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Cloud Kitchens and its impact on the restaurant industry

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Abstract

This study enhances the fact that the Cloud Kitchens are more efficient than traditional dine-in restaurants by implementing a questionnaire through an inter- view with the participation of cloud kitchen owners, managers. It was estimated that the cloud kitchen in India will be worth $2 billion by 2024 (Biswas, India's appetite for takeaway food projected to cook up $2 bil- lion industry by 2024).This research followed a set of 18 descriptive questions in order to acquire data on 100 participants with both genders attended. For the data analysis it followed correlation analysis, student t- test and descriptive statistics by focusing on five major questions, where it obtained a very low positive relationship among variable investment and profit (correlation coeffi- cient – 0.109) and concluded that 54% of the population participated vote that zomato and swiggy companies play a vital role in the success of the survival of cloud kitchen. Furthermore, examined an increment in the average number of employees and in the number of orders after the Covid-19 pandemic occurred. In order to determine the effect of employees on the profit margins of the busi- nesses before and after the pandemic, the research statistically analyzed the data by involving one way ANOVA and Multinomial Logistic Regression. The results obtained concluded that there is a significant effect of employees for the profit margins of the businesses both before and after the Covid pandemic. SPSS analyzing tool is used for the statistical analysis.

1. Introduction

A digitalized virtual stage for customers to place their food related orders, which functions 24 hours, by using internet facility is generally referred to as a cloud kitchen. They act as takeout or delivery food restaurants (Maurya, Subramaniam, and Dixit) . Cloud kitchen restaurants classified as food processing businesses because they do not accept dine-in customers. These businesses are only dedicated to the manufacture of food and the orders are only accepted through the internet. As a result, the term "cloud kitchen" has become popular (John) . The food is subsequently delivered to the consumer as a takeaway order (Juneja). A cloud kitchen is a delivery-only restaurant idea with no physical premises, no dine-in area, and a takeout counter. It's a restaurant kitchen that only accepts delivery orders and doesn't have a regular restaurant or eating area. Simply it is a working kitchen that serves as a manufacturing unit for food preparation. Customers can place orders via online using an online food aggregator or restaurant apps, thus the cloud kitchen, Ghost kitchens, gloomy kitchens, and virtual kitchens are used to describe these types of

kitchens.

Restaurants that are part of the cloud kitchen ecosystem use commercial and centralized kitchens. These restaurants then partner with third-party delivery applications such as Uber Eats and Grub-Hub, among other services. When it comes to cloud kitchens, the focus is primarily on mass production, producing many items, and serving them through relevant delivery apps. (Team) Cloud kitchens are commercial cooking facilities that have no physical dining space and cater only to delivery orders placed online — are projected to become a $2 billion industry in India by 2024, according to RedSeer Management Consulting. (Biswas, India's appetite for takeaway food projected to cook up $2 billion industry by 2024) That's up from $400 million in 2019. (Why cloud kitchen business in India may grow 5 times in 5 years?) In a survey carried out by the company, 21% of the respondents said they were more likely to increase their online ordering of takeaway food after the lockdown, (Sobika and Raj) while just 9% said they were more likely to visit restaurants more often. Cloud kitchens, rather than typical dine-in restaurants, are more suited to the needs of socially isolated clients. They also enhanced the fact that there is a high possibility in saving money for other facilities, such as rental fee, electricity because there is no need of many workers in cloud kitchens (such as no waiters), therefore no wages are paid and eventually the money is saved (Mehnaz and Monali).

The Covid – 19 pandemics aside being a pathetic situation for the whole world, due to the deadly contagious virus that persist upon the society, it was strictly informed the people around the world to wear mask, stay healthy, and most specially stay at homes for their survival. Due to this, revolutionary changes happened with people life style, including, changes in their food style (Moyeenudin, Bindu, and Anandan) . As accordance with their usual lifestyle, they tend to eat in restaurants without cooking on their own with their usual normal day and often people engaged in hanging out with a bunch of people in restaurant premises. But with the Covid pandemic, dine in restaurants completely collapsed, giving rise to strong set of online delivering systems with virtual kitchens than existed ever before.

The objective of the study is therefore to reveal how the cloud kitchens affected the traditional restaurant industry and how great of an opportunity Cloud Kitchens is for Start-up enthusiasts during Covid-19 pandemic period.

2. Literature review

Cloud kitchens are not new pizza delivery services that have been for decades and were first introduced in the 1950s. Rebel Foods, backed by Sequoia, launched its first company, Faasos, which distributes kebabs, in 2003. Rebel Foods now has over 9 brands, has generated $125 million in funding, and is valued at $525 million (Mehnaz and Monali). Despite the pandemic forcing restaurants to close their dining rooms, more and more kitchens are opening their doors. Every month, new brands appear on the Swiggy and Zomato apps, many of which are only available for delivery. The pandemic plays a vital role for the growth of cloud kitchens, often known as dark kitchens or ghost eateries. These are restaurants that solely offer delivery and do not have a dining area. They only take orders placed through food aggregators, and they only accept them via online.

Hotels and restaurants are turning to takeaway to stay open and retain workers as restaurants remain closed for dining. However, income from takeaway will never be enough to break even for a restaurant established for dine-in. starting a new restaurant has long been a dazzling goal for many in the food-service industry due to many alternative expenses that burden upon them. On the other hand, Cloud kitchens are simpler to establish and maintain than that of other usual business implementations, thanks to low entry fees, low capital expenditure, and lower rentals, as many have discovered. As a result, the market is becoming more independent, allowing a new start-up to compete with the industry's most prominent players include SLAY coffee, Keventers, Penang, and Burger King are just a few examples.

Restaurant's traffic is at an all-time low, and revenues are down as much as 90%, according to CRISIL Research; takeaways has become a vital source of revenue for many eateries. CRISIL estimates that the 1.5 trillion-rupee ($20 billion) industry will take approximately a year to recover if the lockdown is lifted (Borah).

Years before COVID-19 reached India's shores, demand for on-demand food delivery formats grew due to demographic changes such as the ongoing rise in nuclear households (Sisodia and Nair) and the

number of working women. Further technological innovations resulted in significant changes in how food was ordered and consumed. As the ease of one-click order placement, reliable service, and integrating digital payments become more popular, online ordering became the standard. Aggregator platforms like Swiggy and Zomato arose as a result of these tectonic upheavals. As a result of these aggregators, the expansion of delivery and cloud kitchen formats has accelerated (Fridayani, Iqbal, and Atmojo) . According to Statista, the 'platform to consumer (cloud kitchen/delivery only) format is predicted to increase at a CAGR (Compound annual growth rate) of 12% from 2016 to 2024. By 2024, this format will have surpassed the restaurant-to-consumer (R2C)' model in market share. The restaurant to consumer industry was expected to increase at a CAGR of 7.1 percent before COVID. Given that the restaurant industry has been virtually shut down for the previous 120 days, the delivery format may overtake the restaurant format sooner than expected.

While many cloud kitchens were able to weather the COVID-19 storm, the restaurant business was seriously impacted by the initial 120-day shutdown, which was followed by demand failure as customers stayed home. Many restaurants will close down, which is a sad fact. Currently, every restaurant is in the survival mode. In the medium run, traditional restaurants will need to shift their focus to delivery to profit. Even if they do succeed in pivoting, many will fail. Cloud kitchens or food and beverage outlets powered by a cloud kitchen network have a better chance to survive (Sufi and Ahmed) and are likely the future of the food sector in the current environment and with the prolonged uncertainty of the COVID-19 pandemic (Qureshi).

Before Covid-19, there was a major separation between delivery-oriented and dine-in brands. However, this would not be the case moving forward. Eventually, every restaurant brand will begin with a meal delivery centered brand of their own. Lately, several recognized hospitality organizations have started implementing the cloud kitchens model, a delivery-based operation. The first wave of the global pandemic was a learning experience for the industry. It was mainly accountable for adjusting the international food and baking industry regarding the challenges that restaurateurs face. With the second pandemic wave striking the country, cloud kitchens are emerging as a viable backup option, allowing restaurant operators to simplify operations and become more efficient. While the concept was famous even before the epidemic, cloud kitchens have become more profitable in recent years, owing to two factors. Firstly, they enable restaurants to deliver directly to customers' homes whilst secondly, they operate in a fraction of the typical restaurant space, using the resources efficiently through optimized kitchen workflows.

Direct-to-consumer channels to increase profitability (D2C channels)

In 2021, restaurants will progressively explore D2C (direct-to-consumer) channels. Direct channels are already accounting for a rising portion of their orders. This shift results from a shift in customer behavior and lucrative incentives restaurants provide clients on purchases placed through their channels.

Cloud kitchens will aid in the creation of an efficient connection to some D2C channels such as websites, social networking sites, and messaging platforms, allowing restaurateurs to set up their digital storefront. To customize the guest experience, avoid aggregator commissions, and manage online orders, allowing them to adapt to the new normal of dining (Tulsian).

The functioning of a cloud kitchen

One or two restaurants may rent space in a cloud kitchen, a centralized certified commercial food production facility where hundreds of restaurants may rent space to prepare menu items optimized for delivery. One restaurant may operate many brands or virtual restaurants, all of which operate under the same roof. The kitchen may be run as an incubator, with space shared by various sellers and vendors. Visualize a big warehouse with multiple stations (mini-restaurants) of stainless-steel prep tables, hood vents, burners, ovens, and sinks. Each has its own set of orders coming in from customers directly . Menu items in the Cloud Kitchen are designed for simplicity of manufacturing and food quality assurance when delivered. Driver parking, driver waiting rooms (sometimes with screens to monitor order delays), and check-in stations are standard features of cloud kitchens, often physically located in out-of-town industrial complexes. Everything is meant to get food out the door and into customers' hands as quickly as possible. Cloud

kitchens are one of a kind in terms of technology. They achieve this by analyzing enormous amounts of data to determine what kinds of goods to produce for specific communities and when demand will be highest. For example, hot wings are extremely popular near college campuses between 11 p.m. and 2 a.m. This information enables near-real-time adaptation and optimization (Colpaart).

Cloud kitchen as a startup opportunity: Market Opportunity (Maggo)

The concept of having meals delivered at a fair price and on time has increased the number of online orders. Rather than going out to eat, they choose to order in. Online food delivery is not only affecting the market share of traditional dine-in restaurants, but it is also replacing home cooking. Due to a shift in client preferences and an increased sense of inconvenience when dining out, the home delivery option has gained some traction, resulting in a transformation in the restaurant industry, with food now dominating the dining experience (Maggo).

Cloud kitchen as a startup opportunity : Low Investment (Howarth)

Cloud kitchens need little investment to open because they do not require a high-traffic location, lowering real-estate costs. Also, as there is no front-of-the-house, elegant decor and friendly wait staff aren't required to provide a positive client experience. These two considerations have a significant impact on the cost of starting a cloud kitchen business. A cloud kitchen can be opened at one-third of the cost of a regular dine-in establishment.

Cloud kitchen as a startup opportunity : Ease In experimentation (Times)

The cloud kitchen business model allows restaurants to try out a variety of concepts without investing heavily. Using the same infrastructure and resources, it is possible to run many brands from a single kitchen. Getting a new brand listed on internet food delivery is all it takes to start a new business. The subject only needs to spend money on order preparation because listing online food aggregators is free, and they charge a fixed percentage for every order. The customer can remove the listing from the internet food aggregator if the brand does not perform well. In this instance, the success or failure of one brand has no bearing on the other companies running from the same cloud kitchen (Times)

Cloud kitchen as a startup opportunity : Market growth and competition in India

The food-tech industry in India was valued US$700 million in 2017, and this number is expected to rise to US$2.1 billion by 2021 (Meenakshi and Sinha). Zomato handles 10.5 million orders each day in 21 cities, Swiggy 14 million orders per day in 17 cities, Foodpanda 1.2 million orders per day in 150 cities, and Uber Eats one million orders per day in 31 city centers (Srinivasan and Shashwati). Over the last four years, investment in the food-tech business has increased by 150%. Up to 2021, the industry (customers) is predicted to grow by more than 18% (Singh). To recruit more customers, incumbents compete primarily through promotions, offers, and loyalty programs. Despite the absence of difference, enterprises' revenues have increased as a result of the expanding market. However, the expense of acquiring new customers is considerable, and client loyalty is limited. FreshMenu, Box8, and Faasos are among the cloud kitchen startups likely to compete. Traditional food-tech enterprises are likely to compete with food-tech startups that directly service businesses or customers. In 2018, HungerBox, a B2B food manufacturer, received $2.5 million in funding (Singh).

Cloud kitchen as a startup opportunity: Restaurant collaborations and social implications

Restaurant collaborations are crucial for the food-tech industry since more restaurants mean a wider and more diverse consumer base seeking for new culinary experiences. Swiggy, Zomato, Foodpanda, and Uber Eats, for example, each have roughly 35,000, 25,000, 15,000, and 12,000 restaurants on their respective platforms (Quicktakes Salman) . They provide service to a number of cities across India. The growth struggle is shifting away from urban and Tier I regions and toward untrapped Tier-II cities. For orders placed with a listed restaurant, these internet providers receive commissions ranging from 7% to 15%. (Srinivasan and Shashwati). Because the firm relies on the restaurant chain for more orders, charges from smaller, less well-known eateries are more notable. Restaurants were encouraged by Zomato by reducing commission in return for a minimum order and positive customer feedback. With marketing tools such as flyers and posters strategically placed around these offices and campuses, any potential customer or

TABLE 1. Kitchen Cloud Market growth in India

Sr. No	Industry	Years/cities	Sales/Orders
1	Food industry in India	2017	US$700 million
2	Expected to Rise	2021	US$2.1 billion
3	Zomato	across 21 cities	10.5 million orders per day
4	Swiggy	across 17 cities	14 million orders
5	Foodpanda	across 150 cities	1.2 million orders per day
6	Uber Eats	across 31 cities	processes one million orders per day

anyone interested would contact and make an order for home-cooked food that would be delivered to their doorstep within 24 hours. As a result of technological advancements, such as social media networks, businesses can reach out to their customers (Frederick and Parappagoudar) . With the rise of technology, these kitchens are now reaching out to clients through online platforms such as Swiggy, Zomato, and other similar services.

India's food transportation sector is valued at $15 billion and is growing at a rapid pace. When comparing 2017 to 2018, the online meal delivery system grew by roughly 150 percent. The online food delivery system is valued at $300 million, with the cloud kitchen market accounting for $200 million. In 2019, the revenue from online food delivery was total US$8,167 million (Mehnaz and Monali).

Challenges that Cloud Kitchens is now facing: Expenses of Technology (Juneja)

The main flaw with the cloud kitchen idea is that it replaces real estate expenses with technology costs. Cloud kitchens have enormous technical expenditures. This is due to the fact that these kitchens must work with a variety of meal delivery apps. Orders must be taken and passed on to the cook closest to the customer's location. There are cloud-based options that allow restaurants to upgrade their technology without experiencing significant upfront fees. On the other hand, the monthly subscriber price burns a hole in the pockets of many startup kitchens. As a result, the prices are quite close to those of traditional restaurants. However, because these shops do not offer dine-in service, the number of users is severely limited.

Challenges that Cloud Kitchens is now facing: Hygiene (Juneja)

Scaling the cloud kitchen system is challenging. The issue is that many businesses construct their kitchens in unsanitary conditions. This is done to save as much money as feasible. Customers are not interested in being serviced from prime real estate. However, any chosen kitchen must be hygienic for the food to be edible. Many instances of unsanitary food served to consumers have been reported on social media (**Juneja**).

Challenges that Cloud Kitchens is now facing: Limitations and implications of the research

To gain a competitive advantage, food-tech companies must first identify ways to differentiate themselves. Second, customer loyalty is critical to long-term profitability, and businesses must figure out how to increase it. Loyalty cannot be built through promotions and offers. Companies would need to diversify their monetization methods, such as cloud kitchens and B2B food delivery services, to increase revenues and profits (**Meenakshi and Sinha**).

Challenges that Cloud Kitchens is now facing: Cloud Kitchens' Math

The underlying premise of cloud kitchen economics is highly straightforward. Dining in cloud kitchens is not possible because there is no physical space for diners to sit and eat. Their business relies solely on online orders (Dsouza and Sharma) , placing them in a position of disproportionate dependence on food aggregators such as Zomato and Swiggy. Cloud kitchens eliminate this restriction by allowing multiple brands to operate from the same place under one canopy. For example, the same kitchen that prepares your favorite biryani may also prepare pizzas or Chinese cuisine. Individual branding for each of these "cuisines" makes them appear completely unrelated on the app side, yet the same cooking team could be cooking food for all restaurants beneath a cloud kitchen. With food delivery set to become the fastest-growing segment of the restaurant industry, investors worldwide are putting resources into a network of shared kitchens, storage facilities, and supply chains to cut costs and

immediately launch new fast food and casual dining concepts. ”Single cloud kitchens will not be able to compete in this business since the platforms (Zomato and Swiggy) will not allow them to do so.” Smaller restaurateurs are easier to exploit,”

Compliance, on the other hand, is a major issue. While different towns in India have distinct licenses for catering and restaurants, cloud kitchens do not yet have their category. Cloud kitchens, unlike dine-in restaurants, do not require a police license because they do not serve walk-in clients. According to restaurant owners, this renders them exposed to unscrupulous police officers and municipal officials. These are the costs involved in running cloud kitchens in Indian cities, which many businesses face (Kondalamahanty).

3. Methodology

To investigate the effect of cloud kitchens in traditional restaurants industry and the revolution of cloud kitchens with the pandemic, an interview was conducted with the participation of cloud kitchen owners, managers, employees, delivery agents and customers, by implementing a set of 18 questions on 100 people, by considering major issues such as their initial investment, growth of the business over years.

The data collection was done by creating a set of questionnaires on Google forms software and posting the link in cloud kitchen owners Facebook groups from India. It was also able to manage to send the link to personal direct messages via Instagram to cloud kitchen owners. The Facebook groups were requesting a specific identity to prove that the joining crowd is genuinely cloud kitchen related and we were approved on a special request to the Group admins. The cloud kitchen owners found via Instagram were administrating Instagram pages for their cloud kitchens.

On the other hand, an error in the recent data collection resulted as an issue in the study, due to lockdown situation persisted during the pandemic, as most restaurants hit the rock-bottom financially for a major period of time, leading to permanent destruction of the traditional food restaurant businesses.

Statistical analysis

For detailed statistical analysis of the data set obtained, correlation analysis, student t test, and descriptive statistics were used, by categorizing the set of data into 5 major problems focused namely relationship between profits and investments (correlation coefficient), relationship between number of employees before and after COVID-19 (parametric paired t-test), relationship between average number of orders before and after COVID-19 (paired sample test) as the status of the businesses before and after covid 19 pandemic majorly explains the development of cloud kitchens in restaurant industries (Roy, Spiliotopoulou, and Vries) in the country Fourthly, taking into consideration which delivery company has the most orders (descriptive statistics) and finally evaluating which delivery platforms have better effect (descriptive statistics) in order to identify the most effective platforms for cloud kitchens.

Furthermore, in order to statistically determine the relationship with profit and the employees before the pandemic one-way ANOVA was used and to analyze the effect of the change in number of employees before and after the pandemic against profit margins (Liu, Wu, and Lian) , Multinomial Logistic Regression was utilized**.** For the implementation of the statistical analysis, SPSS software was used in data analysis using a windows 10 HP laptop. Furthermore, graphs and pie charts are also provided where necessary in order to represent the data diagrammatically.

4. Results and discussion

5. Relationship between profits and investment

To find the association between the two variables: correlation analysis

The table two elucidates the linear connection between profit and investment using correlation analysis. From the above table the value of Pearson correlation coefficient is 0.109 which indicates that there is a low positive relationship between the variable investment and profit. This indicates the low relationship between two factors considered. Therefore, according to the results obtained, the profit does not thoroughly depend upon initial investment.

6. Is there any difference between number of employees before and after COVID-19?

To check the relation between the number of employees before and after the COVID-19, the research uses the parametric paired t-test which is most preferable in this case.

According to the table 03, the mean or average of number of employees before covid-19 is 6.08

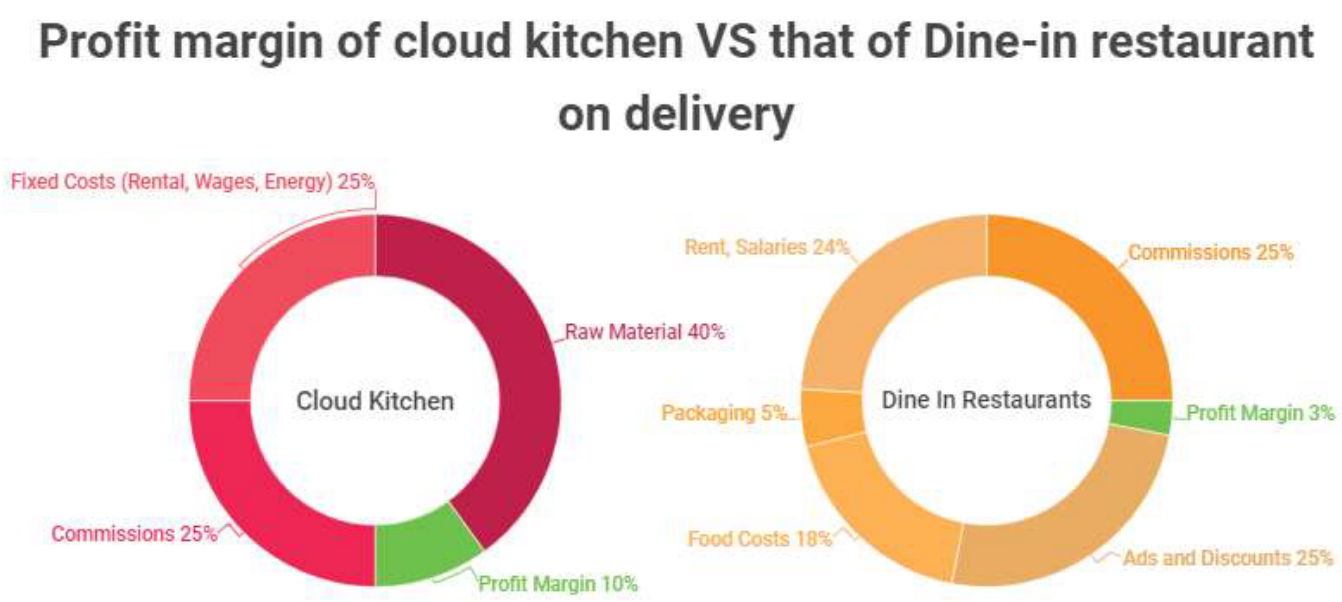

FIGURE 1. Source: https://inc42.com/features/the-economics-of-foodtech-part-2-cloud-kitchen-math/

TABLE 2. Correlations

		What is your profit margin?	How much initial investment did you do?
What is your profit margin?	Pearson Correlation	1	0.109
	Sig. (2-tailed)		0.282
	N	100	100
How much initial investment did you do?	Pearson Correlation	0.109	1
	Sig. (2-tailed)	0.282	
	N	100	100

TABLE 3. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Number of Employees before Covid-19?	6.08	100	12.35	1.24
	Number of Employees after Covid-19?	7.67	100	10.13	1.01

and after covid-19 is 7.67, therefore it indicates that on the average the number of employees after covid-19 has been increased as compared to number of employees before covid-19. This concludes the fact that development in the business through e commerce and cloud kitchen concepts has led the smaller businesses to arise.

Since the p-value is 0.002 which is less than the value of level of significance 0.05, therefore research can conclude according to the data obtained that there is a significant difference between the number of employees before and after covid-19.

7. Is there any difference between average number of orders before and after COVID-19

The table 05 delineates the business development captured though number of orders. The mean or average number of orders before covid-19 is 1.95 and after covid-19 is 2.73, therefore it concludes that on the average the number of orders after covid-19 has been increased as compared to number of orders before covid-19.

Since the p-value is 0.00 which is less than the value of level of significance 0.05, there is a significant difference between the number of orders before and after covid-19.

TABLE 4. Paired Samples Test

		Mean	Std. Deviation	t	df	P-value
Pair 1	Number of Employees before Covid-19? - Number of Employees after Covid-19?	-1.59	4.94	-3.22	99	.002

TABLE 5. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Average number of orders received per day before Covid-19?	1.95	100	1.07	.10766
	Average number of orders received after Covid-19?	2.73	100	1.39	.13916

TABLE 6. Paired Samples Test

		Mean	Std. Deviation	Std. Error Mean	t	df	P-value
Pair 1	Average number of orders received per day before Covid-19? - Average number of orders received after Covid-19?	-.78000	1.27588	12759	-6.113	99	.000

8. Which delivery company has the most orders?

The zomato which is a major multinational restaurant aggregator and a food deliver company allows restaurants to track sales efficiency, performance and functionality in real time. The swiggy platforms with hold the fast delivery services and I provides coverage of distance, which is, it allows customers to order from far away. Creating an own platform will make the cloud kitchen procedure more costly, timely and erroneous, but it always beneficial as the owner owns the platform and has a unique identity and platform in the internet for the business. The table 07 (illustration 1&2) shows that Zomato delivered 41 percent orders which is the most, as compared to the other platform.

9. Is Zomato and Swiggy have huge role on the survival of a cloud kitchen?

According to the descriptive analysis carried out 54% percent of the participants thinks that zomato and swiggy companies have a huge role on the success and survival of a cloud kitchen. (Refer table 08, illustration 3 and 04)

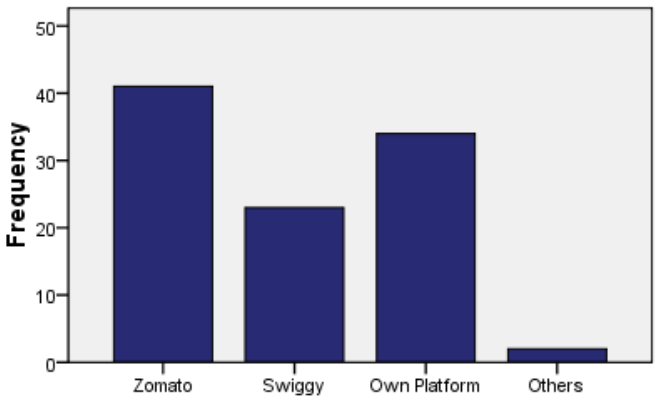

FIGURE 2. Which Delivery platform brings the most orders?

Analysis of Variance (ANOVA)

The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of three or more independent groups. In case of one-way ANOVA, the research has one dependent variable and independent variable. In this situation the dependent variable is "Number of Employees before Covid-19?" and the independent variable is the

TABLE 7. Which Delivery platform brings in most orders?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Zomato	41	41.0	41.0	41.0
	Swiggy	23	23.0	23.0	64.0
	Own Platform	34	34.0	34.0	98.0
	Others	2	2.0	2.0	100.0
	Total	100	100.0	100.0	

TABLE 8. Food delivery platforms such as Zomato and Swiggy play a huge role in success and survival of a cloud kitchens

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	15	15.0	15.0	15.0
	Agree	54	54.0	54.0	69.0
	Neutral	23	23.0	23.0	92.0
	Disagree	7	7.0	7.0	99.0
	Strongly Disagree	1	1.0	1.0	100.0
	Total	100	100.0	100.0	

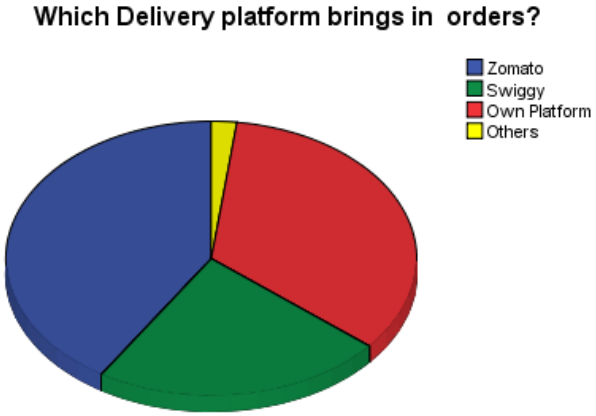

FIGURE 3. Which Delivery platform brings the most orders?

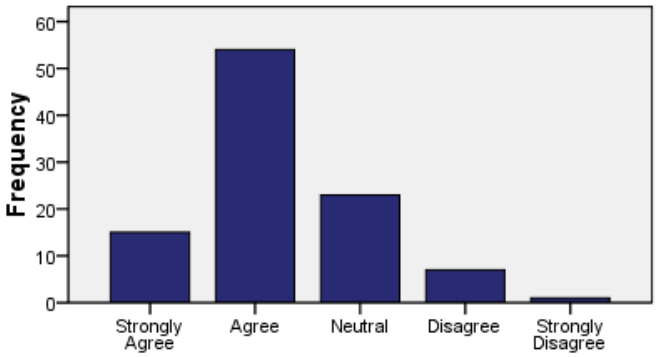

FIGURE 4. Food Delivery platforms such as Zomato and Swiggy play a huge role in success and survival of a cloud kitchen

profit margin.

Mean of the dataset determines the central value of the distribution like the group of "2%-5%" which has the mean 3.4 and is the middle of the mean value. And standard deviation talks about how far the observations are dispersed from the mean value.

Null and Alternative hypothesis

H0: All group means are equal.

H1: At least one pair of group mean is not equal.

Since the p-value is 0.056 which is greater than significance level 0.05 so it does not reject the null hypothesis and also concludes that all the group means are equal. This means there is no statistically significant difference between the means of the different levels of the profit margins.

Multinomial Logistic Regression

A method for predicting a nominal dependent variable given one or more independent factors is multinomial logistic regression. Because it allows for a dependent variable with more than two categories, it is generally seen as an extension of binomial logistic regression. In this study there is a one categorical dependent variable "profit margin" and two independent variables the "Number of employees before COVID-19" and "Number of employees after COVID-19". The objective to apply multinomial logistic regression analysis is to check the

TABLE 9. Number of Employees before Covid-19?

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
2%-5%	5	3.4000	3.78153	1.69115	.00	9.00
5%-10%	10	16.6000	36.58233	11.56835	.00	120.00
10%-15%	40	6.3500	5.98952	.94703	.00	25.00
15%-20%	30	3.9333	2.09981	.38337	.00	9.00
Above 20%	15	3.5333	2.61498	.67518	.00	9.00
Total	100	6.0800	12.35230	1.23523	.00	120.00

TABLE 10. ANOVA - Number of Employees before Covid-19?

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1381.060	4	345.265	2.390	.056
Within Groups	13724.300	95	144.466		
Total	15105.360	99			

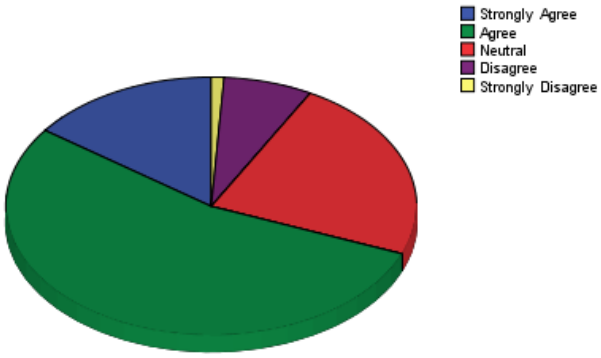

FIGURE 5. Food delivery platforms such as Zomato and Swiggy play a huge role in success and survival of a cloud kitchen

dependency of profit margin on the defined independent variables.

Predicted variable: Profit Margin

Predictor variables: Number of employees before and after covid-19

The model fit was checked using -2 log likelihood. The null hypothesis for likelihood is that the predictors do not predict the model well or in other word null model containing only intercept and full model containing predictors are same. The result revealed that the research rejects the hypothesis that the predictors are insignificant in the model due to p value less than 0.05 showing significant effect.

From the table of Likelihood ratio test the p value for before is 0.027 which is less than significance level 0.05, so it concludes that profit margin before the COVID-19 was significant as compared to after COVID-19. So, determining that the numbers of employees after the COVID-19 have not a significant effect on the profit margin of Cloud Kitchen.

10. Conclusion

Restaurant collaborations are critical for the food-tech business since more restaurants result in a wider and more diverse consumer base looking for alternative culinary options. Cloud kitchens, rather than typical dine-in restaurants, are more suited to the needs of socially isolated clients. They can also save money on things like rent because they don't need as many waiter workers. Scaling the cloud kitchen system is challenging. The previous studies and articles critically showed that the issue is that many businesses construct their kitchens in unsanitary conditions, customer loyalty is critical to long-term profitability, and businesses must figure out how to increase it. Companies would need to diversify their monetization methods, such as cloud kitchens and B2B food delivery services, to increase revenues and profits.

Apart from cloud kitchens provide such advantageous perspective for the restaurant industry, they play a major vital role among the start-up enthusiasts, due to its easy implementing nature among the society with just one click in the internet. Especially during the covid pandemic, the cloud kitchens not only supported the ongoing businesses, but also it gave a spectacular opportunity for the startup enthusiasts in the related field, as they needed only a

TABLE 11. Model Fitting Information

Model	Model Fitting Criteria	Likelihood Tests	Ration	
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	223.058			
Final	207.455	15.603	8	.048

TABLE 12. Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Tests	Ratio	
Effect	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	221.960	14.505	4	.006
Before	218.442	10.987	4	.027
After	211.446	3.991	4	.407

kitchen, a rather smaller investment, and a network connection which allows popularity among the society. This technology allowed self-developing business to achieve their goals without even being on the road, which also allowed to save more time from their respective schedules. Consequently, due to its easy interface, the respective populations tend to start their businesses via internet which eventually created competition, and unfortunately as a result, now easy implementing cloud kitchens is becoming more increasingly difficult for the participants in the restaurant industry.

With the data obtained and statistical analysis carried out, illustrated that the business showed a same profit margin before and after the pandemic even with the condition implemented to cease the dine in option during pandemic by the responsible divisions of the country, the cloud kitchen concept hold the responsibility of achieving required profit margins successfully. Therefore, there is a higher tendency to give rise to many small businesses through cloud kitchen concept even that the covid 19 pandemic besides being a pathetic situation, which will lead to overcome traditional restaurant concepts which are costly and consume hard working.

Furthermore, the analysis confirmed that the restaurants are busy just as before the effect of pandemic, by analyzing the profit margin against the employment engagement in the business. The research also succeeded to conclude through investigation that zomato and swiggy companies engaged in obtaining trust from most of the cloud kitchen workers due to its efficiency and well-developed structure and user-friendly interface which ensures the customer satisfaction and thereby brings out more profit for the cloud kitchen owners.

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