

Influence Of Online Food Delivery Apps On The Operations Of The Restaurant Business

Shantashree Das, Debomalya Ghose

Abstract: Technological evolution has completely changed the entire scenario of the restaurant industry. It has uplifted the usage of online food delivery services and enabled us to order food at the comfort of our home, compare prices and conveniently access these services. These online food delivery services are boosting the option of choosing meals from a wide variety of restaurants with a single tap of our smartphones. From this research paper, we would be able to understand the benefits of integrating online food delivery apps within the restaurant business and the influence of online food delivery apps on the inventory management of the restaurants. The study also lists out various issues faced by the restaurants which the restaurateurs should keep in mind to provide better services to the customers and earn better profit margins.

Index Terms: Inventory Management, Food Delivery Aggregators, Online Business, Online Food Delivery Apps, Restaurants, Sales, Technology.

1. INTRODUCTION

The advent of technology and smartphones are revolutionizing our standard of living. With just a few taps and swipes, we can have the luxury of enjoying the food at the comfort of our home while binge-watching Netflix. Dining out with family and friends has been replaced by the concept of eating-in; someone having a long, tiring day at work and do not have the strength to prepare food or wants to skip home-cooked meal can order through online with just a single tap of their smartphones. The restaurant sector is one of the fastest-growing industries in the Indian economy and the revenues generated from it are likely to increase more in the coming years with the concept of ready-cooked meals. The study is conducted in the Guwahati city of Assam, India. Guwahati has been an important commercial centre of Assam, India for many years which has led to the migration and inflow of people from neighbouring towns and villages resulting in a vast population. With rapid urban development and a massive number of people coming to the cities in search of jobs or leading a better standard of life, the concept of ready-cooked food has gained much attention. The various food delivery apps operating in Guwahati are Swiggy, Zomato, Uber Eats, etc.

The area of interest of this paper is the restaurant industry, and the inventory management of perishable products such as food is very crucial as these have a minimum shelf life. Perishable products have a distinct shelf life and cannot be used after its shelf life is over, which makes it more critical to manage the inventory of perishable products than durable products optimally. The variation in demand and supply also has a significant impact on inventory management of perishable products.

1.1 Need for the Study

Restaurateurs wanting to excel in the restaurant sector should consider the option of tying up with third-party logistics for online food delivery. However, everything has its benefits and drawbacks, so this study will help restaurateurs to understand the importance of online food delivery apps and how important it has become to manage the inventory in this technologically

advanced era efficiently. The study will also help in understanding the issues currently faced by the restaurants so that they can improve their operations accordingly for providing better customer services.

1.2 Review of Literature

Online food delivery apps are the media through which restaurants parcel food directly at the doorsteps of the customers. This idea of food delivery is quickly spreading due to the increase in the number of the working population and their hectic work-life culture in metro cities. There is no human intervention involved in the process of online food ordering, which makes it error-free and more private. At present, the Indian food business is around \$350 billion, and this sector is coming up with innovative ideas every day to provide better customer satisfaction and retain customers in the long run. This scenario has resulted in a massive competition between online food delivery apps and particular restaurants providing free home delivery services (Anupriya Saxena, 2019). Technology has a hidden impact on the restaurant industry and has changed its entire frame. People across the globe are enjoying a new comfort zone as a result of these technically developed online food delivery services. Mitali Gupta (2019), in her paper, studied the impact of food delivery start-ups Swiggy and Zomato on the restaurant business and also studied their various business strategies. Today, companies have changed their traditional business strategies to online marketing for catering to the diverse needs of customers. Jyotishman Das (2018), in his paper, studied consumer perception towards online food ordering and delivery services and aimed to examine the views of the consumers about the different services they receive from different portals. Online food delivery market is not mature yet and possesses various challenges. These problems can only be solved by taking law as the criterion, along with the joined efforts of the food delivery apps, the restaurants, consumers, thereby creating an excellent online takeaway environment (Hong Lan et al., 2016). Efficient inventory management is essential for restaurants to avoid going out-of-stock or having wastages. Thus proper inventory control is crucial. Inventory control refers to a strategic practice of purchasing and storing materials at a low price without affecting the manufacturing and distribution of materials. Inventory control is a method of examining what, when, and how much to have in stock for a given period (Saleemi, 1997). Abad (2003) regarded the problem of dynamic pricing and lot-sizing for a reseller who sells perishable goods, and the price of the product can be

- Shantashree Das, MBA, Department of Business Administration, Assam University, India. E-mail: dshantashree26@gmail.com
- Dr. Debomalya Ghose, Associate Professor, Operations Management, Department of Business Administration, Assam University, India. E-mail: operationsdghosh@gmail.com

varied within the inventory cycle taking in consideration the age of the goods and the value drop associated with it. In today's global market, the retailer's efficient and responsive supply chain can only be achieved by making timely and accurate decisions regarding the quality of orders and maintaining an adequate inventory in competitive market conditions. Broekmeulen and Van Donselaar (2009) examined research on replenishment policies for a single echelon perishable inventory system with stochastic demand and a fixed life period of m periods for comparing the EWA policy with other available policies. Broekmeulen, RACM and Bakx, C.H.M. (2013) said that by limiting the number of batches on the shelf to one, the retailer could reduce the amount of outdating due to LIFO withdrawal at the expense of additional handling. This research shows that products with a short product lifetime, large shelf capacities, expensive outdating and low handling cost-profit most from a single batch in-store replenishment policy. Linh et al. (2015) through their literature, aim to define, describe, and propose a solution for the problem of inventory management in a two-echelon model for perishable and substitutable products with multi-period lifetime. The paper discusses the inventory theory to consider inventory management for perishable and substitutable products having multi-period lifetime, definite lead time, customer service level, and each item is treated separately. It also adopts a multi-metric approach to evaluate the performance of perishable inventory management under given targets. The main objective of perishable inventory management is to attain the best returns, considering the useful life of the product. In the literature, inventory models have been developed for perishable products subjected to the various demand conditions and life considerations. The problem reduces to the well-known 'newsvendor' problem when the life of the product is just one period. Goyal & Giri (2001) have researched by surveying the literature on problems of various types related to decaying, fixed-life and random life of items. Adachi et al. (1999) in their paper proposed a perishable inventory model by taking into consideration different selling prices of perishable commodities under stochastic demand. Different lifetimes of perishable commodities are provided in their model, and they considered the possibility of discriminating selling prices for products at different lifetimes. Over the years, many different, complementary, and sometimes contradictory classifications were proposed to address perishability.

1.3 Research Gap

Based on the literature review, it has become evident that most of the works on online food delivery apps are conducted on consumer behaviour or perception. A very few researches are performed on the restaurants outsourcing the third-party food logistics services; however, none are conducted on the inventory management of the restaurants which is a very crucial aspect for smooth selling in the restaurants.

1.4 Objectives of the study

The objectives of this study are as follows:

1. To understand the importance of third-party outsourcing logistics for food delivery.
2. To analyze the impact of online food delivery apps on the inventory management of the restaurants.
3. To assess the significant issues faced by the restaurant owners.

1.5 Hypothesis for the Study

Let us formulate H_0 as the null hypothesis and H_1 as the alternative hypothesis as follows-

1. H_{01} : There is no significant stock-out situation in restaurants due to the increase in orders through online food delivery apps.
 H_{11} : There is a significant stock-out situation in restaurants due to the increase in orders through online food delivery apps.
2. H_{02} : There is no wastage situation in the restaurants due to over-ordering or overcooking of food items.
 H_{12} : There is a wastage situation in the restaurants due to over-ordering or overcooking of food items.

1.6 Scope of the Study

The research is carried out to understand the impact of online food apps on the operations of the restaurant business. The study is conducted from the restaurant's point of view, how they are managing their inventories with an increase in customer demands and what are the advantages and disadvantages of tying up with the third-party food logistics. The geographical scope of the study is the Guwahati city of Assam, India. The study will help new restaurateurs to understand how they should manage their inventory in this era of online food delivery and also evaluate the pros and cons to understand what aspects they need to focus on for fulfilling the customer demands.

1.7 Limitations of the Study

The sample size is small for the accurate study of the online food apps' influence on the restaurant business. It is carried out in Guwahati city of Assam so that the results may vary for the other parts of the country due to the different lifestyles and regional differences. Also, the researcher could not cover all the food delivery apps due to which proper information could not be extracted. However, these limitations provide scope for further research in future.

2 RESEARCH METHODOLOGY AND DATA

The present study is exploratory, and both quantitative and qualitative methods are used for data collection. The study analyzes the responses collected from the restaurants of the Guwahati city of Assam and attempts to find out the benefits and problems arising in the process. The data is primary in nature and collected with the help of a structured questionnaire comprising of both closed-ended and open-ended questions. For the survey purpose, convenient sampling is being used as the sampling method, and the sample size of the study is considered as 125. The research tools used in the study are percentage, Correlation analysis, charts, Chi-square test, and descriptive statistics.

3 DATA ANALYSIS AND FINDINGS

We have conducted the survey with a sample of 125 respondents who have tied up with third-party online food delivery apps for providing their food delivery to the customers.

3.1 Importance of outsourcing third-party logistics for food delivery

The respondents were first asked about the number of food delivery apps they are listed with, whose response is shown below.

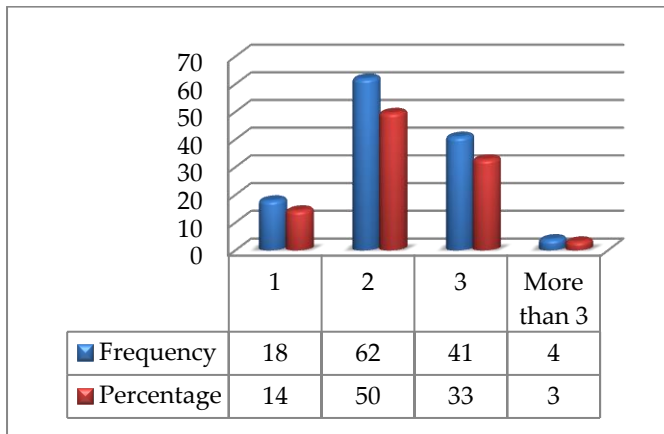


Fig. 1 Numbers of Food Delivery Apps the Restaurants are Listed with

The above figure shows that the maximum of the respondents, i.e. 50% use at least two online food delivery services for their food delivery. 33% of them use three apps, 14% use only a single app, and 3% use more than three apps for delivering their food. Then the response for the extent of usage of apps for the restaurant’s food delivery and their impact on the restaurant business is analyzed. The responses are recorded in the table below as shown.

TABLE 1
Responses for the Extent of Usage of Apps and their Impact on Business

Questions	Attributes	Frequency	Percentage
The extent of usage of apps	Always	62	50
	Quite a lot	50	40
	Very little	10	8
	Not much	3	2
Impact on business due to the apps	Great Extent	46	37
	Quite a bit	57	46
	Very little	18	14
	Negligible impact	4	3

Source: Collected from primary data through field survey

Table 1 shows that the maximum respondents, i.e. 50% always use the third-party apps, 40% of them use quite a lot, 8% use very little, and 2% does not use much. It can also be seen that the usage of apps has impacted their business a lot. 37% have been impacted to a great extent, 46% to quite a bit, 14% have been impacted very little. However, 3% have a negligible impact on their business. *Pearson’s correlation coefficient is carried out between the data of the extent of usage of apps and their impact on the sales to examine if the two factors are correlated to one another and if correlated, to what degree the strength of their association is.*

TABLE 2
Correlation Analysis between the Extent of Usage of Apps and their Impact on Business

	The extent of usage of apps	Impact on business due to the usage of apps
The extent of usage of apps	1	
Impact on business due to the apps	0.86	1

Source: Correlation Analysis done in MS Excel

We can see from above that both the data sets are positively correlated and have a strong correlation of 86%. Thus, an increase in the usage of apps increases sales to a great extent. The features of online food delivery apps that help the restaurant business in increasing its sales are shown below.

TABLE 3
Features of Online Food Delivery Apps that help the Restaurant Business in increasing their Sales
Source: Collected from primary data through field survey

Features	Frequency	Percentage
Promotion	54	43
Customer Base	16	13
Cost-effective	31	25
Brand building	24	19

Table 3 shows the features that help in the increase in sales of the restaurants. 43% said that promotion helps the most in increasing the sales, 13% said that they help in increasing the customer base, 25% said that they are cost-effective to the business, and 19% said they help in building their brand image.

3.2 Impact of online food delivery apps on the inventory management of the restaurants

With the amount of increased online orders pouring in, it has become very imperative for restaurants to manage their inventory strategically. Operating with too much inventory or too little inventory can cost the business in various ways. Earlier, the restaurateurs did not need to bother much about going out-of-stock. When a customer used to come to dine-in, they would directly tell him or her that the dish he or she is looking for is unavailable which did not hamper the restaurant’s image on a large scale. However, with customers having access to browse through the restaurant’s menu all the time, it has become very crucial to optimally manage inventory as the customers will develop a negative attitude if they see most of the dishes or the dish they wish to order being ‘unavailable’. Also, the restaurants cannot buy in bulk to avoid stock-out as food is a perishable item having a low shelf life and would result in wastage. Thus, keeping the balance between stock-outs and wastages is the main aim of inventory management. The inventory management practices of the restaurants are analyzed as follows:

TABLE 4

Response for Usage of Inventory Management Software and Safety Stock Maintenance for Packaged Food Items

Questions	Percentage	
	Yes	No
Usage of inventory management software	38	62
Maintenance of safety stock for packaged food items	76	24

Source: Collected from primary data through field survey

On being asked whether the restaurateurs use any inventory management software, it was found that only 38% use inventory management software whereas rest of the 62% does not use any software and are still dependent upon the standard manual practices. Some of the inventory management systems used by the vendors are NAV, POS, Hustle, Just Billing, RanceLab, etc. Almost every one of the respondents, i.e. 76% maintain safety stock for the packaged and processed food items in case of emergencies and only 24% do not maintain any safety stock.

TABLE 5

Reordering Level of Raw and Packaged Food Items

Questions	Attributes	Frequency	Percentage
Reordering level of the raw food items	Daily	102	82
	2-3 days	19	15
	Weekly	4	3
	Monthly	0	0
Reordering level of the packaged food items	Daily	18	14
	2-3 days	67	54
	Weekly	35	28
	Monthly	5	4

Source: Collected from primary data through field survey

From the above, it can be seen that the maximum of the vendors i.e., 82% reorder their raw materials daily, 15% reorder every two to three days, and 3% reorder weekly. None of the vendors reorder the raw items monthly. For packaged food items, it can be seen that the maximum of the vendors i.e., 54% reorder every 2-3 days. 28% reorder weekly, 14% reorder daily, and 4% reorder monthly.

TABLE 6

Storage of Items in terms of their Shelf Life

Questions	Attributes	Frequency	Percentage
Shelf life of raw food items	1 to 6	0	0
	6 to 12	25	20
	12 to 24	77	62
	More than 24	23	18
Shelf life of semi finished food items	1 to 6	51	41
	6 to 12	63	50
	12 to 24	11	9
	More than 24	0	0
Shelf life of	1 to 6	42	34

finished food items	6 to 12	67	54
	12 to 24	13	10
	More than 24	3	2

Source: Collected from primary data through field survey

From table 6 it is evident that the maximum of the vendors maintains the shelf life of raw items of 12 to 24 hours and both semi-finished and finished food items for 6 to 12 hours. None of the respondents keeps semi-finished and finished food items for more than 24 hours, which is a good practice. The customers ordering online will have a healthful meal, which will be a good thing for both the restaurant and the online food delivery apps.

The study tries to find out if there is a significant stock-out situation in restaurants due to the increase in orders through online food delivery apps. For that, let us formulate the null hypothesis as H_{01} and the alternative hypothesis as H_{11} such that:

H_{01} : There is no significant stock-out situation in restaurants due to the increase in orders through online food delivery apps.

H_{11} : There is a significant stock-out situation in restaurants due to the increase in orders through online food delivery apps.

The calculated value of Chi-square came out to be 26.56, which is higher than the critical value of 9.49 with 5% level of significance and 4 degrees of freedom, thus rejecting the null hypothesis. We accept the alternative hypothesis that there exists a stock-out situation in the restaurants due to the increase in orders through online food delivery apps.

The study also tries to examine if there is a wastage situation in the restaurants due to over-ordering or overcooking of items. For that, let us formulate the null hypothesis as H_{02} and the alternative hypothesis as H_{12} such that:

H_{02} : There is no wastage situation in the restaurants due to over-ordering of raw materials or overcooking of food items.

H_{12} : There is a wastage situation in the restaurants due to over-ordering of raw materials or overcooking of food items.

The calculated value of Chi-square came out to be 13.68, which is higher than the critical value of 9.49 with 5% level of significance and 4 degrees of freedom, thus rejecting the null hypothesis. We accept the alternative hypothesis that there exists a wastage situation in the restaurants due to over-ordering of raw materials or overcooking of food items.

TABLE 7

Major challenges faced by the restaurants in terms of Inventory Management

Attributes	Mean	SD
Low item turnover	1.91	0.77
Excess inventory	3.19	0.78
Failure to keep track of stocks	3.14	0.92
Difficulty identifying demand patterns	3.04	0.96

Source: Collected from primary data through field survey and descriptive statistics done in MS Excel

Table 7 shows that the significant challenge faced in terms of inventory management is excess inventory with mean 3.19 and standard deviation 0.78, followed by failure to keep track of stock, followed by difficulty identifying demand patterns.

From the hypothesis testing it is found that there are stock-out and wastage situations in the restaurants due to the online delivery apps.

TABLE 8
Reasons for stock-outs and wastage

Questions	Attributes	Mean	SD
Reasons for stock-outs	Inaccurate data	3.4	0.65
	Failure to reorder timely	3.19	0.86
	Poor communication with suppliers	2.5	0.77
	Not enough working capital	2.3	0.91
Reasons for wastage of food	Overstocking	3.07	0.83
	Over production of food	3.28	0.76
	Defected or low quality items	2.62	0.96
	Spills	2.61	0.84

Source: Collected from primary data through field survey and descriptive statistics done in MS Excel

Table 8 shows that the primary reason for stock-out is inaccurate data with mean 3.4 and standard deviation 0.65 and that for wastage is the overproduction of food with mean 3.28 and standard deviation 0.76.

A few recommendations for the restaurateurs to better manage their inventory are discussed as follows:

1. Even though a maximum of the restaurants in Guwahati does not use or may be unaware of the importance of an inventory management system, it is very crucial to deploy a Proactive Inventory Management System as it can be a crucial investment in a food business. Most of the vendors of Guwahati go out-of-stock, mainly due to inaccurate data. An inventory management system makes everything much more manageable by automating all the processes. Hand counting of inventory can take a longer time, but the restaurants can perform the same process with an inventory management system in a matter of a few minutes.
2. The restaurateurs need to take their inventory regularly. They should prioritize items and take their inventory accordingly. Customer these days are very health conscious and give special care to hygiene and health. Different items have different storing temperature requirements and consequently, different shelf lives. The items like meat, vegetables, fruits which have a low shelf life should be consumed fast than items which have a higher shelf life.
3. They need to clean out and organize the stock areas before taking inventory and discard items that have expired, or organize similar items on the same shelf. Taking inventory after the outlet has closed, or before it opens is advisable. One cannot take accurate inventory while goods are getting sold, so a fixed time should be picked to avoid fluctuations in the results.
4. It is necessary to accurately assess the already existing stock in the outlets before going for a new purchase. Maximum food wastages happen when the stock is ordered in large quantities but not consumed before it gets expired. The restaurateurs should use the First-In-First-Out (FIFO) method for inventory usage and ask their staff to arrange the inventory according to their expiry dates or their in-time at the kitchen and dispense the inventory as per the FIFO rule.
5. The vendors should define the maximum and minimum storage levels at the fast food outlets to keep the inventory fresh and edible.
6. It is crucial to conduct audits while stocking the inventory items for examining damaged or low-quality food items regularly.

3.3 Major issues faced by the restaurants due to the online food ordering apps

Although the online food ordering system has become extremely popular these days due to its ease and convenience, yet it possesses a good number of challenges. On being asked as part of the survey, the restaurateurs listed out the following issues that they face for using the services of the online food delivery apps:

1. Online food delivery aggregators have become a necessary evil for restaurants. The online food delivery aggregators, when first entered the market, offered pretty low and reasonable commissions to the restaurants. With an increase in the usage of these apps, some of the aggregators are charging commissions as high as 20-25%. As a result, the small businesses are running on very low-profit margins, and if this trend continues, they will soon be out of business.
2. There is no denying the fact that the quality of food decreases when delivered in packages. It is very tough to maintain the quality of food in comparison to the hot food served straight out of the kitchen. Despite the utmost care taken in delivering the food, the orders are prone to various quality failures such as spills, turning cold, and many more. Also, the foods which are supposed to stay fresh and crispy turn moist or become sticky. All of these quality issues result in a negative experience of customers directly or indirectly hampering the image of the restaurants.
3. Due to the soaring demand for the online orders received through third-party providers, the walk-in customers are slowly facing dissatisfaction due to the delay in receiving food as these orders have very little turnaround time (TAT) within which the food is to be prepared and dispatched to their destination.
4. With a wide range of restaurants providing a variety of options to choose from, it has become challenging for restaurants to retain customers in the long run. The customers become loyal to food delivery apps and not restaurants.
5. Even after offering discounts and various other extra benefits, it is not always sure that the customers will place the order.
6. The customers often cancel their orders when the food does not get delivered according to their expected time, which causes wastage of food. The customers call the delivery guy several times to locate their order, ultimately resulting in customer dissatisfaction and decreasing the chance of ordering from that restaurant again.
7. The concept of cloud kitchen or dark kitchen is also becoming a trend that is slowly ruining the restaurant business. The cloud kitchens only need a highly skilled kitchen staff but no wait staff since they do not have any physical space for customers to dine-in or any takeaway facilities. As a result, it is considered to be very cost-effective.

4 CONCLUSION

The restaurant segment and the food delivery market have enormously changed over the last few years with rapid urbanization and endless influx from neighbouring places to cities. Ordering a meal from outside and eating-in has become a tradition these days with the increasing number of smartphones and food delivery apps. This research paper gave an idea about how the usage of online food delivery apps can have a positive impact on the restaurant business. The paper also highlights the inventory management strategies that the restaurants are following in today's scenario. For effectively managing the restaurant inventory, a few recommendations are given that might be helpful to the restaurateurs. The issues faced by the restaurants currently can be solved in the future, which leaves scope for further research.

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