

Rise and the Future of Cloud Kitchens in India: A Consumer Study

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Abstract: Cloud kitchens are online-operating eateries lacking a physical presence, and their growth has been key in the growth of the food industry as a whole. Cloud kitchens operate on the basis of Food Delivery Apps (FDAs) that enable a set foundation to reach out to consumers. The role these eateries have played during the COVID-19 pandemic has been and continues to be important – especially with rigid lockdowns in India. Cloud kitchens such as Faasos, Fresh Menu, etc. operating through FDAs have supported food demands and dealt with demand and supply fluctuations, setting up an efficient food production and delivery process. This paper studies the factors that differentiate cloud kitchens from traditional kitchens, consumer behaviour and reaction to cloud kitchens, and the impact COVID-19 has had on consumer interaction with food delivery, specific to cloud kitchens. The analysis of this industry is important for future growth, so as to identify the main pain points and consumer behaviour specific to cloud kitchens in terms of expectations and prioritization of elements related to food delivery.

Keywords: Cloud kitchens, COVID-19, Food delivery, India.

1. Introduction

As consumer spending patterns change and demand as well as consumer confidence patterns fluctuate, so do the technologies to adapt to these. With the advent of e-commerce came a concept that has taken off in the last few years – that of cloud kitchens. Cloud kitchens are fully online-based food aggregators that supply prepared meals in the mode of delivery only, having no physical presence consumers can visit (Chouadhary, 2019). Cloud kitchens operate on a low-cost, demand based model relying on solely the online delivery of food, and have been an essential element in sustenance during COVID-19 lockdowns in India, and even beyond, with social distancing now being an essential safety measure.

Cloud kitchens eliminate many of the hassles that come with traditional kitchens – supply chain disruptions, inventory management, and dependence on the nature of the consumer base amongst many others. By prioritizing food quality, hygiene and preparation, these models have proved to be beneficial to most consumers of food delivery apps (FDAs), especially in a time period when convenience and safety through distancing has been of utmost importance. Motivators such as hygiene, food quality, ratings, comfort/past experience, and many others have served as essential factors in consumer decisions, impacting buying behaviour in the context of FDAs.

Cloud kitchens have ‘ticked the checkboxes’ for many consumers in this respect, where the key consumer expectations are met by efficient models of preparation and delivery. Cloud kitchens have seen extreme success, with popular brands such as Faasos, Fresh Menu, Oven Story, etc. taking over FDAs, and have been central to tackling the many impacts of the COVID-19 pandemic.

Table 1
Different food industry bodies and market sizes

Formats	Market Size (INR crores): 2018-19
Quick Service Restaurants (QSR)	32,880
Affordable Casual Dining Restaurants (ACDR)	60,255
Premium Casual Dining Restaurant (PCDR)	19,984
Fine Dining Restaurant (FDR)	2,872
Desserts, Ice Cream (D&CI)	4,121
Cafe	9,370
Pubs, Bar Cafe and Lounge (PBCL)	17,979
Cloud Kitchen	928

Source: Express Food and Hospitality, India Food Services Report 2019

Cloud kitchen as a concept has a very diverse background. It has taken inspiration from the East and the West alike, incorporating processes from Chinese takeout restaurants and American pizza delivery chains. Cloud kitchens are centralised facilities located in residential hubs and other high populous areas. These warehouse-like structures sometimes may have dozens of restaurants operating under the same roof all of which are vertically integrated and optimised for delivery. Cloud kitchen as a concept in India was pioneered by rebel food in 2003. Today this parent company operates over nine brands including Faasos and Oven Story. The cloud kitchen concept has been executed on the backing of various business models which are incorporated below:

1) The independent-kitchen model

This is the purist execution of a cloud kitchen model. This model is based around having only a small kitchen space and has no seating or physical storefronts. Their entire business is optimised for delivery only and they usually only specialise in one cuisine in order to further optimise their process.

2) The multi-brand & single kitchen model

This is a relatively sophisticated execution of the cloud kitchen business model. The business decisions are based on

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analysis of massive datasets across categories such as demographics of residents, most ordered cuisines and logistics infrastructure. The cornerstone of this execution is to fulfill the demand for the most ordered dishes across cuisines within a pre-decided radius. This model allows the owner of the cloud kitchen to operate multiple brands under the same roof. Hence, keeping their operating cost low.

3) *The aggregator owned business model*

Under this business model food delivery aggregators i.e., Swiggy and Zomato provide established or new restaurant businesses with kitchen space along with infrastructures such as gas pipelines, drainage and ventilation systems already in place.

The availability of a vast delivery network, data on consumer preferences and marketing capabilities makes this model the optimal choice for smaller brands.

The food industry has suffered the consequences of the pandemic in the form of many different challenges, but has also adapted to a large extent to suit consumer needs, as FDAs have efficiently done. This study aims to analyse cloud kitchens, and the role they continue to play in the context of COVID-19 and Indian consumers, ascertaining the changes in consumer behaviour specific to the challenges the pandemic has brought forward, therefore filling a research gap existing with regards to cloud kitchens in India specific to pandemic factors.

B. *Research Objectives*

The research objectives of this study are:

1. To demonstrate the viability of a cloud kitchen based model by in-depth examination and analysis via case studies.
2. To demonstrate the consumer sentiment around the existence and practices of cloud kitchen via a primary study.
3. To elaborate on the various challenges faced by proprietors and operators of major cloud kitchens.

C. *Research Question*

The following article attempts to answer the following questions:

1. What is the current status of the Indian restaurant industry (pre-covid) and where do cloud kitchens fit within the industry?
2. Is the cloud kitchen business model sustainable and scalable?
3. What is the future scope for growth and technological innovation within the cloud kitchen business model?

2. **Literature Review**

1) *Cloud kitchens and their significance in India*

Cloud kitchens refer to shared or non-shared spaces where restaurants operate on a delivery-only model, having operations and processes specifically geared towards the delivery of food items and not catering to in-person customers (Chern and Ahmad, 2020). Aside from a few disadvantages mainly concentrated on overdependence on virtual infrastructure, cloud kitchens have all the advantages over physical eateries as there

is a significant time, cost, and effort saved by the elimination of factors such as storage, sitting space, prime property pickings, etc. (Choudhary, 2019). The cloud kitchen market is projected to reach an evaluation of 2 billion in India by 2024, and high domestic and international investments into large companies operating on cloud kitchen models reflect this fast growth. COVID-19 as a pandemic has forced offline businesses to adapt, and concepts such as cloud kitchens to rise (Maurya, Subramaniam, and Dixit, 2021).

Food Delivery Apps (FDAs) have not existed in Indian markets for very long, but have taken hold in the Indian food industry better than most other new businesses in the past decade. With the evolution of e-commerce and related technologies, companies such as Zomato and Swiggy have taken advantage of the growing youth population and demands of the same in India, by eliminating logistical costs and worries, and expanding to an online-only system (Sufi and Srivastav, 2020). Studies have also reflected on the main elements contributing to this extreme growth in the food delivery industry, mainly focused on a growing middle-class income group, hectic work hours, and a growing economy reflecting a higher standard of living (Bhotvawala et al., 2016). Food-tech companies have expanded into cloud kitchens to a major extent, financially supporting such undertakings and enabling small businesses to operate on low-cost and low-risk models, negating the normal risks of any cloud-based business (Meenakshi and Sinha, 2019). Multiple primary concerns have also emerged, however, with regards to FDAs and cloud kitchens - including hygienic preparation of food, material condition, pandemic-related drawbacks, etc. that present a unique opportunity for FDA companies - to set stringent standards that can be trusted by an expanded consumer base (Munshi and Singla, 2020).

The Indian 'Dabbewala' model has also been a concept regularly compared to food delivery models in the country, with shared factors such as ease of delivery, no collection point required, and ease of payment (Patel and Vedula, 2006). The stemming concept of FDAs has brought about multiple opportunities for further growth in this market - technological advancements, further supply chain developments, and the revolution of food products to support a large consumer base included (Thamaraiselvan, Jayadevan, and Chandrasekar, 2019). One of the largest opportunities for improvement in infrastructure and processes lies in sustainability - with the advent of ease of purchase and online-based models, sustainability in terms of the environmental impact of food delivery has also been called into question as part of the 3 key sustainability pillars and must be addressed in the coming years (Miroso and Bremer, 2020).

Supply chain disruptions due to the pandemic have only further highlighted the requirement of FDAs and safe, circular model-based cloud kitchens in India, with multiple logistic failings chalked up to supply chain cuts and making the need for cloud-based systems even more prevalent (Mahajan and Tomar, 2021). Cloud kitchens are, therefore, not only on the rise but also a concept that is being and will continue to be adapted across India for better income and food security of

businesses and individuals.

2) *Consumer behaviour in an online model*

Online models have boomed in Indian markets, although only 10% of the Indian population makes use of e-commerce websites and apps, with a strong retail segment still going in India supporting rural parts of the country (Tandon, 2021). India is a country with a large youth population, and approximately 70% of this age group uses the internet on a daily basis and is aware of online sold goods and services. A survey found that a large part of this population prefers cash on delivery as the payment mode for online products, and approximately one-fourth of the responding population have faced difficulties at some point or the other with online shopping (Rastogi, 2010). The online shopping behaviour of millennials consumers in India follows similar patterns throughout - with cash on delivery as the most preferred mode of payment, and the cost rather than quality or brand of products being of utmost importance (SivaKumar and Gunasekaran, 2017). Studies have also found certain age and buying relations. Older customers are less likely to research online before purchasing and are more likely to consider quality at par with cost (Goyal, 2017). Singular results were found as well, such as older customers buying as much as younger ones, but researching and marking products at a significantly lesser rate than youngsters (Sorace, Perotti, and Widrick, 2005).

With motivators in online shopping, reasons for online purchases can be narrowed down to goal-oriented and experiential shoppers. Goal-oriented shoppers browse and purchase with specific requirements and demands in mind, while experiential shoppers do so for the experience and often retail therapy online purchasing caters to (To and Sung, 2014). The former drives most of the retail online shopping that takes place. Experiential shopping as compared to goal-oriented shopping creates long-term value add and results in future purchases and browsing (Wolfenbarger and Gilly, 2020). These described factors and distinctions also apply to the FDA sector of online shopping.

In terms of food and grocery delivery, factors such as income group, age, tastes, gender, etc. have extremely diverse impacts on the buying decisions of consumers, and also fluctuate within product categories (Prasad and Aryasri, 2011). With regards to food delivery, three dimensions rule the preferences and tastes of Indian consumers - service and delivery, product, and quality dimensions. This includes factors such as hygiene and nutritional content of food products, both of which result in the first preference of most Indian consumers being homemade rather than eatery sourced food (Goyal and Singh, 2007). Zomato, one of the leading FDAs in India, reports a high customer growth rate year-on-year, specifically during the pandemic, which in itself is a reflection of the growing popularity of online food delivery services. The company uses multiple marketing tactics to attract a growing customer base, including an emphasis on quality over quantity, an aspect that brings more Indian customers to the table (Sparta, Alsumait, and Joshi, 2019). The three key players in this model, customers, FDAs, and restaurants, need to work in tandem in an efficient low-effort chain that prizes the customer's wants

and needs above all - as the higher the ease, the more customers that a food delivery company can bring to its platform (He et al., 2019).

3) *Consumers and Cloud Kitchens*

Indian consumers have in the past decade shown an inclination towards online services - but this has gotten highly pronounced in the last year due to the pandemic and consequent lockdowns. Food security has been negatively affected by a large extent, specifically daily wage workers who are often dependent on government school schemes to feed their children (Alvi and Gupta, 2020). The Indian restaurant sector offers employment to almost 7.5 million workers, and those that had shifted to online models were able to keep employing these workers. Although Indians have shown a general aversion towards eatery food during COVID-19, more families and individuals have shifted to online food delivery systems during the pandemic (Sufi and Ahmed, 2021). In India, an average of 20% of the population depends on food from eateries and restaurants, which made food delivery essential during lockdowns (Kumar, 2020). FDAs have seen tremendous growth in their customer base due to the minimization of contact they bring as a benefit and the dependence many had on such applications during the pandemic (Mehroliya, Alagarsamy, and Solaikutty, 2020).

A study found that the highest prioritized factors by customers with respect to food delivery during COVID-19 have been loyalty and comfort with the restaurant, quality of food, variety, and quality of preparation amongst many others (Dsouza and Sharma, 2021). Research also suggests that although shifting to cloud kitchens has been profitable during the pandemic, restaurants have faced many problems such as adaption to an online-only model, inventory/food stock issues, and investment into an efficient admin order management system (Kumar and Shah, 2021). With respect to cloud kitchens, standardization of processes and the mass-production of food with a focus on quality makes the concept an ideal fit for the demands Indian consumers have during COVID-19. These fast-tracked systems require investment in many cases, but the benefit of cloud kitchens is their optimal adjustability, making it relatively easier to shift from offline to online modules (Reardon et al., 2021). These online models, therefore, make the process of food delivery faster, easier, standardized, and of a higher quality.

Multiple factors make cloud kitchens the perfect fit for Indian consumers and force them to seek out virtual infrastructures, focused on quality, usability in online interfaces, delivery speed/efficiency, and preparation factors (Panse, Sharma, and Dorji, 2019). The food industry has had to adapt to a large extent, but so have consumers. FDAs have had to make it easier for first-time customers to hop over to an online model, and the prioritization of factors such as quality and consistency in cloud kitchens has played a large role in this (Jha, 2021). Factors such as income constraints, COVID-19 restrictions, and general consumer behaviour leaning towards variety, new experiences, and a break from routine force consumers to sometimes step out of their comfort zones for the usage of FDAs. These influences make consumers lean towards cloud kitchens, whether known

or previously untried ones (Gupta and Duggal, 2020). COVID-19 has forced an era of higher online dependency, and this applies to consumer behaviour with regards to food delivery services to a large extent as well.

3. Research Methodology

A. Research Problem

Although there is a wide base of research on FDAs and cloud kitchens, there is lacking research on the Indian consumer base and the impact COVID-19 has had on consumer behaviour specific to food delivery. This research can help build a basis for reaching and targeting consumers more effectively during COVID-19 in a changing sector using insights gained from a study of consumer behaviour and changing patterns.

B. Significance of the Study

1. This study will be significant to potential and current entrepreneurs on the verge of entering or expanding in the hospitality space, as it will propose an alternate and disruptive business model.
2. This study will provide in depth consumer insights to current operators of cloud kitchens, which will further help them optimise their business decision

C. Research Design

This study will follow a descriptive research design where a smaller sample of the wider population will be targeted to ascertain the behaviour of the population. The design of the research leans on both primary and secondary sources, with no prerequisites to limit sample size or authenticity of samples.

- Population – The larger population is that of Indian consumers who use FDAs and delivery services.
- Targeted sample – Indian consumers of different ages who use food delivery services within accessible range.
- Time period – Collection of data within 1 week.

D. Research Data Collection Sources

1) Secondary Research

For the purpose of setting a base knowledge and studying what other research implied or found, secondary research is done in an extensive manner. The study of existing research helps to point to existing pain points, and new ones that other studies have detailed. The sources used are:

- Published papers of reputed journals from sources such as T & F, Science Direct, JStor, etc.
- Census data and statistics from online sources
- Online websites and trusted news platforms
- Conference proceedings and books

2) Primary Sources

For primary research collection, a questionnaire was utilized so as to gather data on consumer behaviour and opinion and ascertain thought process on cloud kitchens, COVID-19 and food delivery, etc.

- Method used – Online questionnaire
- Platform used for collection – Google Forms
- Type of data – Mostly Qualitative, Quantitative

- Sample size – 108

4. Data Interpretation and Analysis

The survey conducted helped us find out consumer behaviour with respect to cloud kitchens and online food ordering. Questions were also included to understand how the consumer behaviour has been affected because of the Covid-19 pandemic. In order to avoid confusion between normal restaurants and cloud/ghost kitchens, the definition of cloud kitchen was given in the description of the questionnaire. The survey was filled by 108 consumers which mainly included college students.

Q.1. What is your age?

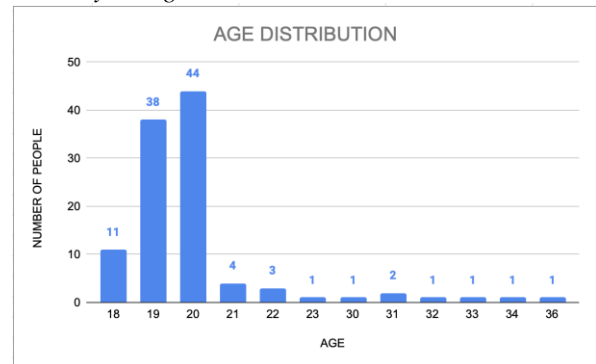


Fig. 1. Graph showing percentage age distribution

Data Interpretation and Analysis:

The following chart shows the age distribution on the consumers who filled the survey.

It was found that 63% of the consumers were 20 and below who were mainly college students.

Q.2. What is your occupation?

Table 2
Occupation of the Sample

Category	Number of Participants	Percentage
Student	96	88.90%
Part Time	1	0.90%
Job	4	3.70%
Self-Employed	4	3.70%
Homemaker	3	2.80%
Unemployed	0	0%

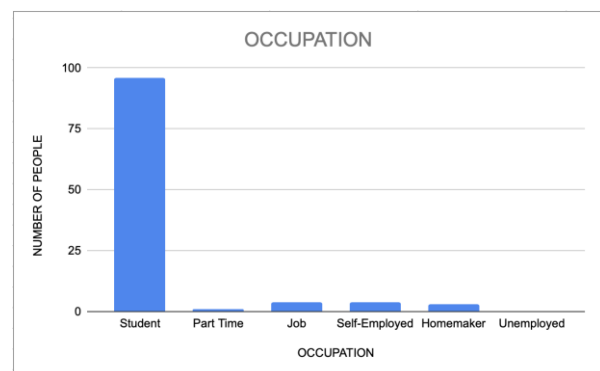


Fig. 2. Occupation of the sample

Data Interpretation and Analysis:

The questionnaire was mainly filled by the college students

as they are the ones who use online food services the most and thus would be a great audience to answer questions in the survey.

Q.3. How often do you use food delivery services in a week?

Table 3
Frequency of food delivery service used

Category	Number of Participants	Percentage
Every day of the week	1	0.90%
4-5 Days a week	11	10.20%
2-3 days a week	32	29.60%
Once a week	44	40.70%
Rarely	20	18.50%

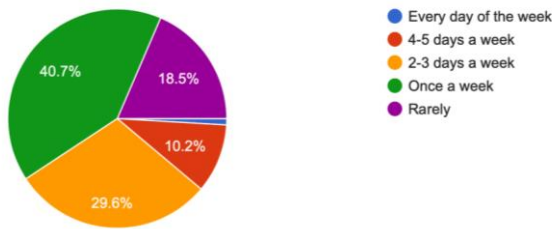


Fig. 3. Graph showing percentage of frequency of food delivery services used

Q.4. How important is delivery speed for you when using food delivery apps?

Table 4
Percentage impact of delivery speed on consumers

Category	Number of Participants	Percentage
Extremely Unimportant	0	0%
Unimportant	0	0%
Neutral	10	9.30%
Important	47	43.50%
Extremely Important	51	47.20%

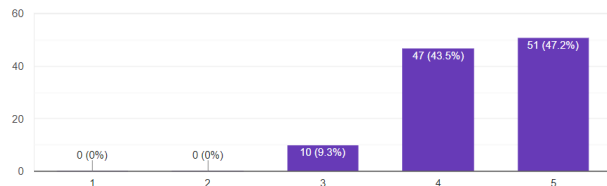


Fig. 4. Graph showing percentage of impact of delivery speed on consumers

Data Interpretation and Analysis:

The results of the importance of delivery speed were skewed more towards somewhat and very important options. Most respondents selected either option, allowing for the establishment of the importance of delivery speed as high, owing most likely to factors such as impacted quality of food, shortage of time, etc.

Q.5. How important is the level of hygiene of an eatery when ordering food online?

Table 5
Percentage impact of hygiene of an eatery on consumers

Category	Number of Participants	Percentage
Extremely Unimportant	1	0.90%
Unimportant	0	0%
Neutral	3	2.80%
Important	12	11.10%
Extremely Important	92	85.20%

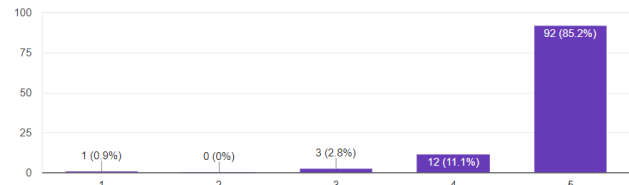


Fig. 5. Graph showing percentage impact of hygiene of an eatery on consumers

Data Interpretation and Analysis:

The first few sets of questions in the questionnaire concentrated on gathering information on general consumer behaviour and reaction in terms of cloud kitchens. Level of hygiene was found to be an important factor in FDA deliveries according to existing studies, and this is supported in the above graph. Hygiene is an important consumer factor, one that has increased in importance with the pandemic's progress. Most responses were leaning towards the importance of hygiene being very high when ordering food, indicating an important factor of focus. Therefore, for close to 85% of consumers, hygiene is a very important factor when ordering food from eateries.

Q.6. In most cases, people order food from restaurants they have visited physically in the past. How important is this to you when ordering food?

Table 6
Percentage of importance of physical visit for consumers

Category	Number of Participants	Percentage
Extremely Unimportant	1	0.90%
Unimportant	16	14.80%
Neutral	40	37%
Important	37	34.30%
Extremely Important	14	13%

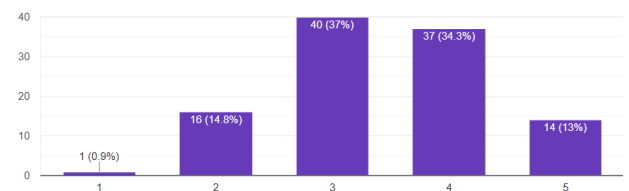


Fig. 6. Graph showing percentage of importance of physical visit for consumers

Data Interpretation and Analysis:

Online shopping and services generally necessitate the level of comfort the consumer has with the shop, product, or service, and this applies to some extent to FDAs as well. Most

respondents were neutral about level of comfort with the eatery, but the sum total of the responses for somewhat and very important is higher than the neutral option. Hesitancy in ordering when the eatery is not known/experienced is therefore high, most probably also impacted by the hesitancy and caution COVID-19 has made necessary. This also indicates that a significantly high number of people trust offline eateries and their experience with them, and although this does not mean a clear preference over cloud kitchens, it points to consumer intention when it comes to offline experience and comfort level when ordering food.

Q.7. If you have tried delivering from cloud kitchens, is your overall food experience better than with traditional restaurants (in terms of food quality)?

Table 7
Percentage of consumers finding food quality of cloud kitchens better

Category	Number of Participants	Percentage
Yes	27	20.60%
No	19	18.60%
Maybe	62	60.80%

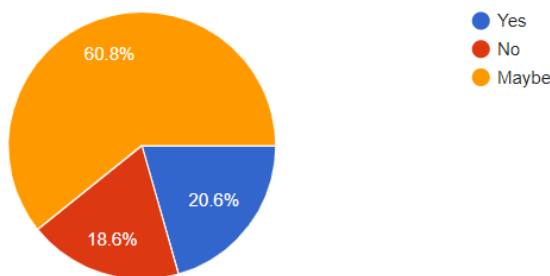


Fig. 7. Graph showing percentage of consumers finding food quality of cloud kitchens better

Data Interpretation and Analysis:

As with a few other analysed questions from the survey, the majority of respondents have a neutral opinion on the preference of cloud kitchens over traditional kitchens. This could be owing to the fact that there is no clear and always present distinction between the two, with most consumers being unaware of the concept and differentiation. However, a higher number of people do clearly believe that their experience with cloud kitchens in terms of food quality is better than with traditional kitchens (this difference is minute, only 2%). Although this is a significant question and the data is important, the results do not help conclude anything concrete with regards to a preference.

Q.8. Do you think COVID-19 has impacted your choice in ordering food and the eateries you select in any way?

Table 8
Percentage of Impact of Covid-19 on Consumers

Category	Number of Participants	Percentage
Yes	73	67.60%
No	15	13.90%
Maybe	20	18.50%

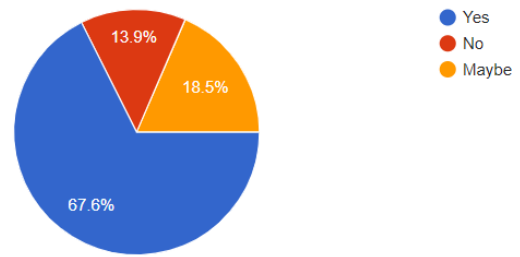


Fig. 8. Graph Percentage of Impact of Covid-19 on Consumers

Data Interpretation and Analysis:

Although this question does not analyse the exact reasons for a change in buying behaviour, it still indicates an important pattern – most consumers believe that their choices in ordering food and selecting eateries have been impacted, to some extent, by COVID-19. 67.6% on respondents believe that it has, whilst 18.5% are unsure of the same. Such a high rate of positive responses suggests that there are factors that have increased in importance when ordering food for most consumers that must be emphasized by eateries and cloud kitchens.

Q.9. In the COVID situation, which of the following kind of eateries do you trust when ordering food?

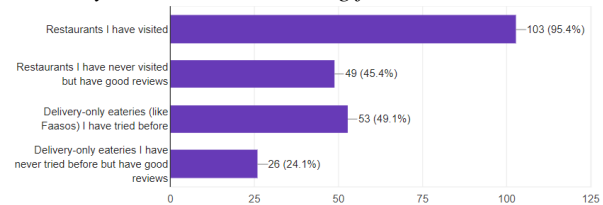


Fig. 9. Percentage of consumer's choice of eateries for ordering food

Data Interpretation and Analysis:

The largest group of responses pointed towards the high significance of being comfortable with and having visited an eatery previously. 95.4% of respondents believe that the factor of past experience is an important one when ordering food, which again points to changing consumer behaviour. A more conscious approach has been adapted by most consumers with regards to the usage of FDAs. Another significant takeaway from this is the disparity between well rated but untried restaurants and well rated but untried delivery-only eateries. A significant difference lays between the comfort of consumers with untried restaurants and untried cloud kitchens, which points to factors such as a lack of transparent cooking process, human touch, etc. that may impact cloud kitchens negatively.

Q.10. With respect to delivery-only kitchens, or cloud kitchens, which of the following are most important to you when ordering?

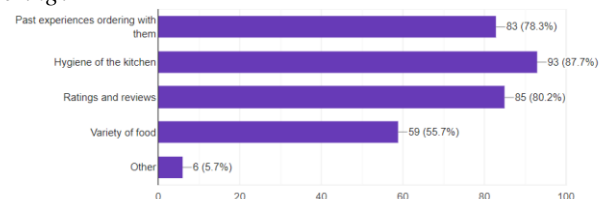


Fig. 10. Percentage of factors affecting consumers while ordering from cloud kitchens

Data Interpretation and Analysis:

Again one of the highest prioritized factors when ordering food has come out to be hygiene, which is a predictable outcome given the circumstances. Ratings and reviews, however, are more important to consumers by a small extent than past experiences ordering with a cloud kitchen. This applicable only to cloud kitchens, where the factors of experience ordering from the eatery, hygiene, and ratings are the main priorities being considered by consumers with regards to cloud kitchens. These are, therefore, the main factors that should be considered by cloud kitchens as priorities to consumers that should be maintained and marketed so as to understand consumer preferences and utilize them.

5. Results, Discussions and Conclusion

A. Conclusion

With rising demand for ease of services, technology has streamlined many industries and sectors to a large extent, with the food industry being one of these. Cloud kitchens enable peak efficiency and satisfy consumer requirements such as hygiene, good food quality, and fast delivery without having to compromise due to there being less inventory and physical management problems that come with traditional kitchens. The fully-online models have found to satisfy most consumer needs and with COVID-19, have served essential services to consumers. As found through the primary study, there is not only a marked change in consumer behaviour with regards to online food delivery, but there are also certain factors with regards to cloud kitchens that respondents favour over others, for example hygiene. There is a clear impact of COVID-19 on consumer behaviour with relation to FDAs, and this impact is felt by cloud kitchens as well. Changing consumer behaviour has increasingly made consumers seek out models such as cloud kitchens, where the essential factors are met, but there is still a long way to go for the industry and for cloud kitchens owing to the large diaspora of the Indian population.

B. Limitations

The limitations of this study are centrally around the collection of primary data. An extensive sample size that reaches across not just age groups but also income groups and geographically separated consumers would benefit the study, as an extensive sample size could prove existing hypothesis' and provide new data for the purpose of analysis. Furthermore, a lack of empirical data on cloud kitchens in India has also restricted the reach and the viability of this study.

C. Scope for Further Research

As COVID-19 is an on-going pandemic and many factors are still unaccounted for, future studies that reflect in depth on how cloud kitchens have revolutionized the food industry and have been boosted by pandemic factors would allow managers and firms to study this growth and apply the changes demanded for by consumer behaviour. Extended studies of cloud kitchens in India would bring more insights into costing, marketing, management, etc. factors of a concept that is relatively new in the Indian market. Studies of the advantages cloud kitchens

provide to consumers, firms, and the surrounding business environment can benefit further strides made in the research of this sector.

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