have previously agreed will do so again. The algorithm is based on User-

Based Collaborative Filtering using the Pearson Correlation Coefficient (Surhone et al., 2010). This method identifies users with similar preferences and makes recommendations by predicting how a user would rate items that similar users have rated highly (Hu & Long, 2021).

Content-Based Filtering

The algorithm employs content-based filtering with cosine similarity to generate food recommendations for users. Unlike collaborative methods that rely on user behaviour, content-based filtering analyses item attributes—in this case, food descriptions—to provide personalised suggestions (Lops et al., 2019). Cosine Similarity quantifies the likeness between two text-based vectors by computing the cosine of the angle between them, effectively assessing how closely the descriptions of different food items align (Singhal, 2001). This approach is particularly effective in matching users with relevant menu items based on textual similarity.

Empirical Review

Kumar et al. (2021) illustrated the mechanism of online food ordering application. The paper layout the working mechanism of the app. The study concluded that platforms have made it very simple to share one's experiences with others through evaluations, whether they are related to a product purchased or any type of service received.

Madinga et al. (2023) examined factors influencing the adoption of food delivery apps during the COVID-19 pandemic, as well as the moderating effects of education and age. The study found that perceived ease of use significantly impacts usefulness and user attitudes, while attitudes influence usage intentions. Social pressure and convenience also influence attitudes. The perceived threat of COVID-19 did not affect attitudes, and education and age did not significantly influence relationships. These findings are crucial for restaurant operators and mobile app developers.

Wahyudin et al. (2024) aimed to evaluate food delivery apps (FDA) importance, performance and identify strategies to maximise its potential gains from a business partner's perspective. The paper categorised FDA features into four groups: "concentrate," "good work," "low-priority," and "basic." Credit rating, internet presence, client loyalty, and competitive advantage are examples of "concentrate" attributes. To satisfy partner expectations, FDA suppliers should set aside funds to create these functionalities. Among the "good work" aspects are credit transfer and order clarity. Stable terms and conditions, income sharing, and consumer data are examples of "low-priority" features. The "basic" features include prompt service, order taking, and delivery.

Hwang et al. (2024) concluded that the global aging population faces growing food insecurity, yet the potential of online food delivery apps (FDAs) to mitigate this issue remains understudied. This scoping review synthesises recent evidence (2019–present) from 19 studies across 10 countries, examining whether FDAs can improve food access for older adults (≥50 years) while addressing equity, usability, and health impacts.

Madhuritha and Nedumaran (2025) highlighted that online food ordering apps have revolutionised convenience, making food delivery effortless and accessible globally. With rapid technological advancements and rising demand, these platforms are poised for significant growth. To maintain a competitive edge, the study emphasises the need for innovation in personalisation, sustainability, and delivery efficiency. By prioritising these areas, food delivery apps can solidify their position as industry leaders.

RESEARCH METHODS

This paper implements and analyses two recommendation algorithms-Collaborative Filtering (User-Based) and Content-Based Filtering-for an online food ordering application. The paper adopted a basic flow chart to elaborate the functioning of the online food ordering system. Under, the diagram presentation and analysis, the paper adopted sequence flow chart and work-flow diagram to illustrate the working mechanism of food ordering apps understandable for the application developers and layman users. This methodology ensures a structured approach to implementing and evaluating recommendation systems in online food delivery applications.

DATA ANALYSIS AND DISCUSSION

This part of the paper illustrates the implementation steps for the Collaborative Filtering (User-Based) and Content-Based Filtering online food ordering apps.

Implementation Steps of Collaborative Filtering (User-Based)

1. Calculate User Similarity:

- For a given user (User A), find all other users who have rated the same food items as User A.
- The similarity between User A and another user (User B) is calculated using the Pearson Correlation Coefficient formula:

similarity(A,B) = $\frac{\sum_i (r_{A,i} - \overline{r_A})(r_{B,i} - \overline{r_B})}{\sqrt{\sum_i (r_{A,i} - \overline{r_A})^2} \cdot \sqrt{\sum_i (r_{B,i} - \overline{r_B})^2}}$

Where:

- rA,i and rB,i are the ratings of User A and User B for the same food item i
- r**A** and rB are the average ratings of User A and User B across all their rated items.

This formula measures how closely the users' ratings match across the same items.

The resulting similarity score ranges from -1 (completely opposite preferences) to 1 (identical preferences).

2. Identify Similar Users:

• For the target user, identify other users in the system who have a high similarity score. These are users whose food preferences align closely with the target user.

3. Generate Recommendations:

• For each food item that the target user has not rated, calculate a predicted rating based on the ratings of similar users. The predicted rating is computed as a weighted average:

predicted rating(i) = $\frac{\sum_B \text{similarity}(A, B) \times r_{B,i}}{\sum_B |\text{similarity}(A, B)|}$

Where:

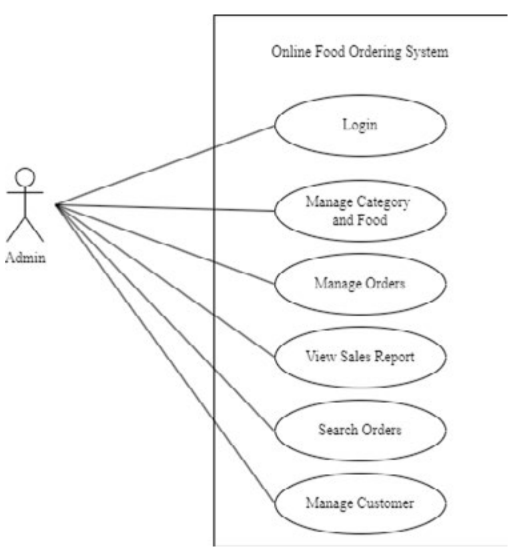
• rB,i is the rating given by a similar user B to the food item i.

• similarity(A,B) is the similarity score between the target user A and the similar user B

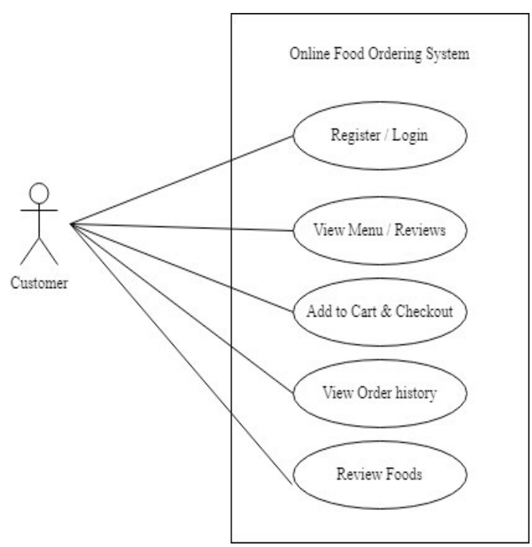
4. Normalise and Rank Recommendations:

• The predicted ratings are then normalised by dividing by the sum of the similarity scores.

• Sort the food items based on their predicted ratings in descending order to create a list of recommended items.



a) Use case Diagram for ADMIN



b) Use case diagram for User

Figure 1. *Diagrammatic Presentation of User-Based Filtering for ADMIN and User*

Implementation Steps of Content-Based Filtering

1. Identify the User's Favourite foods and retrieve their descriptions

• The algorithm retrieves the textual descriptions of the user's favourite food items from the database. These descriptions are used to create word frequency vectors.

2. Tokenisation and Vector Creation:

• Tokenisation: The descriptions are converted into lowercase and non-alphanumeric characters are removed. The remaining words are split into individual tokens (words).

• Word Frequency Vectors: For each description, the algorithm creates a vector where each element corresponds to the frequency of a particular word in the description.

3. Calculate Cosine Similarity:

• The algorithm compares the user's favourite food descriptions with each available food item's descript sine similarity.

Cosine Similarity = $\frac{A \cdot B}{\|A\| \times \|B\|}$ Where:

• A and B are word frequency vectors for two food descriptions.

• A . B is the dot product of the vectors.

• ||A|| and ||B|| are the magnitudes of vectors A and B respectively.

The result is a similarity score ranging from 0 (completely dissimilar) to 1 (identical).

4. Calculate the Recommendation Score:

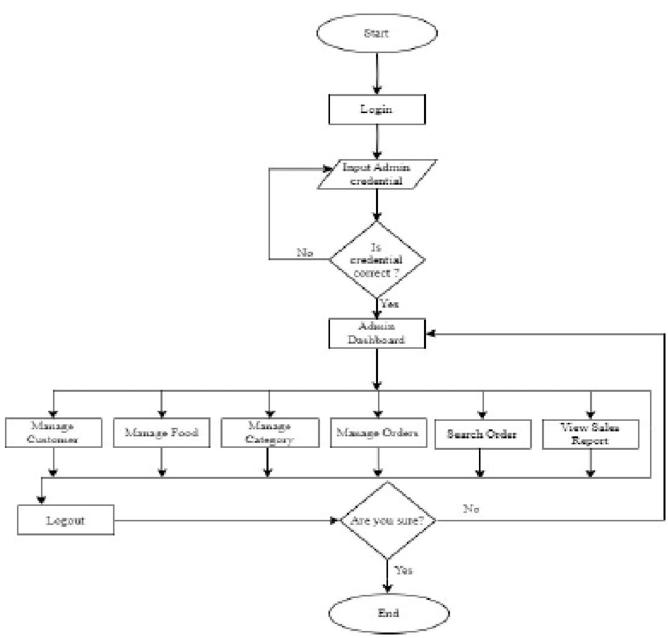


Figure 2.*Diagrammatic Presentation of Content-Based Filtering for ADMIN*

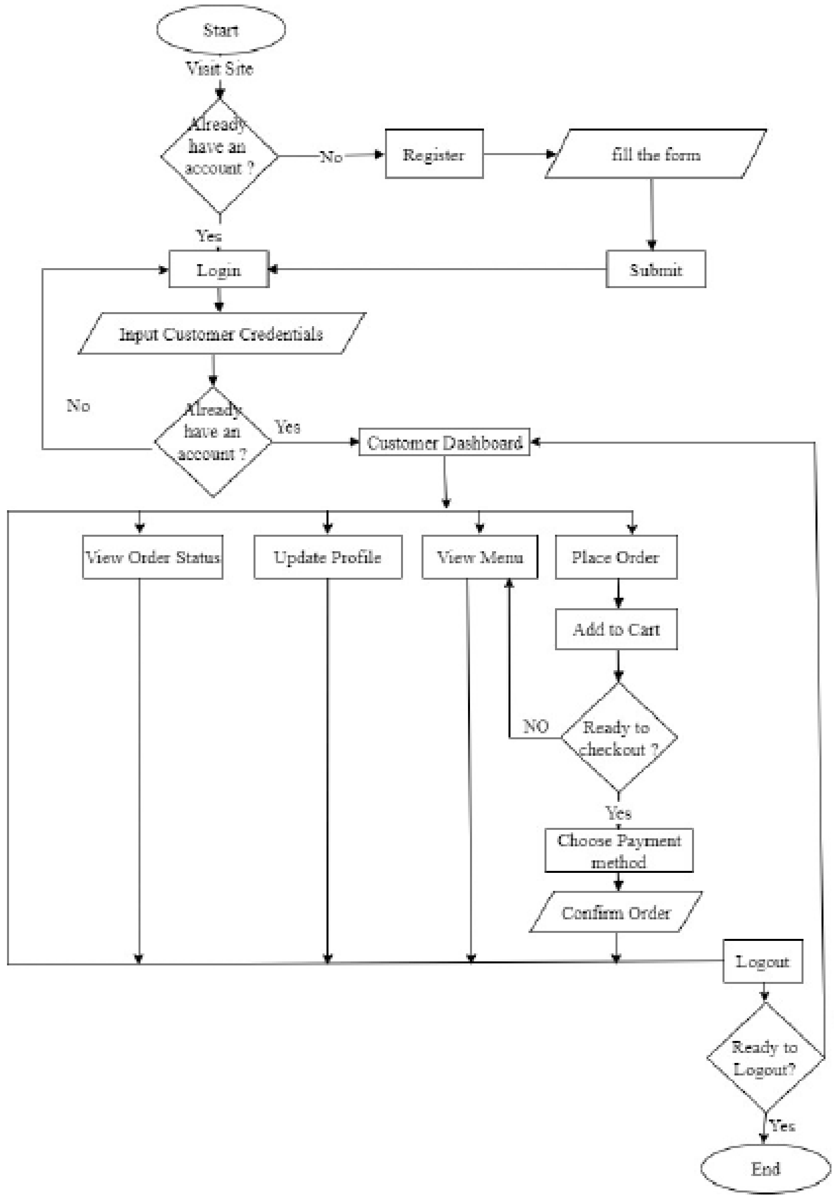


Figure 3. Diagrammatic Presentation of Content-Based Filtering for User

- For each food item, if it hasn't been ordered before and its cosine similarity exceeds a certain threshold, a recommendation score is calculated:

Score = Cosine Similarity − Price Weight × Price Difference

5. Rank the Recommendations: The algorithm ranks all the food items based on their recommendation scores. Higher scores indicate stronger matches to the user's preferences.

Sequences of Food Order Flow in context to ADMIN and Customer

The flow chart below illustrates how the food ordering apps work after admin login to the portal:

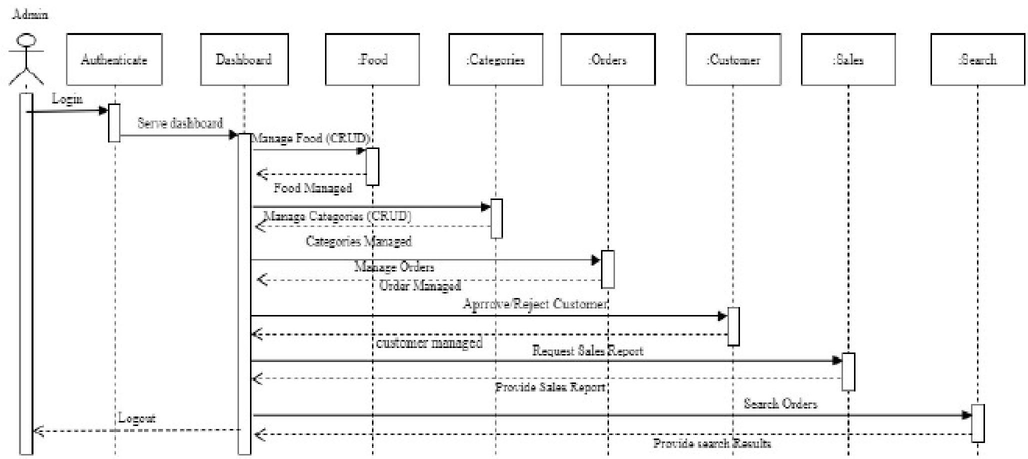


Figure 4.*Sequence Diagram for ADMIN*

The flow chart below illustrates how the food ordering apps work after customers login to the portal:

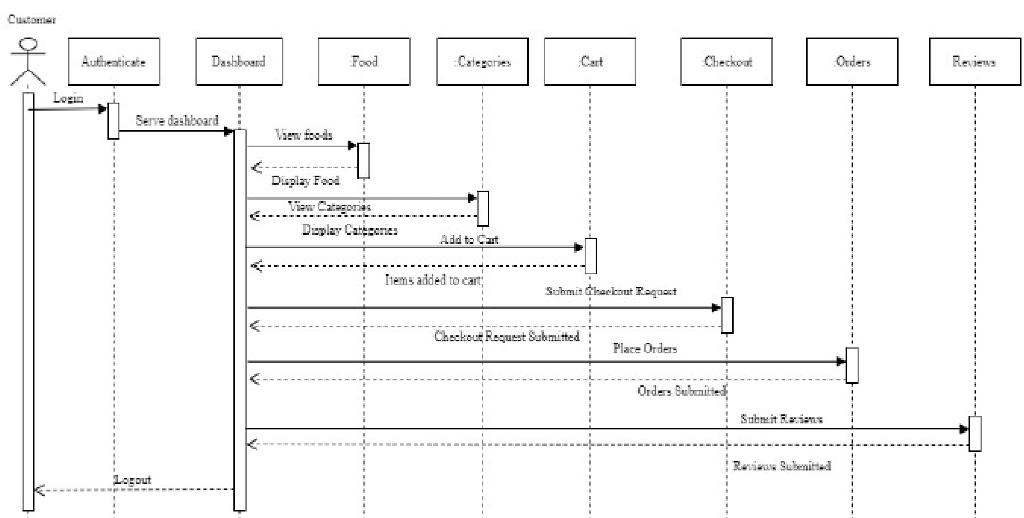


Figure 5. Sequence Diagram for Customer

Food ordering is a critical operation for restaurants to provide timely and accurate service to their customers. The process of manually taking orders, calculating totals, managing inventory, and processing payments can be tedious and prone to errors, especially for busy restaurants. Automating this process can significantly reduce the time and effort required to manage orders and enhance customer satisfaction. The proposed "Online Food Ordering System" is a web-based application designed to streamline the food ordering process for both customers and restaurant staff. It automates the process of browsing the menu, placing orders, processing payments, and tracking order statuses. The system stores all relevant customer information, including order history, payment details, and delivery addresses. The food ordering system provides restaurants with an efficient and accurate way to manage their ordering processes, reducing errors and saving time. This software is built to eliminate and, in some cases, reduce the hardships faced by the existing system.

Moreover, this system is designed to meet the specific needs of the restaurant to carry out its operations smoothly and effectively. Overall, this food ordering system can streamline the process of placing orders and ensure that all orders are accurate and delivered on time.

Discussions

The integration of User-Based Collaborative Filtering and Content-Based Filtering algorithms in online food ordering applications enhances customer personalisation. User-Based Collaborative Filtering identifies patterns by analysing similar users' preferences, using the Pearson Correlation Coefficient for accurate predictions. This method thrives in communities with frequent ratings.

Content-Based Filtering addresses the cold-start problem, focusing on matching a user's previous preferences with new food items via Cosine Similarity. Visual aids like flow charts and diagrams illustrate system interactions, clarify user and admin roles in managing tasks, and show operations from browsing to order placement. The streamlined workflow improves efficiency, reduces manual tasks, and boosts user satisfaction. Overall, these algorithms improve recommendations and the system's usability, essential for food delivery platforms.

CONCLUSION AND IMPLICATIONS

Online Food Delivery (OFD) apps have revolutionised the food industry by bridging the gap between restaurants and consumers through digital platforms. These apps leverage advanced technologies such as real-time GPS tracking, recommendation algorithms (collaborative and content-based filtering), and seamless payment gateways to enhance user experience. The rise of OFDs has been accelerated by factors such as smartphone penetration, internet accessibility, and the demand for contactless services—especially during the COVID-19 pandemic.

In the Nepalese market, platforms like Foodmandu, Bhojdeals, Pathao Food, and Bhok Lagyo have gained popularity by offering convenience, discounts, and a wide variety of food choices. However, challenges such as manual order errors, inefficient logistics, and tracking difficulties persist, affecting customer satisfaction and operational efficiency.

The study highlights two key recommendation systems used in OFD apps: (i) Collaborative Filtering (User-Based) – Predicts user preferences by analysing similar users' behaviour. (ii) Content-Based Filtering – Recommends food items based on textual similarity and user preferences. These algorithms enhance personalisation, ensuring that users receive tailored suggestions, thereby improving engagement and order frequency.

Implications: Combining automation and AI in the food ordering industry benefits companies such as restaurants and delivery platforms hugely. Efficiency can be greatly increased through eradication of human errors with order processing using AI. Dynamic pricing and marketing based on user behaviour also increases sales, while logistics optimisation in terms of better route planning and real-time monitoring minimise delays in delivery. In response to this, the restaurants implement customer retention strategies like loyalty and reviews systems that stimulate user engagement. The customers derive convenience and speed, immediacy of access to various restaurants at their fingertips, and personalised experiences through food suggestion via AI. Real-time online order tracking also brings transparency and reliability. Regulators and policymakers also have a role to play in safeguarding data privacy and security, ensuring competitive commission and pricing plans so that high-cost platforms are not overly advantaged, and governing delivery businesses with hygiene, packaging, and ethics. In the future, studies can explore sustainability actions like green packaging and low-carbon-emission delivery. Research can also be conducted to merge voice and AI assistants to order hands-free and blockchain technology for enhanced transparency in payments and order tracking.

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Conflict of interest

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