



Analyzing Online Food Delivery Industries using Pythagorean Fuzzy Relation and Composition

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Abstract Food and beverages constitute a significant portion of the family expenditure, which motivates the food delivery companies in striving hard to meet the customer needs through their dynamic food delivery apps. The online food ordering system is one of the most profitable marketing strategies for restaurant businesses. The face of the restaurant industry has shifted from the traditional dine-in culture to takeaways, online ordering, and home deliveries. Digital technology and social media have a significant role in ensuring the efficiency and popularity of a food delivery app. The four essential factors for a food delivery company to satisfy the needs of the consumers in day to day life are choice of restaurants, speed of delivery, payment option and quality of service. The objective of this study is to discern and analyse these four essential factors adopted by the leading four food delivery companies and evaluate the perceptions of the consumers. The best online food delivering company is identified using Pythagorean Fuzzy Relation (PFR) and composition. The analysis concludes that Zomato food application is the best in consumer's perception. The outcome of the survey is made more efficient by adopting a mathematical approach.

Keywords: Choice of Restaurants, Payment Option, Pythagorean Fuzzy Relation, Speed of Delivery, Quality of Device

INTRODUCTION

The online food delivery market of India, on the back of high growth rate, is expected to reach \$12.53 billion by 2023 and compared to the global growth rate of 9.01%, it is growing at 15% (Bureau, 2019). The connotation of food tech has changed over the years. In the past, food processing referred to the related technology adopted for manufacturing, whereas currently, it relates to the market of online food ordering and delivery services. Capitalising on the rampant digitisation, progressive consumption rate, unprecedented investment interest and funding in tandem to the changing lifestyles and food consumption habits, food tech companies in India have witnessed six times growth in the last couple of years. Chaotic urban work style and augmented disposal earnings have also propagated food delivery.

A young population, high-speed data, growing technology, fast and busy professional life, fascination for food and lack of time for its preparation at home are the key drivers to

the growth of multiple mobile food delivery apps in India. While most of these companies are limited to single cities, few made it big and are now available in several towns offering good food delivery service. These companies use mobile apps for food delivery to compete amongst each other in providing better service. Some of these food delivery apps also possess live tracking facility to trail food delivery persons, thereby enhancing the food delivery process (Deepanker, 2019). Food delivery applications revolutionise the food consumption style of Indians. Ordering food online is becoming a habit, enhancing the potential of food tech apps, having an enormous headroom to surge the reach with its commitment to improve the frequency of usage. The method of home delivery or the takeaways has augmented the customers in places like malls and offices in addition to big-party orders for residential complexes. While going to work, people avoid breakfast, and most of them like to have a corporate lunch or party cuisine by ordering food. Due to the ease and instant source of food option at home, people are excited about online food order and delivery options.

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Local markets and the mom-n-pop stores are still contributing extensively. This segment has some effect on the brick-and-mortar formats of in-dining restaurants, as more people desire to have restaurant-style cuisines privately in their homes or workplaces, even though the result is not phenomenal as it may appear to be. So it is necessary to find the best food app in consumers views to identify the consumers buying behaviour. It is essential to research consumer behaviour because, in this way, marketers can understand what drives consumer purchasing decisions. Through understanding how customers decide on a product, they can fill the demand gap and recognise which products are needed and which products are outdated. Studying the behaviour also allows advertisers to determine how to deliver their goods in a way that maximises consumer impact. It is also a critical secret to attract consumers and convincing them to purchase.

The proposed analysis considers the underlying four best factors that help to determine the consumer’s perception of online food applications. Perception of consumers reflects on their attitude towards a newly introduced product or service, which play an essential role in their success. Customer sensitivity will have a direct bearing on the popularity and longevity of the product or service in the market. The food delivery company regularly aims to achieve customer satisfaction. Hence it is essential to distinguish and analyse these factors to assess consumer perception. Successful market strategies ensure seamless service to customers if the perception of the consumer and food delivering companies are in harmony. The prevalent online environment reveals the types of products and services available, thus, influencing the perception of the consumers. The number of restaurants listed in the food applications denotes the choice of restaurants. Generally, consumers need more choice for choosing restaurants in online food apps as they desire to select the best and the nearby restaurant. Speed of delivery is the time taken to deliver the food to specific consumers and any inordinate delay is likely to create a poor impression on the service, thus making it one of the critical factors for consideration. In online food apps, the payment option allows the consumer to pay quickly with the availability of multiple payment possibilities like a credit card, debit card and cash on delivery. Among all the four factors being considered, excellence in service is an essential factor in the online food app, as consumer satisfaction emanates from the quality of service.

This work proposed the Pythagorean fuzzy relation based analysis of online food industries. Pythagorean Fuzzy Relation (PFR), identifies the predominant factors influencing the buying behaviour of the consumer perception towards online food services. The four types of factors used, help to identify the perception of consumers about online food application. This study proposed an idea of relation called POSITIVE-NEGATIVE composition to corroborate the association found. This alteration presents affiliation and

non-association rule, μ which ascribes a number with an interval $[0, 1]$ for each aspect of the discourse universe to denote the degree of belonging to the group considered. The definition of fuzzy sets popularises the principle of classical sets by facilitating intermediary conditions amid the entire and zero. The membership function described in a Fuzzy collection explains the degree of entity relationship in a class. The relationship value varies from 0 to 1, with 0 implying the entity does not fit to a class, 1 represents ‘belongs to’, and other costs represent the degree of relationship to such a class. The relationship function complemented the specific function in smooth sets for fuzzy sets. Subsequently, the union and intersection between A and B is determined. Let $A, B \in \text{PFS}(X)$. Then, the sum of A and B is defined as follows:

$$A \oplus B = \left\{ \left(x, \sqrt{\mu_A(x)^2 + \mu_B(x)^2} - (\mu_A(x))^2 \mu_B(x)^2, \nu_A(x) \nu_B(x) \right) \mid x \in X \right\},$$

and the following equation defines the product of A and B:

$$A \otimes B = \left\{ \left(x, \sqrt{\nu_A(x)^2 + \nu_B(x)^2} - \nu_A(x)^2 \nu_B(x)^2, \mu_A(x) \mu_B(x) \right) \mid x \in X \right\}$$

Example of the proposed work calculation: Let $E, F \in \text{PFS}(X)$ for $X = \{X_1, X_2, X_3\}$. Supposing

$$E = \left\{ \left(\frac{0.6, 0.2}{x_1}, \left(\frac{0.4, 0.6}{x_2} \right), \left(\frac{0.5, 0.3}{x_3} \right) \right\} \quad \text{And} \quad F = \left\{ \left(\frac{0.8, 0.1}{x_1}, \left(\frac{0.7, 0.3}{x_2} \right), \left(\frac{0.6, 0.1}{x_3} \right) \right\}$$

Composition T is found using relevant formulae that are membership function $\mu_T(y) = \bigcup_x (\min[\mu_A(x), \mu_R(x, y)])$ and

non-membership function $\nu_T(y) = \bigcap_x (\min[\nu_A(x), \nu_R(x, y)])$

$$\text{as } \mu_R(e_i, f_k) = \bigvee_{X_j \in X} (0.6, 0.4, 0.5) = 0.6 \quad \text{and} \quad \nu_T(e_i, f_k) = \bigwedge_{X_j \in X}$$

$(0.2, 0.6, 0.3) = 0.2$ then Composition $T = \mu_T \nu_T \pi_T \nu_T$
 π_T and $T = 0.6 - (0.2 * 0.7776) = 0.4451$. The objective of this work is to analyse the customer needs and impacts for developing online food business through the collection of consumer feedback. The study determines the best food serving company from the top 10 most popular food delivering applications in India like Zomato, Swiggy, Food Panda, Uber Eats, Domino’s, Pizza Hut, JustEat, Faaso’s, TastyKhana and FoodMingo.

RELATED WORKS

In recent decades, numerous studies analyse different factors influencing consumers to choose a food application through an online portal. Quantitative and questionnaire-based methods determine the preferred online food application. There are some limitations in both methods. In quantitative, lack of resources is a constraint for data collection, and it needs much time to perform the analysis. In the questionnaire method, while some questions are ignored, some remain

unanswered, besides the differences in understanding and interpreting leads to ambiguity. PFR deals with the uncertainty, multi-attribute and imprecision problems, and PFR is used to identify the consumer perception of online food applications in a mathematical way. Pythagorean fuzzy sets (PFS) is the simplification of the intuitionistic fuzzy sets and widely applicable in many fields. After its appearance, several extensions such as interval-valued PFS, hesitant PFS, and PFS come into play to solve real-life problems.

Feng et al. (2018), Ejegwa (2019) and Peng, (2018) explored Pythagorean fuzzy set conceptions and construed some propositions related to the purposes of score and accuracy. They used the PFR with min-max composition for career placement applications, but it shows the general decision-making process. They did not consider the factor-based analysis, which helps to identify the influences in a particular application. PFS can propose a superior substitute, since fuzzy sets have some drawbacks in managing ambiguity, insecurity and consumer perception. Wei and Lu (2017) & Khan et al. (2018) present an enhanced PFS in online food ordering applications using POSITIVE-NEGATIVE feedback and composition (t). This work presents membership and non-membership function, μ that ascribes the positive feedback and ν that posts the negative feedback for the given table. A numeral from the unit interval $[0, 1]$ signifies the degree of relationship to the set under deliberation. By permitting intermediate situations between the whole and nothing, the conception of fuzzy sets popularises traditional sets theory. The fuzzy set uses a membership function to signify the degree of membership of an element to a class. The membership value varies from 0 to 1, where 0 indicates that the element does not belong to a class, whereas 1 denotes it belongs to the class, and the other values represent the degree of membership to a class (Gao & Wei, 2018; & Rahman et al., 2017).

Kumari (2019) identified the four factors and relationship between online and customer behaviour based on the chi-square method. They described the analysis shorter and have some limitations in the mathematical approach. Das (2018) studied how consumers in different areas of Pune perceived online food delivery services using a limited sample size of 153 respondents for analysis. However, the results do not extend to other parts of the country due to social and cultural differences. Through the study, Lee et al. (2019) find that the habit of the consumers had the most substantial influence on their intention to use the same delivery app for food purchase continuously. However, the quality of information had an unintended bearing on their preferences. The significance of the quality of information, performance expectancy, social impact and habits are factors inducing consumers in the continuous use of food delivery apps. Hatim et al. (2019) brought out that the statistics of Quick service restaurants portrayed the practices of the current generation in ordering food online, thus escalating the online traffic to 300%. It is a

known fact that the convenience of ordering online ensures a reduction in waiting time. Hence, the students of UiTM Perak Branch, Tapah Campus patronise FoodCart, a secure and efficient food ordering service which not only has a positive impact on the students but also enhances the income of the vendors. Kwong et al. (2017) embraced a qualitative research approach collecting data through physical interviews with F&B business owners depending on their online food outsourcing awareness, attitudes, perceptions, and needs. There are some problems in qualitative research method such as a non-statistical representative form of data collection which are difficult to replicate results.

Vinaik et al. (2019) proposed the consumer's awareness regarding mobile food Apps. They tried to understand the viable factors considered by consumers while using food Apps. However, they did not analyse the crucial aspects of the food app. Zhang and Zhong (2019) quantitatively investigated the confidence of E-commerce system users by using their reviews and assessments. Direct path was used by them to define the rigidity of assurance. They developed and suggested an improved path algorithm to identify the trust relationship between users. (Liu et al., 2017) discussed a Pythagorean uncertain linguistic Partitioned Bonferroni mean (PULPBM) operator and its weighted form (WPULPBM) to resolve such conditions and classifying all characteristics into numerous types, built on definite correlation characteristics. Here the members belonging to similar groups are interrelated while correlation among multiple categories are lacking. Later, an approach for Multi-attribute decision making (MADM) problems with Pythagorean uncertain linguistic information is proposed based on the WPULPBM operator. Liang and Xu, (2017) merged the Pythagorean fuzzy sets (PFS), and hesitant fuzzy sets (HFSs) and suggested a new theory of hesitant Pythagorean fuzzy sets (HPFSs) by giving a new semantic interpretation for assessment. Prior study of the properties and the operators of HPFSs before studying the normalisation method and distance measures of HPFSs will help. Subsequently, by using the method, Technique for Order of Preference by Similarity to Ideal Solution, (TOPSIS), HPFS application is applied to multi-criteria decision making (MCDM). (Patel et al., 2020) elaborated the several algorithms that are used for sentiment analysis of hotel reviews, which minimises the noisy data and classifies the reviews based on the model created as well. Based on the sentiment, whether positive or negative, the users judge the factors for selection. Rahman et al. (2019) presented the broad background of food delivery applications and procedure of ordering of food through food delivery applications. He provides some overview but did not perform analysis based on factors of the service.

MATERIALS AND METHODS

The data collected includes both primary and secondary sources. Preliminary data comprises of information gathered

through a questionnaire based on the perception of customers using online food service. Secondary data consists of 10,000 tweets collected through the online dataset. The research is descriptive.

For examining the consumer perception towards services offered by the online food delivery companies like Zomato, Swiggy, Food Panda, and Uber Eats in Bangalore city of Karnataka; the researcher selected 120 consumers using a random sampling method. The research tool used a well-structured questionnaire with five-point Likert's scaling technique. For evaluating their perception towards services of the online food service companies, Pythagorean Fuzzy Relation and Composition is used and discussed in the analysis section.

Fig. 1 depicts the flow of work. The reviews of customers collected through a questionnaire, online datasets and the feedback of the users are analysed. Subsequently, the most influencing factors are chosen for analysis to determine the best food serving company. Further, using the composite value 't', the best aspect with the highest positive feedback is calculated.

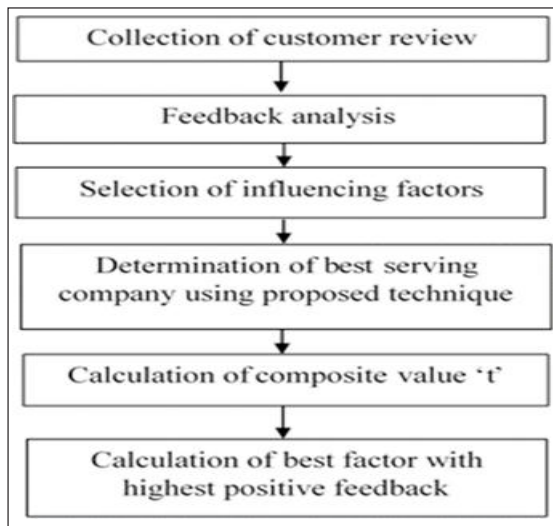


Fig. 1: Work Flow Diagram

ANALYSIS AND INTERPRETATION

Consumer's perception is of four types. They are highly dissatisfied, dissatisfied, highly satisfied and satisfied. They

lay from 0 to 1 and are validated using a fuzzy relation membership function. There are four essential factors for a company to satisfy the needs of the consumers in day to day life. They are choice of restaurants, speed of delivery, payment option and quality of service. Table 1 contains the fuzzy values for customer's perception of service by online food ordering application.

Table 1: Consumer Perception in Fuzzy Values

Values	Perceptions
0 to 0.25	Highly Dissatisfied
0.26 to 0.50	Dissatisfied
0.51 to 0.75	Satisfied
0.76 to 1	Highly Satisfied

Fig. 2 depicts the top four food ordering companies considered for this study.



Fig. 2: Logos of the Top Four Food Delivering Companies

The data reveals both the positive and negative feedback of the consumers collected from the online data sets. Feedback not classified as positive or negative are considered uncertain.

Table 2 contains the feedback for Swiggy. Choice of restaurants received the highest positive feedback indicating the extensive range provided by Swiggy, meeting the requirements of a wide range of customers. Speed of delivery received the second-highest positive feedback as Swiggy ensures fast delivery using trained employees besides providing a neat user interface. However, some consumers provided a large number of negative feedback to the quality of service because Swiggy increases the bill amount by adding delivery and packing charges to the customer (Bhasin, 2020).

Table 2: Feedback for Swiggy

Factors	SWIGGY				
	Positive Feedback(μ)	Consumer Perception	Negative Feedback (ν)	Consumer Perception	Uncertain Feedback
Choice of restaurants	0.70	Satisfied	0.25	Highly Dissatisfied	0.5
Speed of delivery	0.62	Satisfied	0.23	Highly Dissatisfied	0.15
Payment option	0.62	Satisfied	0.36	Dissatisfied	0.2
Quality of service	0.56	Satisfied	0.41	Dissatisfied	0.3

Table 3 reflects the feedback for Zomato. Choice of restaurants and quality of service received the highest positive feedback in comparison to Swiggy, Uber Eats and Food Panda, revealing

the popularity of Zomato in this segment. This factor is evident as Zomato deals with 1500 top-rated restaurants, bars, and pubs across 14 cities in India (Roopana, 2018).

Table 3: Feedback for Zomato

Factors	ZOMATO				
	Positive Feedback (μ)	Consumer Perception	Negative Feedback (N)	Consumer Perception	Uncertain Feedback
Choice of restaurants	0.82	Highly satisfied	0.15	Highly dissatisfied	0.3
Speed of delivery	0.72	Satisfied	0.26	Dissatisfied	0.2
Payment option	0.62	Satisfied	0.34	Dissatisfied	0.4
Quality of service	0.70	Satisfied	0.26	Dissatisfied	0.4

Table 4 contains the feedback for Food Panda wherein, some consumers have given positive feedback to the speed of delivery because Food Panda delivers food within the stipulated time (Rahman et al., 2019). Some

consumers are just satisfied concerning the choice of restaurants as it allows the consumers to order food from nearby restaurants only, and some fake restaurants are on their list (Kaew, 2020).

Table 4: Feedback for Food Panda

Factors	FOOD PANDA				
	Positive Feedback (μ)	Consumer Perception	Negative Feedback (N)	Consumer Perception	Uncertain Feedback
Choice of restaurants	0.56	Satisfied	0.24	Highly dissatisfied	0.20
Speed of delivery	0.62	Satisfied	0.13	Highly dissatisfied	0.25
Payment option	0.60	Satisfied	0.30	Dissatisfied	0.10
Quality of service	0.59	Satisfied	0.34	Dissatisfied	0.7

Table 5 presents the feedback for Uber Eats wherein many consumers have provided negative inputs to the choice of restaurants and quality of service. Uber Eats neither has a

wide range and number of restaurants, nor it gives timely refund when customers cancel the order. Sometimes the payment options do not work correctly.

Table 5: Feedback for Uber Eats

Factors	UBER EATS				
	Positive Feedback (μ)	Consumer Perception	Negative Feedback (N)	Consumer Perception	Uncertain Feedback
Choice of restaurants	0.65	Satisfied	0.26	Dissatisfied	0.11
Speed of delivery	0.70	Satisfied	0.13	Highly dissatisfied	0.17
Payment option	0.56	Satisfied	0.10	Highly dissatisfied	0.34
Quality of service	0.60	Satisfied	0.20	Highly dissatisfied	0.20

PFR used fuzzy maximum and minimum fuzzy techniques to find the best company by calculating the composition of t . In Table 6, μ refers to the fuzzy value of positive feedback and ν refers to the fuzzy value of negative feedback, s denotes Swiggy, 'z' denotes Zomato, f denotes food panda, and 'u' denotes Uber eats. Positive and negative feedback of all the factors related to all the companies

are analysed using PFR, and the highest favourable reviews and lowest negative reviews of all factors are compared and tabulated. Zomato application has the highest positive feedback and the lowest negative feedback. Hence Zomato application is considered to serve the best, compared to all other online food delivery applications.

Table 6: $\mu S \cup Z \cup F \cup U \max(s, z, f, u), v S \cap Z \cap F \cap U \min(s, z, f, u)$

Factors	μ Positive Feedback (max)	v Negative Feedback (min)
Choice of restaurants	0.82	0.15
Speed of delivery	0.72	0.26
Payment option	0.62	0.34
Quality of service	0.70	0.26

The composition (t) is determined using the formula:-

$$t = \mu v \pi \quad (1)$$

Where π value can be calculated by the formula:-

$$\pi = \sqrt{1 - \mu^2 + v^2} \quad (2)$$

Calculate the π value:-

(a) Calculate the π value for the choice of restaurants

$$\begin{aligned} \pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.82^2 + 0.15^2} \\ &= \sqrt{1 - 0.6724 + 0.0225} \\ &= \sqrt{1 - 0.6499} \\ &= \sqrt{0.3501} \\ \pi &= 0.586 \end{aligned}$$

(b) Calculate the π value for the speed of delivery

$$\begin{aligned} \pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.72^2 + 0.26^2} \\ &= \sqrt{1 - 0.5184 + 0.0676} \\ &= \sqrt{1 - 0.4508} \\ &= \sqrt{0.5492} \\ \pi &= 0.741 \end{aligned}$$

(c) Calculate the π value for payment option

$$\begin{aligned} \pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.62^2 + 0.34^2} \\ &= \sqrt{1 - 0.3844 + 0.1156} \\ &= \sqrt{1 - 0.2688} \\ &= \sqrt{0.7312} \\ \pi &= 0.855 \end{aligned}$$

(d) Calculate the π value for the quality of service

$$\begin{aligned} \pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.70^2 + 0.26^2} \\ &= \sqrt{1 - 0.49 + 0.0676} \\ &= \sqrt{1 - 0.4224} \\ &= \sqrt{0.5776} \\ \pi &= 0.76 \end{aligned}$$

After determining π values as tabulated in Table 7, 't' is determined as illustrated and shown in Table 8.

Table 7: π Value of Zomato Application Factors

Factors	π Value
Choice of restaurants	0.5524
Speed of delivery	0.6434
Payment option	0.7071
Quality of service	0.6651

Calculate the composition t for *choice of restaurants*,

$$t = \mu - v\pi; t = 0.82 - 0.15(0.5524); t = 0.7371.$$

Calculate the composition t for *speed of delivery*,

$$t = \mu - v\pi; t = 0.72 - 0.26(0.6434); t = 0.5527$$

Calculate the composition t for *payment option*,

$$t = \mu - v\pi; t = 0.62 - 0.34(0.7071); t = 0.3796$$

Calculate the composition t for *quality of service*

$$t = \mu - v\pi; t = 0.70 - 0.26(0.6651); t = 0.5271$$

Table 8: Composition (t) Calculation for Zomato Application

Factors	(t) Value
Choice of restaurants	0.7371
Speed of delivery	0.5527
Payment option	0.3796
Quality of service	0.5271

On analysis, Zomato is the best among the food serving industries, and the choice of restaurants is the top-rated factor among all other factors in the food serving application.

RESULTS AND DISCUSSION

Demographics

Generally, the parameters belonging to the category such as the gender, age, profession and consumption of customers affect the usage pattern of the mobile apps. These parameters are important because they determine the consumption pattern and customer behaviour in using these apps. Table 9 indicates the demographic and socio-economic characteristics of the 120 respondents involved in the study for understanding the customers' behaviour in the usage of food delivery apps.

Table 9: Demographic Profile

Category		Number	Percentage	Category		Number	Percentage
Gender	Male	56	47%	Age	20 – 30	64	53%
	Female	64	53%		30 – 40	33	28%
	Total	120	100%		>40	23	19%
			Total		120	100%	
Profession	Unemployed	2	2%	Consumption	1000	63	53%
	Student	107	89%		500	43	36%
	Working	7	6%		100	14	12%
	Self-Employed	4	3%		Total	120	100%
	Total	120	100%				

Consumer's Feedback

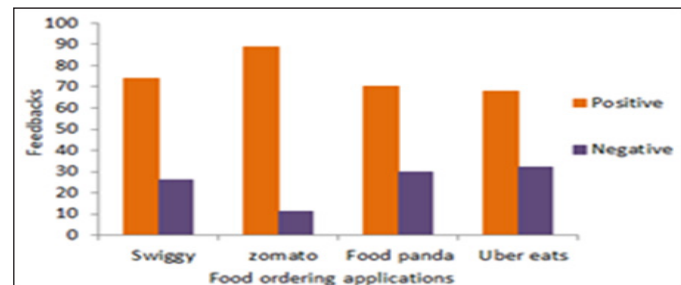
Customer feedback denotes the data that originates straight from the consumers about their experience regarding a specific product or service. Table 10 represents the positive and negative feedback of all the foodservice companies ("Twitter Reviews: Online Food Ordering Services"). Zomato occupies the top position in positive feedback and the bottom position for the least number of negative feedback. The result is consistent with a previous study of Das (2018) in which Zomato is the most preferred food service provider due to the discounts offered and timely delivery.

Table 10: Consumer's Feedback for Each Application

Applications	Feedback (%)	
	Positive	Negative
Swiggy	74	26
Zomato	89	11
Food panda	70	30
Uber eats	68	32

Fig. 3 shows the feedback comparison between the food delivering applications. Consumers provided

high positive feedback for Zomato application. We can observe that Zomato leads the race by dominating in all the four factors and Uber Eats occupies the last position as it lags in all four aspects, particularly in the speed of delivery.

**Fig. 3: Comparison of Feedback of Each Application**

Overall Feedback

The term overall feedback refers to the given customer feedback of online food delivery applications. Table 11 represents the overall feedback on all the companies against all the identified factors.

Table 11: Overall Analysis

Factors	Overall Feedback (%)			
	Swiggy	Zomato	Food Panda	Uber Eats
Choice of restaurants	38	42	15	5
Speed of delivery	32	45	15	8
Payment option	30	50	11	9
Quality of service	38	40	12	10

In Fig. 4 all the four factors, namely, choice of restaurants, speed of delivery, payment options and quality of services are compared to find the best online food delivering company among Swiggy, Zomato, Food Panda and Uber Eats. Zomato leads the group as it tops in all the four factors. This study will facilitate Swiggy, Food Panda and Uber Eats to analyse their performance in all the four factors and help them in taking corrective measures to take the lead over Zomato.

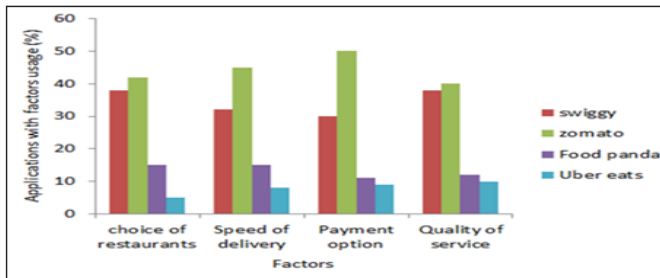


Fig. 4. Comparison of Overall Feedback Analysis of Online Food Delivery Applications

The analysis helps in understanding the perceptions of the consumer regarding the online food ordering service. The observations reveal that the choice of restaurant is a vital factor considered by many customers in the food serving industry. Zomato dominates in the “choice of restaurants” and leads the race. Swiggy’s choice of restaurant is nearer to Zomato but still needs to progress. Food panda lags among all the providers. Uber Eats provides better services when compared with Food Panda. Speed of delivery of Food Panda is slow when compared to Swiggy, but Uber Eats is faster than Swiggy. Overall the race is between Zomato and Swiggy to be amongst the top two and between Food Panda and Uber eats for the next two places. The survey also exposed the most common complaints of the customers which are related to timely delivery besides fresh and warm food which are equally applicable to all the food serving companies. Also, many feedback mentioned about the lack of communication with the customers by the companies. Suitable countermeasures should be adopted by the companies to address this vital aspect which is necessary to ensure business development.

Findings

Zomato provides the user-friendly environment to customers where they can rate, search, review and share the preferred or neighbouring restaurants. Excluding combos, the second-highest priced items are offered free by Zomato, which could be an added advantage to it. In India, 12% of the young population have installed Zomato’s app in their smartphones while Swiggy has 10%, which proves that Zomato has more customers in India. This app provides reviews and information about restaurants besides its menu with images, even if the restaurant does not have its website. Thus Zomato dominates all other online food delivery apps and is placed on top. There are many reasons for Uber Eats to occupy the last position as the restaurants provided to the customers’ for their food selection are limited. Also, Uber Eats is unconcerned, about the inconvenience caused to the customers despite numerous customer complaints about its delivery process, which is not only time consuming but also delivers incorrect food.

Implications of the Study

The study analyses and highlights the four significant factors, i.e., “choice of restaurants, speed of delivery, payment option and quality of service” a food delivery company need to address in order to enable the consumers in distinguishing the information on the type of food products available with each restaurant before ordering their choice of items. This knowledge of the food consumed is of critical value to the consumer, and the onus of providing precise information is with the food tech companies. It is vital to have a regulator to enforce the rules and carry out an evaluation of the food tech companies and online campaigns to create awareness of the fast-growing food ordering community are necessary.

Recommendations

Uber Eats needs to improve upon the consumer-side problems. They should explore the possibility of placing orders rapidly from a list of items. Designing a payment gateway will help to process payments and verify promo codes to enable the customers in completing a payment transaction with ease and speed. *Swiggy* should develop certain services like consumer accommodation to provide menus and quick techniques to select and pay for the orders. Dispatch rendering service should combine order, region and delivery course data which can offer access to the list of requests and allow members to contact the couriers for arranging delivery. They should develop the capability to monitor the status of the order, expected delivery time and courier location. *Zomato* is not a preferred choice for a consumer wanting to order from a small restaurant near

home or office. Hence Zomato should endeavour to capture the local orders from consumers. *Food Panda's* technical issues prevent some consumers wanting to place an order from them. Employees are unable to respond to customer queries due to the prevalent technical concerns, inviting widespread complaints from the consumers. Food Panda should try and overcome the problems before losing a more significant market share.

CONCLUSION

Online sales are capturing the market at a tremendous pace, swaying the consumers towards it, and the food industry is no exception. Consumers have side-lined offline and preferred online for food delivery owing to its convenience. Slowly customers would prefer to order from the website of the restaurant directly and this in the coming years will pose a significant challenge to third-party apps like Swiggy, Zomato, Food Panda and Uber Eats. In the current study, Zomato dominates in the choice of restaurants and leads the race, followed by Swiggy. The study reveals that the major complaints of the customers are related to timely delivery and in provisioning fresh and warm food. Feedback indicate a lack of communication with the customers by the companies. Adoption of suitable countermeasures by the companies in addressing these issues will enhance their business development and augment their market share.

LIMITATIONS AND FUTURE SCOPE

Like all studies, this study too has its limitations. This research is Bangalore specific, and the results may vary with other destinations. In the future, the use of multiple dynamic factors for analysing the online food delivery app by examining diverse feedback dimensions will help. This study considers a single social media platform, but future research may weigh more than one social media platforms for analysis.

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