

Customer Behavioral Trends in Online Grocery Shopping During COVID-19

Victor Chang, Aston University, UK

 <https://orcid.org/0000-0002-8012-5852>

Ou Liu, Xi'an Jiaotong-Liverpool University, China*

Kiran Vijay Barbole, Aston University, UK

Qianwen Ariel Xu, Aston University, UK

Xianghua Jason Gao, Aston University, UK

Wendy Tabrizi, Aston University, UK

ABSTRACT

The evolution of online shopping started when big players like Amazon began selling all types of merchandise. Customers understood the ease of shopping online, so the trend grew even stronger. It is therefore essential to conduct a study of online shopping usage and the perception of customers during COVID-19, especially in the grocery sector. In this study, approximately 28 respondents from 50 specifically targeted groups were surveyed, and data collection was undertaken through a structured questionnaire. The regression method was conducted to analyze the collected data. Additionally, 5 interviews were conducted to validate and support the findings. Customers definitely preferred online grocery shopping (OGS) services during COVID-19 due to safety, convenience, and government restrictions. The influential factors were very important in this case, like delivery times, good discounts, and the quality of products. Secondly, OGS services were more stable and alert during the pandemic situation, following the government's rules and restrictions. Customers were extremely satisfied with the safety precautions during COVID-19, the assistance provided through helplines for support, and the increased customer reach to make groceries as accessible as other reputable online departments.

KEYWORDS

Consumer Behavior, COVID-19, Online Grocery Shopping, Pandemic, Theory of Fear

1. INTRODUCTION

The COVID-19 pandemic caused many large businesses worldwide to be heavily impacted by negative effects, especially the food industry. According to Aday and Aday (2020), the percentage of food purchases from offline supermarkets and use of food service is 50% of what it was before the outbreak. Farmers have limited access to the resources and labor needed for farming due to road constraints, leaving more than 40% of Africa's agricultural land uncultivated. Moreover, the COVID-19 crisis has caused some governments to change their food trade policies, shifting toward promoting imports

DOI: 10.4018/JGIM.317081

*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

and restricting exports. In the UK, the highest record made in the online shopping sector was around 87% of people in the UK, which was 10% higher than in 2018 (Aashind, 2022). This shows us the increased number of users moving toward the online shopping industry. Customers chose online shopping more frequently than compared to offline methods.

The start of 2020 introduced a series of events that largely affected the online sector and the majority turned out to be difficult for sales of the daily essentials like groceries, as there were lockdowns imposed on populations of every city in the UK. There were different types of lockdown laws imposed by the UK government in response to the coronavirus pandemic, like gathering, movement and business restrictions (Ferguson and Brown, 2022). Any kind of contact within a crowd of people was something people became scared of. So, everyone had to stay home and avoid outside contact. Hence, people preferred to stock up on goods at home so that they would last long enough without the need to go out to purchase necessities. There was a change in behavior from normal to panic buying/ impulsive buying (Aljanabi, 2021) during the early stages of COVID-19. This change was the motivation in the first place for this research. It showed that customers were turning more towards online grocery shopping and preferring it for daily household goods as well and not just for clothing or accessories. As customers shifted towards OGS services, a new pattern of customer behavior emerged in this sector. This study was mainly directed toward understanding that pattern and the factors influencing customers. OGS services are not a new thing, but due to the pandemic, there was a whole new group of people who became inclined towards it, and to reduce the gap between this new relationship, the OGS respondents took new steps to reach their customers and provide help/support 24/7 (Mathew, 2022).

1.1 Aims and Objectives

The main purpose of this project is to analyze the change in customer behaviors and the influential factors that made customers more comfortable with OGS during COVID-19. Prior to the pandemic, even though the same items were available online, people preferred to go out and buy them themselves due to the difficulty of adapting to the new behavior. Whereas during the pandemic phase, customers were able to shift to this new change, which in turn created a new buying behavioral pattern.

The main underlying objective of this research is to study the changing landscape and understand the influential factors in the behavior of customers of online grocery shopping amid a pandemic due to the growing choice for cashless shopping options for groceries and daily items. This study is focused on researchers' motivation to understand whether there were any positive impacts on OGS services during COVID-19 using the real time feedback from customers. The main research points are mentioned below:

1. To perform an evaluation of verifiable methods to inspect and learn about the majority of factors responsible for customer behavior.
2. To examine and verify customer perception from the data collected for buying groceries online during COVID-19.
3. To clearly provide a heuristic approach to the positive and negative experiences of customers while online grocery shopping, in order to understand what factors customers care about?

1.2 Research Questions

The aim and objectives lay the foundation for this research project and after carefully understanding them both, the main questions/problems that this research paper will focus on are below. The below questions also outline the tasks that define this project:

1. What are the main influential factors responsible for customers choosing online grocery shopping during COVID-19?

2. What are the essential considerations for the online grocery shopping industry to take care of during a pandemic?
3. How does the customer experience during the pandemic lay down the future for the online grocery shopping industry as a whole?

1.2.1 Structure of the Paper

Section 1 outlines the foundation and the background to which the whole research is based, and it gives the underlying concept of the research and its presentation. The existing literature reviews articles, research papers and supporting studies which were described in detail in *Section 2* to form the basis of the hypothesis. *Section 3* describes the methods of data collection, data analysis and sampling of data and the research methods used to analyze the records. Followed by *Section 4*, where the data collected is analyzed and the results based on the hypothesis have been clearly defined. The accepted and rejected hypotheses are briefly explained with the reason for the specific decision after analysis of the statistical significance of each influential factor in *Section 5*. The concluding summary of the whole research is represented using the results and discussion in *Section 6*. The limitations/constraints observed for the overall research, with some suggestions for future study are explained in *Section 7*.

2. LITERATURE REVIEW

2.1 The Emergence of the Pandemic

The COVID-19 pandemic has caused a very tough situation for the whole world and due to this many top-running businesses collapsed. The industries saw a situation that no one would have ever imagined. There were extreme measures taken by the UK government to handle this dreadful situation. Keeping in mind the economy of the country and handling the lives of millions of people, the government imposed a lockdown on 16 March 2020. The UK Prime Minister urged everyone to stay at home and stop any travel and contact until further announcement. The pandemic changed all the courses of daily activities for the citizens of the country. No one was allowed to go out of their houses for any contact until unless there was an emergency situation. The lockdowns were imposed on different states and cities. Hence, people were required to follow strict guidelines to stay healthy and at home (Martin-Neuninger & Ruby, 2020).

According to the publishing services of the UK government, the observations made on the consumption of food and drink items were as shown as Table 1 (Public Health England, 2020). The food and drink categories had shown the highest increase in sales just before the lockdown was imposed.

Table 1. Timespan of records and food/ drink categories sales increase during 2020

The time span during 2019- 2020	The higher difference in sales (%)	Highest recorded sales (%)
21 June 2019 – 21 June 2020	11	
23 March 2020		43.6
June 2019 – June 2020	17.7	
Categories	Name of the items	% increase in sales during 2020
Drinks	Alcohol	27.6
Food/ Drinks	Home cooking	23.5 – 26.2
	Savory carbs and snacks	18.8
Food	Frozen meat	19.1
	Frozen confectionery	17.8

2.2 Age and Gender Influencing Customer Behaviors in Online Grocery Shopping

Online shopping is a billion-dollar industry with increasing demands every year. In a study undertaken by U.S. Census (2022), they found that there was an increase in online shoppers by around 36.3% between the third quarters of 2019 and 2020. Hence, they predicted that the OGS sector would need to grow to serve the increasing demands of its customers.

With regard to age categorization, according to a study by Gong, Stump and Maddox, in 2013, younger customers were more drawn to online shopping and had a higher frequency than older ones. Older adults came across more obstacles while shopping online in terms of value, risk and traditional patterns (Suman, Vadera, & Srivastava, 2019). Shoppers in the age group of 20-22 years, shopped online more often than the older age groups and had a tendency to shop more after their first online shopping experience (Mathew, 2015). The new technologies and user experiences were enhancing in surprising ways, which was a major reason why older shoppers were showing less interest in adopting the new online shift, which comes from a lack of user experience rather than the age factor (Hernández, 2011).

With regard to female shoppers, they were more inclined toward the components and website functionalities and the convenience of it. In contrast, male buyers showed higher intentions to shop online after their first experience. Online shopping is the most in-demand activity on the internet these days, and buyers are in search of good quality products, good discount offers and flexible delivery options. In a study conducted by Lin et al. (2019), women buyers have a tendency to pay attention to relevant details more than men. The interesting part of online shopping these days is despite gender-specific differences in other mediums, an increasing number of women are using the internet for online shopping and the gap is subsequently decreasing (Lin et al., 2019):

H1a: AGE is a significant factor in the relationship between purchase intentions and online platform, with a negative effect.

H1b: Profession is a significant factor in moderating the online purchase intentions. During COVID-19, customers in different professions had different frequencies of using OGS services.

2.3 Statistical Analysis of Changes in Customer Behavior during COVID-19

The emergence of COVID-19 drastically affected the way customers conducted their grocery shopping. In 2021, a survey was conducted to research and find some statistical data on this topic about the percentage of people wanting to shop online or whether they would continue to do so in the future. As we saw grocery shopping patterns changed during the 2020-2021 pandemic year, as by the end of May 2020, it was reported that nearly 30% of shoppers agreed that they had seen an increase in their online grocery shopping activities. Alcoholic beverages were the most commonly bought items during the year and the least popular items were fish and non-alcoholic beverages (Tighe, 2021).

A survey was conducted in the UK to understand the customers' preferences in shopping for groceries online post-pandemic (Coppola, 2022). The results showed that the changes in a customer's perception depends on a number of factors like better product options, efficient ordering process, discounts and lower prices, delivery times, ease of shopping from home, hassle-free shopping and avoiding multiple trips to the store, time-saving options and many other benefits. But as COVID-19 hit the UK, some other factors were added to the list that many customers preferred online shopping due to the safety measures, such as avoiding physical contact with other people, safer than visiting stores/outlets, and home delivery options and strictly following the safety precautions.

Situational factors like perceived value, ease of use, usefulness, benefits and risks lead to the identification of behavioral intention based on the level of satisfaction (Alaimo, Fiore, & Galati, 2020). As we can see in the above survey, 42.6% and 6% of customers responded that they were continuing with online grocery shopping after the pandemic. This is because of the precautions taken by the

food companies in delivering groceries, which constitutes an important part of customer preferences following the COVID-19 implications. Hence, this hypothesis forms the first conclusion:

H2a: The frequency of shopping for groceries online has increased during and after the post-pandemic.

2.4 Using Customer Value as a Decision Tool

The empirical research and theory based on customer value is usually defined as CV, and can be measured by the customer's utility value based on the perceived costs and benefits of using the product (Park et al., 2018). There is a difference between the customer value generated from using the same services in various situations. Like before the pandemic, customer shopping was more inclined towards self-desired and self-sufficient products, but the after-effects of the pandemic changed it to only self-sufficient shopping as it was the most essential. Information systems have played a large role in collecting, organizing and analyzing data to generate useful customer value insights and identify the key attributes responsible for generating the most effective customer value. (Ainin & Mohd Salleh, 2014). The value-based hierarchy describes the customers' preferences based on attributes such as product performance and the value they gained from it and evaluates user experience. The CSM process has been very useful in determining customer value, leading to customer satisfaction. It's a cycle that involves a customer buying a certain product according to their needs/wants, user experience for a certain period of time, evaluating results – how well the product performed -> which in turn will decide the future of the product.

Customer satisfaction is a qualitative descriptive measure and needs statistical analysis with data and sampling to prove the facts (Nedelcu, Dumitrascu and Cristea, 2010).

Chanpariyavatevong et al. (2021) considered that customer satisfaction measures are a critical factor in predicting customer retention, customer loyalty, attracting new customers and repurchase intentions, which is vital to any product or company.

CSM includes this in its process – identifying potential customers and what they require or desire, analyzing the key buying criteria and evaluating the performance of the products. This could be used as a tool for identifying the customer value generated while using the CSM framework.

Sellers identify the consequences of their actions in this process of delivering quality products to their customers while maintaining all the buying criteria specified. The below hypotheses were derived from the research study above:

- **Buying criteria:** Household products/ Grocery items.
- **Preventive measures:** Maintain social distancing, wear masks, and safe delivery.
- **Customer Value metrics:** Quality products, ease of ordering, convenient deliveries, safety concerns.

As per the article published by McKinsey in 2020 (Kohli, Timelin, Fabius, & Veranen, 2020), they categorized the shake-up of customers' preferences in online shopping in an interesting way: Temporary trends and Enduring trends. The temporary trends might be high today, but not as much as in the coming 4-5 years, so they cannot be a part of the strategies involved in this segment to retain or gain more customers. Temporary trends are as follows: Large basket sizes, reduced self-desired consumption (on-the-go products), major customers turning towards trusted brands, using trusted products for sustainability, and staying at home.

The second hypothesis conclusion is as follows:

H2b: Customer satisfaction was derived from factors like safety measures, convenience and flexible delivery times.

2.5 Changes in the Basket Sizes of Grocery Shoppers During COVID-19

During the pandemic, there were nationwide lockdown phases all over the world, mainly starting from March 2020 till the end of 2021, during which many stores/outlets were shutdown leaving customers with the option of online grocery shopping or very limited access to stores whenever there was some relief in the lockdowns imposed (Boyle and Bond, 2022). This made offline customers move online and buy large amounts of food products, daily household essentials and other items. In turn, this increased the basket size of grocery shoppers because the customer could buy all sorts of products in just one order. As the different online shopping websites were taking advantage of these larger purchases, they started introducing exclusive offers to attract more customers and increase organizational profits. One of the largest followed offers was giving free deliveries/ discounts on orders above £10 - £25 (Martin-Neuninger & Ruby, 2020).

Directly proportional to this offer, customers preferred to buy more groceries to get the free deliveries and discounts, which gradually increased the basket size of every order.

The patterns of basket sizes of customers can be seen below (Martin-Neuninger and Ruby, 2020):

1. A general increase in basket sizes of above £10.
2. The sharp increase in basket sizes of above £30.

It is clearly apparent that the online grocery shopping experience has its own complexities, but as COVID-19 urged many new customers to shift to digital interfaces, the applications and website navigations became more important. In a national survey study conducted by (Burke, 2002) about what customers wanted in the physical and virtual stores showed that customers are best satisfied with the convenience, quality, selection, and value provided by the retailers and OGS sites. As new technologies are enhancing the shopping experience, the main formula for making customers happy and satisfied is making the applications tailored to the unique requirements of changing customer segments and multiple product categories.

H2c: Safety issues, convenience, discounts, quality of products and value provided were significant factors for customers having a preferred website.

2.6 The Need for CRM Systems in the Post-Pandemic World

Customer Relationship Marketing (CRM) systems have been helping businesses for a long time and were needed much more than ever during the pandemic. Apart from retaining existing customers, gaining new customers was also managed through the deployment of CRM systems. This was achieved by analyzing data and user insights and enhancing business work patterns. CRM also helped to maximize existing customer value by supporting teams that were working remotely, to ensure provision of a well-guided and efficient customer experience to both existing and potential customers (Hannath, 2022).

To keep the economy functioning effectively in crisis conditions like COVID-19, a stable operational telecommunications infrastructure and a high level of digitalization are of vital importance, according to a rigorous study in 2020 by Katz et al. The study recommends that the public and private sectors need to collaborate and cooperate to promote the improvement of the digital ecosystem (Scutariu et al., 2021). According to the research done by Scutariu et al. (2021), using dendrograms for comparative analysis during the year of 2018 and 2020 with Euclidian distance and Wards methods, a grouping of 31 European countries was undertaken in 7 clusters. CCS and ECRM were some of the significant variables used in this study to show the percentage distribution by every country. The United Kingdom was a part of cluster 4. Hence aligning with the conclusion, the UK was seen to be risen by 30% in CCS and 22% in ECRM. In research conducted by Limon (2021), a survey analysis was conducted to understand the frequency and situations of safety measures taken during food

delivery. In this research, it was stated that the essential factors in food delivery include disinfecting vehicles used in delivery, cleaning, sanitizing the bags and high levels of hygiene maintained for the sanitization of food. Changes were observed in customer behavior and adaptations to new methods like shopping online for groceries and food, home deliveries and online payment transactions (cashless) due to the increased contamination measures (Eger et al., 2021).

H3a: The safety measures taken by the OGS respondents during the pandemic were a part of the new approach toward online selling.

H3c: Customer reach through emails, messages and recommendations to establish strong customer relationship management

2.7 Customer Trends Transforming the Online Grocery Shopping Sector

Following the pandemic, many big companies, outlets and vendors had to change their way of selling to make it more convenient, safe and easy for customers. Jean-Philippe Nier, head of e-commerce for Kraft Heinz business in the UK and Ireland, said “The big step for us was really trying to make the platform a more personalized experience for customers and to push a product that you cannot find in the retail world” (Creasey, 2021).

1. Increased online shopping during and after a pandemic is the new behavior.

The COVID-19 lockdowns required people to stock up and fill their food storage, as everyone was staying and working at home. The study shown in this article explained the main reasons why customers ordered groceries online. 21% of people confirmed that they preferred to stock up grocery supplies while ordering online (Aull and Begley, 2022).

2. A simple and easy user experience is necessary.

A simple user experience for the customer makes it easier for them to conveniently use the applications for online grocery shopping. This way, while retaining customers, new customers get attracted to the easiest features of the online shopping platform.

3. Customers are willing to pay the delivery fees – convenience, ease and quality are important.

Amidst COVID-19, customers expected fewer delivery times and large basket sizes, that is, high-order deliveries, because high-order value deliveries can signify the presence of “want” and “should” items in the online shopping basket (Bauerová, 2018). The value proposition has increased due to delivery and operational efficiencies, increased basket sizes, preferred delivery slots, same-as-instore pricing, a huge variety of options to choose from and the convenience of providing any instructions to be followed during delivery.

Many online grocery shoppers used strict measures to help deliver the orders safely by following the social distancing rules.

4. E-commerce shopping has different features and options to provide.

The distinctive features of online shopping websites guide shoppers into either convenience-oriented or recreational shopping (LaRose, 2006). This study showed the features highlighted and broken down into categories, including the most important and significant features of online grocery shopping:

1. Quick and easy selection of products.
2. Ability to choose from a variety of products and categories.
3. Ease of ordering and getting it delivered to your doorstep.
4. Promotions, discounts and offers for orders to provide product selection.
5. Support and chat feature to help with any issues/ doubts with orders.

2.7.1 Transition to Remote Working

Digital technologies were highlighted as the most important tools in helping this acceleration during COVID-19. The enduring daily routine patterns were changed in response to adapt to a “new normal” life through activities like working from home, the rise of e-pharmacy and e-doctors, entertainment source channel shift from physical to digital and a surge in e-commerce (Kohli, Timelin, Fabius, & Veranen, 2020).

2.7.2 Shift to Digital Buying and Selling

There was an active surge in digital transactions more so than traditional ones and respondents considered digital transactions to be more significant, as they are likely to be the most used methods in the upcoming years (Gavin & Harrison, 2020). More than 90% of respondents transitioned to the virtual sales model during Covid-19 around the world, according to the reports published by McKinsey in 2020. The survey conducted by McKinsey showed that 43% of B2B respondents in the UK moved their all-field sales team to videoconferencing/ phone interactions with their customers, which was not seen before. This made customers reconsider their shopping habits, making the alternative to the peripheral habit the core and the peripheral the existing habit (Sheth, 2020).

H3b: Assistance provided through helplines/support pages or emails by the OGS respondents was considered by the customers to feel valued in the OGS services.

2.8 Conceptual Framework

The emergence of the pandemic introduced many changes in our day-to-day lives, from daily routines to daily shopping. As people started to understand the seriousness of the pandemic spreading and became aware of the situations happening around them, there was much fear, anxiety and panic created amongst them. The government started imposing lockdowns and social distancing measures very strictly, as it was confirmed to be a highly contagious and widely spreading disease worldwide.

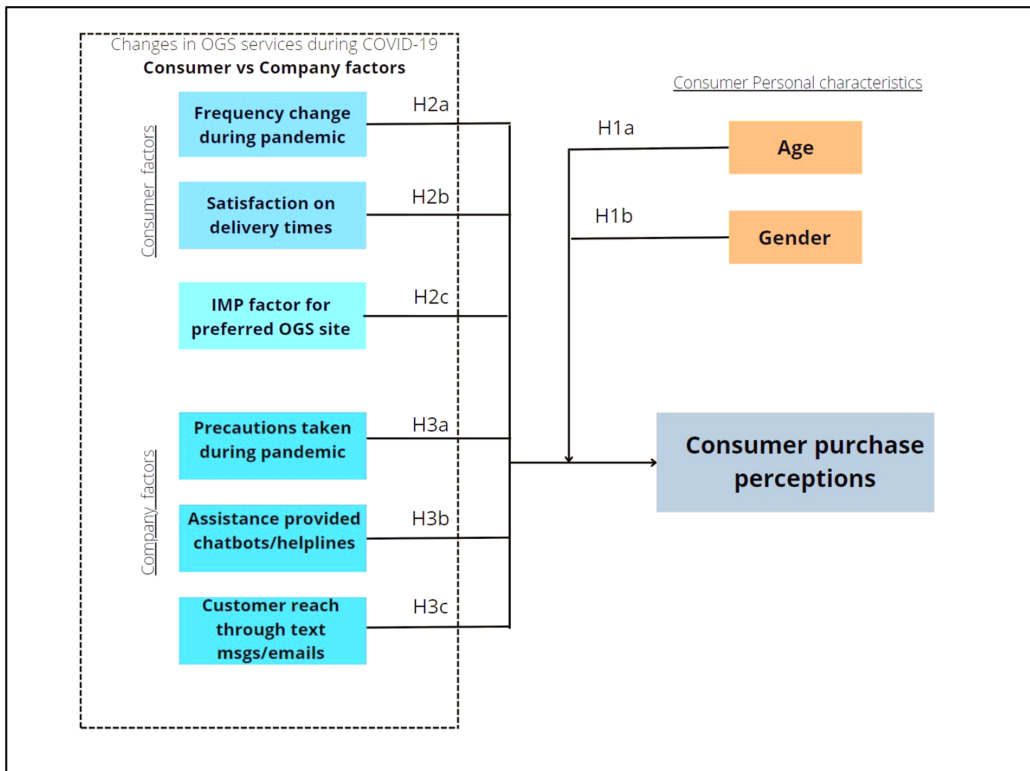
As much as government-imposed measures were important, it was also established that individually self-imposed safety measures like frequent handwashing, wearing masks, sanitizer usage regularly and keeping away from crowds proved to be the most effective prevention methods during COVID-19 (Teslya et al., 2020). There are many existing theories of protection motivation, which arise out of fear and anxiety of an individual to take preventative measures to avoid a dangerous and extremely tough situation. Fear is described as a challenging motivational variable for an individual which makes them take necessary action to feel safe and decreases the intensity of a far worse situation. COVID-19 was a key situation in which fear was a main motivation for people to take action to stay safe and away from the pandemic. (Eger et al., 2021). The above research concludes the findings for analyzing the resultant customer behavior based on emotions like fear, anxiety and safety and how it impacted actions in online shopping.

The direct effects of government-imposed rules such as lockdowns, shutdowns of cities, malls, travel, and other physical gathering spots, restrictions on the crowd and strict social distancing created the impact. The UK government took action to ensure people followed the rules thereby causing them to adopt online/ digital shopping interactions for almost everything in order to stay safe. People moved to online grocery shopping options as a PM for a convenient and easy daily shopping shift.

Figure 1 shows a motivational and perceptual framework combining existing and influential factors for changes in customer behavior during COVID-19. Following the conclusions identified based in the above literature reviewed, it is important to validate whether the influential factors are positively responsible for the change in customer behavior and the new pattern of OGS services. Thus, the below hypothesis has been perceived to analyze the final results of this research:

- H1a:** AGE is a significant factor in the relationship between purchase intentions and online platform.
- H1b:** Profession is a significant factor in moderating the online purchase intentions. During COVID-19, customers in different professions had different frequencies of using OGS services.
- H2a:** The frequency of shopping for groceries online has increased during and post-pandemic.
- H2b:** Customer satisfaction was derived from factors like safety measures, convenience and flexible delivery times and the reason for the change in customer perception.
- H2c:** Safety issues, convenience, discounts, quality of products and value provided were significant factors for customers having a preferred website.
- H3a:** The precautionary measures taken by the OGS respondents were a significant part of the new approach and the reason for the change in customer perception.
- H3b:** Assistance provided through helplines/support pages or emails by the OGS respondents was considered by the customers to feel valued in the OGS services.
- H3c:** Customer reach through emails, messages and recommendations through strong customer relationship management have a strong effect on customers' intention to shop for groceries online again.

Figure 1. Combining existing and influential factors for changes in customer behavior during COVID-19 – Motivational and Perceptual framework



3. RESEARCH METHODOLOGY

3.1 Research Method and Design

Content analysis mostly relies on statistical procedures for sampling a wide range of data and then categorizing them into meaningful theories by establishing inter-code reliability to test hypotheses (Lindgren et al., 2020). The study identified vital articles in forming a conceptual background and hypothesis to lay down the structure of this research. Researchers were broadly categorized into how well their articles related to this study. Important articles were closely observed and determined in order to establish the first part of this research. The difference between customer behavior before and after the pandemic has certainly changed. Accordingly, the work patterns of online grocery shopping respondents have responded to that change quite well.

In order to test the hypotheses described and analyzed in the literature review, the online questionnaire method was used. The survey was formed with a total of 17 questions that targeted the customer OGS behavior both during the pandemic and captured their intentions after the pandemic. A primary advantage of using online questionnaires is that they can save time, be cost-effective and give easy access to the desired community with the same characteristics. Researchers can save a lot of time by working on other tasks and simultaneously collecting the data in the backend (Wright, 2006).

The first five questions were related to understand customers' personal OGS characteristics, starting from their age, profession and "whether they shop for groceries online or no", if they selected yes, then they would be required to jump to the next questions and if they chose NO, then they should select an option in the further question, which clearly specifies the reason for it.

The next section of questions from Q6 – Q11 was to understand their perspective on the OGS services during COVID-19 and what they like/dislike. Then, after Q8, the questions were intended to understand what motivated them to order groceries from the same OGS website.

From Q12 onwards, it was basically to analyze the behavior of the OGS respondents during COVID-19 to increase sales and provide safe deliveries to customers. For example, whether they followed the safety precautions and rules mentioned by the government.

3.2 Method of Data Collection

Data collection was undertaken using the Google forms questionnaire, which is shown in Table 12 of the Appendix. The survey consisted of 17 questions, which started from the customers' profession to their experiences during the pandemic In OGS services, what they liked and disliked, how the respondents dealt with the COVID-19 rules like safety precautions, safe deliveries, etc. The questionnaire was sent to 50 respondents in total, all of whom were living in the UK, were using the OGS services, and had access to a mobile, laptop, or desktop with an internet connection. There were responses from 28 people received back. The questionnaire was sent through a link on Instagram, LinkedIn and WhatsApp and accepted responses over a two-week period.

3.3 Sampling

A sampling of data was used for the quantitative analysis, where responses to the questionnaire from the public were collected in Google forms to cover a wide range of areas that would best assist the researchers to analyze customer behavior changes. The questions were formed keeping in mind the situational changes that occurred in the OGS sector during COVID-19 from both the vendor and the customer sides as a response to the restrictions. The responses collected were used to categorize and segment data into valuable results and findings and establish a relationship between the qualitative content analysis and quantitative data collected. Aligning the data collected from the real-time world, where people recorded their responses based on their experiences, would help provide judgments and conclusions. Changes in customer behavior during COVID-19 in the OGS sector were remarkably progressive. Hence, there are a lot of research articles and studies based on this topic, which helps us to identify the current gaps and make the OGS sector even more stable and reliable for the upcoming

years, so that in such crisis times, the systems would function 100% accurately (Suman, Vadera, & Srivastava, 2019; Alaimo, Fiore, & Galati, 2020; Kohli et al., 2020). Similarly, this gap was covered by analyzing the existing research on customer behavior and recorded customer responses.

The main sampling was undertaken in 5 categories:

1. Age, profession, and reason for yes/no to OGS.
2. Safety precautions are taken by respondents during COVID-19 deliveries.
3. Customer experiences during COVID-19 in the OGS sector.
4. Ease and accessibility of services provided by the respondents.
5. Reason to have a preferred website for shopping for groceries online.

4. RESULTS

4.1 Data Analysis and Interpretation

The results of this survey were split into three main categories from which the below descriptions and analysis have been derived. The main intention of forming these categories of responses was to analyze the customer and OGS organizational behavior during COVID-19 and derive the most promising influential factors:

1. Personal factors aligned:
 - H1a – Age
 - H1b – Profession
2. Customer factors:
 - H2a - Frequency change during the pandemic in using OGS
 - H2b - Satisfaction with delivery times
 - H2c – Imp factor for preferred OGS website
3. Company factors:
 - H3a – Precautions taken during a pandemic
 - H3b – Assistance provided using chatbots/helplines
 - H3c – Customer reach through messages/emails

This analysis has been divided into customer changes and, correspondingly, organizational responses to COVID-19 restrictions.

4.1.1 Personal Factors Aligned

Here, the main purpose is to check and analyze the frequency using the crosstabulation method in the IBM SPSS statistics tool. The main factor which explains the change in the frequency of buying groceries online was analyzed according to age and professional parameters. It is useful to keep one point constant and validate how it aligns with two of the personal characteristics of the respondents.

- **Profession:** Table 2 shows the respondents' professional descriptive statistics. According to the profession, the observations stated that students bought the most during the pandemic and just less by a difference of 1. Respondents with jobs/businesses have a count of 10. We got a total of 21 counts, which agreed to have increased the usage of OGS services during COVID-19, following in line with the vital parameter of this research.
- **Age:** As shown in Table 3, the responses recorded from the total of 28 respondents show that most of them were around the 20-30 age group, which aligns with the profession parameter as well. The age group of 20-30 satisfied the expected count = actual count. These two identified hypotheses were clearly calculated using the linear regression model to analyze their statistical significance in further points. Prior to this, age was perceived as a moderating factor, where

Table 2. Respondents' professional descriptive statistics

			Less during the pandemic	More after pandemic due to safety measures	No change	Yes – More during pandemic	Total
profession	Job/ Business	Count	0	1	2	10	13
		Expected count	.5	1.9	.9	9.8	13.0
		Residual	-.5	-9	1.1	.3	
	Student	Count	1	3	0	11	15
		Expected count	.5	2.1	1.1	11.3	15.0
		Residual	.5	.9	-1.1	-.2	
Total		Count	1	4	2	21	28
		Expected Count	1.0	4.0	2.0	21.0	28.0

Table 3. Respondents' age descriptive statistics

			Less during the pandemic	More after pandemic due to safety measures	No change	Yes – More during pandemic	Total
Age group	20-30	Count	1	3	2	16	22
		Expected count	.8	3.1	1.6	16.5	22.0
		Residual	.2	-.1	.4	-.5	
	30-40	Count	0	1	0	5	6
		Expected count	.2	.9	.4	4.5	6.0
		Residual	-.2	.1	-.4	.5	
Total		Count	1	4	2	21	28
		Expected Count	1.0	4.0	2.0	21.0	28.0

the interaction of older generations with the internet is not much accepted as compared to the younger generations. As the professional factor does not give a confirmed result on moderating customer behavior, the **H1b** hypothesis was rejected and **H1a** was accepted fully to analyze them with the other factors.

4.1.2 Customer Factors

According to the data collected through the Google questionnaire, the questions were purposefully framed to focus on the customer behavioral changes that occurred during COVID-19 and, in accordance with that, how the OGS respondents responded to that change and had a sync with their customers. As shown in Table 4, the highest percentage observed was in the first point of frequency changes, where almost (72 percent) of respondents bought groceries more during the pandemic. The two responses were very close for the delivery times followed, between Highly satisfied (37.9%) and Neutral (34.5%). Amazon was the most favorite OGS website of around 41.4 percent of the respondents and out of the 28 respondents, good discounts (36.2%) were the one common factor that was mostly chosen by the respondents. Along with the quality of products (44.8%), which strongly influenced COVID-19

Table 4. Consumer OGS preferences/perceptions during COVID-19

		Frequency	Percent
Did the frequency of buying groceries online change during pandemic?	Less during the pandemic	1	3.4
	More after pandemic dur to safety measures	4	13.8
	No change	2	6.9
	Yes – More during pandemic	21	72.4
How satisfied are you with the delivery times followed during pandemic?	Dissatisfied	1	3.4
	Highly satisfied	11	37.9
	Neutral	10	34.5
	Somewhat dissatisfied	3	10.3
	Somewhat satisfied	3	10.3
Which was your go-to online grocery shopping website during pandemic?	Amazon - Fresh and Morrisons	12	41.4
	ASDA	3	10.3
	Ocado	4	13.8
	Others	7	24.1
	Tesco	2	6.9
Which was the important factor in ordering from the same website?	Good discounts and less delivery times	8	27.6
	Good discounts and quality of products	13	44.8
	Just good discounts	3	10.3
	Only good quality of products mattered	2	6.9
	Only less delivery times mattered	2	6.9

online grocery shopping. The above frequencies and percentages were from a customer perspective, briefly describing the changes in the OGS patterns during COVID-19. The most positive point was that most respondents were doing their OGS more during the pandemic and were looking for good discounts, quality of products and fewer delivery times.

4.1.3 Company Factors

Table 5 shows OGS companies provided services and support during COVID-19. This data analysis was done based on the frequency analysis. OGS respondents changed their working process and behaviors where they had to accommodate the new safety measures, delivery timings and quality of products in a crisis situation. Thus, not only their performance but the way they led this change in OGS services during COVID-19 was of vital importance. The significance of respondents who unanimously agreed on the level of satisfaction with the safety precautions taken by the OGS respondents during COVID-19 was around 96.6%. Out of the total 96.5% responses, 24.1% of the respondents were unhappy with the help/assistance provided by the OGS, but a good side to this was definitely the high number of customers (72.4%) that felt the help/ assistance helped them to shop with ease and convenience.

Table 5. OGS companies provided services and support during COVID-19

		Frequency	Percent
Did you encounter any bad experiences while buying groceries online?	No	17	58.6
	Yes	11	37.9
Were you happy with the product recommendations given specifically based on your shopping experiences?	Maybe	5	17.2
	No	3	10.3
	Yes	20	69.0
Did the frequency of product recommendations increase during the pandemic?	No	5	17.2
	Yes	23	79.3
Did the website/applications provide smart assistants or chatbots to help you with your orders?	No	7	24.1
	Yes	21	72.4
How frequent were the text messages or emails sent to you based on your grocery recommendations?	Everyday	1	3.4
	Monthly	12	41.4
	Not at all	4	13.8
	Weekly	11	37.9
Did you get the notifications of your requested products when they are back in stock?	No	7	24.1
	Yes	21	72.4
During the pandemic were you satisfied with the safety precautions taken by the companies?	Yes	28	96.6

This difference in customer behavior highlights the gap between the satisfaction rate of customers with OGS services. The relative factors like product recommendations, frequency of text messages/emails, notifications of products back in stock and bad experiences counter a fair percentage of the actions the OGS respondents took. These factors form a very strong foundation for the various customer outreach methods that the OGS sites followed during COVID-19.

4.2 Influential Factors in Customer Behavioral Changes during COVID-19

In this section, the analysis of the dependent variable, which is “Frequency of using OGS change during COVID-19”, was calculated with the other factors to identify the statistically significant aspect of the hypothesis and understand whether they can be accepted or not.

Q1: Did the frequency of using OGS change during COVID-19? * Were you satisfied with the delivery times followed during COVID-19?

Table 6 shows Chi-square tests of influential factor 1. The frequency of change in shopping for groceries online during COVID-19 has changed drastically, with many new users moving to remote working and responding proactively to this digital shift. Pearson’s chi-square tests were performed to determine the statistical significance of satisfaction with delivery times on frequency of using OGS during COVID-19. The chi-square statistic was 25.229, and the p-value (.014) is in the same row in “Asymptomatic significance (2-sided)” column, which is less than the designated alpha level (.05). Hence, the result is significant. The researcher rejects the null hypothesis and the data confirms that delivery time has a significant influence on customer satisfaction. Therefore, **H2b** is accepted fully.

Table 6. Chi-square tests of influential factor 1

	Value	df	Asymptotic Significance (2-sided)
Pearson chi-square	25.229*	12	.014
Likelihood ratio	15.380	12	.221
Linear-by-Linear association	.432	1	.511
N of valid cases	28		

* 18 cells (90.0%) have expected count less than 5. The minimum expected count is .04

Q2: Did the Frequency of using OGS change during COVID-19? * Does customer satisfaction make customers prefer to use the same OGS website?

As shown in Table 7, to identify the value of customer satisfaction with the regularly used websites for online grocery shopping, the chi-square test result for this relation was found to be 13.755 with a p-value of .317, as a result, was more than the normally accepted p-value of .05, the **H2c** hypothesis confirmed that the two variables were independent of each other and did not have any statistically significant effect on the outcome. Hence, the **H2c** hypothesis was rejected fully as the two variables were not significantly related to each other.

Q3: Did the Frequency of using OGS change during COVID-19? * Did OGS provides smart assistants/chatbots?

As shown in Table 8, the third combination was between the frequency of change variable and smart assistants/chatbots, which was statistically proven to be significant with a score of p-value=.053, which has a difference of 0.003 with the normally accepted p-value. The chi-square value was 7.683, with 75% of the expected count with less than 5. This data analysis is supposed to be partially accepted

Table 7. Chi-square tests of influential factor 2

	Value	df	Asymptotic Significance (2-sided)
Pearson chi-square	13.755*	12	.317
Likelihood ratio	10.657	12	.559
Linear-by-Linear association	.781	1	.377
N of valid cases	28		

* 18 cells (90.0%) have expected count less than 5. The minimum expected count is .07

Table 8. Chi-square tests of influential factor 3

	Value	df	Asymptotic Significance (2-sided)
Pearson chi-square	7.683*	3	.053
Likelihood ratio	8.438	3	.038
Linear-by-Linear association	.383	1	.536
N of valid cases	28		

* 6 cells (75.0%) have expected count less than 5. The minimum expected count is .25

for H3b hypothesis, as there is a slight significance of Smart assistants/ chatbots provided variable on the frequency of change.

4.3 Model Significance

The linear regression model was performed and used to analyze whether the influential factors in different formats add any statistical predictive power to the changes in customer behavior/ perception intentions during COVID-19. As shown in Table 9, there are two models specified to analyze the constant and variable factors, like in Model 1, Frequency of change, customer satisfaction and customer-preferred OGS site have been found to be statistically significant ($F(3,25)= 3.286, p>0.000$) with an adj R2 of .197. As the R2 was found to be .283, and the adj. R2 was .197, which indicated a slight reduction in the model's precision of statistical significance between the model factors. Thus, Model 1 explains 19.7% of the variance in the predicted value of influential factors. It was derived that for identifying the Frequency of a change of OGS during COVID-19, there were two qualifying metrics: customer satisfaction and delivery times. But due to the reduction in precision, it wasn't correctly defined which factor had the most weightage.

Statistically, customer satisfaction was found to be significant with ($t(1,91)=2.234, p>.000$), whereas delivery times was not precisely significant with ($t(1,91)=1.445, p=.161$).

With the next 2 influential factors: Precautions taken by the OGS and Assistance provided in the forms of helplines/ support, ($F(6,22)= 3.027, p>.000$) with an adj. R2 of .303. Hence, Model 2 explains 30.3% of the variance in the predicted values. The frequency of change in the online grocery shopping variable was found to be statistically significant, with a p-value of ($p=0.026$) in the descriptive analysis.

A linear regression was carried out to identify whether the dependent variable had any statistical significance with the other influential variables that supported the frequency of online grocery shopping during COVID-19. The objective of Pearson's correlation test was to determine whether personal factors, in this case: Age and Profession influenced the change in online shopping behavior during COVID-19.

Furthermore, the other specified hypothesis has been observed in this matrix, where we tried to inspect the difference in the variables' significance in the regression models to analyze the multicollinearity between the influential factors and the frequency of change in using OGS services during COVID-19. As shown in Table 10, the frequency of change variable has a significant correlation with many other variables.

For example, frequency of change variable was significantly related to the OGS providing smart assistants/ chatbots (.101), customers happy with product recommendations (.312) and the critical factor that customers preferred websites based on their choices (.378). Hence, the tests analysis and significant variables agreed to accept the **H2a** and **H3c** hypotheses completely. This 2-way correlation was identified to be significant at 0.05 level (2-tailed) matrix. The difference between the significant values of the variables was due to multicollinearity.

When adding the three influential factors: customers happy with product recommendations, customers satisfied with delivery times, and Safety precautions are taken during the pandemic in

Table 9. Model Summary - Linear Regression output

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig.
1	.532	.283	.197	.973	.283	3.286	3	25	.037
2	.672	.452	.303	.907	.169	2.267	3	22	.026

Table 10. Pearson's independent variables correlation matrix

		Age group	Profession	Did frequency of using OGS change during COVID -19?	Were you satisfied with delivery times followed during COVID -19?	Did OGS provide smart assistants/ chatbots?	Important factor in ordering from the same OGS website	Happy with product recommendations?
Age group	Pearson correlation	--						
	N	28						
Profession	Pearson correlation	-.386*						
	Sig (2-tailed)	.042						
	N	28	28					
Did Frequency of using OGS change during COVID-19	Pearson correlation	.079	-.168	--				
	Sig (2-tailed)	.689	.391					
	N	28	28	28				
Were you satisfied with delivery times followed during COVID-19	Pearson correlation	-.352	.150	.127	--			
	Sig (2-tailed)	.066	.447	.521				
	N	28	28	28	28			
Did OGS provide smart assistants / chatbots?	Pearson correlation	.101	-.041	-.119	.000	--		
	Sig (2-tailed)	.611	.835	.546	1.000			
	N	28	28	28	28	28		
Important factor in ordering from the same OGS website	Pearson correlation	.378*	-.358	-.170	-.162	.091	--	
	Sig (2-tailed)	.047	.061	.387	.410	.646		
	N	28	28	28	28	28	28	
Happy with products recommendations?	Pearson correlation	.312	-.279	.051	-.262	.079	0.13	--
	Sig (2-tailed)	.107	.150	.796	.178	.688	.948	
	N	28	28	28	28	28	28	28

*. Correlation is significant at the 0.05 level (2-tailed)

Model 2, it was found to be statistically significant ($F(6,22)=3.027$) and $p>0.000$ with an adj. R^2 of .303. After the statistical significance was established between the variables, the points increased by .146 points for each unit in the influential factor of variable customer reach, .240 points for each unit of increase in the customers satisfied with delivery times during covid-19 variable and safety precautions had an effect with 2.961 points for each unit of increase. Thus accepting the hypothesis, **H1a, H2a, H2b, H3a, H3b, and H3c.**

In this case, multiple differences between the professional factors and important factors for customer-preferred OGS sites depend on factors like situational change, product demand, OGS site offerings, etc. The **H1b and H2c** hypotheses were rejected, as the variables were independent and did not have any statistical significance on the relationship between the influential factors for increasing the frequency of customers using the OGS services during COVID-19.

4.4 Interview Results

An additional interview survey was conducted to five interviewee in this study to supplement the statistical analysis results. The interviewees found it convenient and timesaving to use online stores to shop, and three of them would buy everything they needed in life online, including food, daily necessities, clothes, electronic devices, e.g. one international student often bought water from online stores because buying large quantities offline was heavy and difficult to carry. The results are summarized in Table 13 in the Appendix.

First of all, the results showed that most respondents bought more items during the pandemic, with only one person having the opposite change, which may result from the safety measures after the pandemic. This result is generally consistent with the statistical results of this study in Section 4.1.

Second, the age of the interviewees covered the range 20-50 years old, and their occupations ranged from students to managers. Although the results of the statistical analysis reject the H1b hypothesis, that is, the profession is a significant factor in moderating online purchase intentions, our interview results imply that purchase intention may be related to the salary corresponding to different occupations since a student spends £500 per month, while a manager spends more than £2000 per month during COVID-19.

Third, most interviewees encountered unsatisfactory experiences when using online grocery stores for shopping. Safety measures, good discounts, quality of products, and fewer delivery times were the most significant factors, which also validated H2b accepted by the statistical analysis. However, the interviews provided details about the changing importance of these factors. The results of the interviews showed that discounts and product quality were the top considerations for respondents buying from online grocery stores, followed by delivery times. However, during COVID-19, the aspect that interviewees were most concerned about for online shopping was delivery speed, followed by discounts and product quality. It is worth noting that due to the possible health risks associated with the delivery process due to the pandemic, delivery safety also emerged as a factor of concern for customers.

Fourth, the interviewees were satisfied with the product recommendations given by the system based explicitly on the user's shopping experience, and all online stores involved will notify customers that the item is back in stock, which supports H3c. It also implies that the advanced big data analytics algorithm has performed well in customized product recommendations. However, the interviewees' views on the frequency of product recommendations and the assistance of intelligent assistants or chatbots from online grocery stores during the pandemic appeared to differ, possibly due to the different technologies used by different online grocery stores.

Furthermore, the results of the interviews show that most interviewees consider online stores and their products reliable, accessible, and acceptably priced since people can buy everything they want at home without visiting different offline stores, searching for the lowest prices, and using electronic discount coupons. Moreover, as e-commerce grows, the corresponding laws are becoming more sophisticated. The regulations for goods sold online are even stricter than offline, making information about all aspects of the goods more transparent.

However, respondents were not equally satisfied with the delivery speed of online stores compared to the merchandise. According to the respondents, this was caused by store or city control measures during the pandemic. Although comprehensive security precautions satisfied customers, the cumbersome process made delivery less efficient, affecting customer satisfaction. Online stores may need to balance security measures and delivery speed to maximize customer satisfaction.

4.5 Summary of Lessons Learned

As online groceries have become more popular since COVID-19, more organizations and people have used them as a routine type of work and interest weekly. More companies and representatives have used online groceries, which have become more reliable and robust in service delivery and offering more products on sale. During the interviews, it is noted that there are four reasons to do online groceries:

- **Reliability of online shopping stores and their food/items:** A high majority of online shops and service providers provide reliable, high/medium quality of products/food, excellent customer/delivery service and secure websites/payment methods. There are millions/billions of transactions daily, with more than 99% of delivery on time.
- **Delivery speed:** Most of the service providers provide next-day delivery or special delivery during and COVID-19. It also means food supply chains have been robust.
- **Availability of food/items:** During COVID-19, a shortage of products with fluctuating prices was common. Maintaining reliability in product sources and prices can be crucial for most of the customers.
- **Pricing of food/items:** Some customers do online groceries mainly due to pricing, as they can save around 10% or more compared to buying from physical stores. Special offers from promotions can save more than 20%.

Customers have a greater trust in online groceries. Although security and privacy may still impose some level of challenges, 1) ease of access and a wide variety of products; 2) the reliable tracking and delivery/customer service of shopping progress, 3) the robustness of supply chains to provide fast delivery, and 4) very attractive prices have developed online groceries into a growing business model, which are beneficial for individual customers or company representatives.

Additionally, two interviewees explain the quality of the products and services, particularly quality of products, is the main reason for them spending more on online groceries weekly. In other words, service providers should ensure the freshness (for food), authenticity and reliability of their products.

With the summary of lessons learned and recommendations from our valuable interviewees, their experiences and feedback have supported our hypotheses. All of them have read our work and agreed with our suggestions and conclusion.

5. DISCUSSION

Table 11 describes a quick overview of the accepted/ rejected hypothesis and a summary of the results based on the data analysis and interpretation.

We hypnotized the influential factors for customers to shop online during COVID-19, the frequency of their shopping and the new pattern that emerged from that situation. One of the most important factors was the safety precautions undertaken by the OGS respondents during COVID-19 to assist their customers. The impact of price value, attitude, and subjective norms has been positive on the online grocery purchase intentions of customers during COVID-19 (Tyrväinen & Karjaluoto, 2022). The increase in the frequency of using OGS services during COVID-19 was definitely due to the imposed restrictions and customers had to use the click-and-collect or home-delivery services.

This study demonstrated that the influential factors like safety precautions taken during the pandemic by the OGS websites, delivery times followed by them, customer reach through various methods opted and the preferred site chosen by the customers due to various factors were interrelated and had a significantly strong impact on the increase of frequency for using OGS services. The coefficient matrix was calculated to understand the concept of multicollinearity, whose unwanted relation between independent variables causes the standard error of the coefficients to increase and eventually causes a statistically significant factor to become insignificant (Daoud, 2017).

Table 11. Decisions table of accepted/rejected hypothesis

Hypothesis	Accepted	Rejected
H1a	Yes	
H1b		No
H2a	Yes	
H2b	Yes	
H2c		No
H3a	Yes	
H3b	Yes	
H3c	Yes	

There were different types of studies/analyses done after the pandemic, which explained how online grocery shopping transformed and achieved the change of a decade in just a few days. McKinsey released several reports regarding the adoption of digital, customer behavior changes and satisfaction depending on the new experiences. This research therefore contributes to the existing studies of McKinsey (Galante, Monroe and López, 2013), which has similar findings to their existing research. Customers look for convenience, but in line with assortment, quality and price points, this is a value proposition aspect, but the marketing strategies - messages and emails (customer reach) of online grocers should reinforce these elements as well. The statistical analysis in this study addressed the new pattern of customer behavioral changes during COVID-19 in the online grocery shopping sector. The insights, the new trends, customer preferences, value-driven behaviors and the contribution of OGS services in achieving the new normal were identified.

The Empirical findings suggested that the frequency of using OGS services was increased during the pandemic due to the safety measures and risk of contamination. Customers were switching to online services and preferred good quality products, precautionary measures, and flexible delivery times. Customer satisfaction was directly related to completing the above-listed points when most were transitioning to the digital shift. COVID-19 introduced a variety of new customer behaviors in the online grocery shopping sector. As this was a forced behavior, the guarantee of retaining it is very thin. On the other hand, customers will remain with it depending on how satisfied they are with different aspects of the services (Kohli, Timelin, Fabius, & Veranen, 2020).

6. CONCLUSION AND FINDINGS

This study intended to understand and analyze the behavioral trends of online grocery shopping customers during COVID-19. During this research, many other existing articles and studies highlighting different aspects of this behavior were discovered. The backbone of this research was the main research questions and the hypothesis conducted as a result, which were the main motivations of the authors to conduct the survey and analyze the collected data for effective outcomes. The hypothesis developed based on the explained literature review and contemporary factors were either accepted or rejected and were briefly described in the results section.

It was found that the factors: of customer satisfaction with delivery times and assistance provided by the OGS added statistical power to the existing model in all the regression models analyzed. Controversially, the frequency of change in using OGS services during COVID-19 was positively revealed to be significant with the above two factors. On the other hand, professional and customer preferences for preferred OGS site was not fully supported and that is why these two factors were not found to be relevant. Overall, the frequency of using OGS services was increased during COVID-19

with supported factors like customer satisfaction with the services provided, concerned safety measures, and assistance from the OGS services were found to influence customer behavioral trends in the online grocery context positively.

7. LIMITATIONS AND FUTURE RESEARCH

Since the survey was carried out through Google forms and distributed over Facebook, Instagram, LinkedIn, and the researchers' connections, 78.57% of the respondents were younger generations under 30 years of age. The statistically significant factors of the conducted hypothesis were confirmed to satisfy the underlying research. However, other researchers are encouraged to validate and verify other mediating factors that may be identical and more beneficial to understand customer behavior. For example, OGS services respondents analyze customer shopping patterns during and post-pandemic and smooth digital acceleration in the technologies used with ease and understandable interfaces. OGS services respondents provide a new future for the online shopping industry, and this new future depends on customer satisfaction and their value-driven behaviors. Hence, future researchers are encouraged to carry out a probability sampling method to ensure more coverage and broader categories to be considered for a generalized outcome of the study.

From a methodological perspective, researchers are urged to adopt quantitative research methods to assimilate the deeper mechanisms motivating the entire process of online grocery shopping during and post-pandemic. Quoted by *John C. Maxwell*, "Change is inevitable and growth is optional", customer perceptions and behaviors change over time, it's not a constant thing (Chang et al., 2005) and this study provides analysis for a certain defined period of time, it is not a longitudinal study. Furthermore, the customer behavioral changes were recorded during and post-pandemic at one point in time only, thus introducing a bias/ irrelevance, making the results less significant.

REFERENCES

- Aashind, A. (2022). 38+ Imposing UK Online Shopping Statistics [2022]. *CyberCrew*. <https://cybercrew.uk/blog/uk-online-shopping-statistics/#:~:text=In%202020%2C%2087%25%20of%20UKthe%20UK%20was%20only%2053%25.>
- Aday, S., & Aday, M. S. (2020). Impact of COVID-19 on the food supply chain. *Food Quality and Safety*, 4(4), 167–180. doi:10.1093/fqsafe/fyaa024
- Ainin, S., & Mohd Salleh, N. (2014). *Organization's Performance, Customer Value, and the Functional Capabilities of Information Systems*. Tandfonline.com. <https://www.tandfonline.com/doi/citedby/10.1080/10580530.2015.983012?scroll=top&needAccess=true>
- Alaimo, L., Fiore, M., & Galati, A. (2020). How the Covid-19 Pandemic Is Changing Online Food Shopping Human Behaviour in Italy. *Sustainability*, 12(22), 9594. <https://www.mdpi.com/2071-1050/12/22/9594>
- Aljanabi, A. (2021). The impact of economic policy uncertainty, news framing and information overload on panic buying behavior in the time of COVID-19: a conceptual exploration. *International Journal of Emerging Markets*. <https://www.emerald.com/insight/content/doi/10.1108/IJOEM-10-2020-1181/full/html>
- Aull, B., & Begley, S. (2022). *Making online grocery a winning proposition*. McKinsey & Company. <https://www.mckinsey.com/industries/customer-packaged-goods/our-insights/making-online-grocery-a-winning-proposition>
- Bauerová, R. (2018). Customers' Decision-Making in Online Grocery Shopping: The Impact of Services Offered and Delivery Conditions. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 66(5), 1239-1247.
- Boyle, P., Bond, R., Martinez Carracedo, J., Simmons, G., Mulvenna, M., & Hollywood, L. (2022). The impact of the COVID -19 pandemic on grocery shopper behaviour: Analysis of shopper behaviour change using store transaction data. *Journal of Customer Behaviour*, 21(2), 259–271. doi:10.1002/cb.1999
- Burke, R. (2002). Technology and the Customer Interface: What Customers Want in the Physical and Virtual Store. *Journal of the Academy of Marketing Science*, 30(4), 411–432. doi:10.1177/009207002236914
- Census, U. S. (2022). Quarterly retail e-commerce sales. USCB. https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf
- Chang, M., Cheung, W., & Lai, V. (2005). Literature derived reference models for the adoption of online shopping. *Information & Management*, 42(4), 543–559. doi:10.1016/S0378-7206(04)00051-5
- Chanpariyavatevong, K., Wipulanusat, W., Champahom, T., Jomnonkwo, S., Chonsalasin, D., & Ratanavaraha, V. (2021). Predicting airline customer loyalty by integrating structural equation modeling and Bayesian networks. *Sustainability*, 13(13), 7046. doi:10.3390/su13137046
- Coppola, D. (2022). UK: impact of COVID-19 on grocery shopping 2021. *Statista*. <https://www.statista.com/statistics/448040/influence-of-covid-19-on-online-grocery-shopping-uk/>>
- Creasey, S. (2021). What can D2C deliver for Big Food? *Just food*. <https://www.just-food.com/analysis/what-can-d2c-deliver-for-big-food/>
- Daoud, J. (2017). Multicollinearity and Regression Analysis. *Journal of Physics: Conference Series*, 949, 012009. doi:10.1088/1742-6596/949/1/012009
- Eger, L., Komárková, L., Egerová, D., & Mičík, M. (2021). The effect of COVID-19 on customer shopping behaviour: Generational cohort perspective. *ScienceDirect*. <https://www.sciencedirect.com/science/article/pii/S0969698921001089>
- Fang, Y., Chiu, C., & Wang, E. T. G. (2011). Understanding customers' satisfaction and repurchase intentions. *Internet Research*, 21(4), 479–503. doi:10.1108/10662241111158335
- Ferguson, D., & Brown, J. (2022). *UK Parliament*. House of Commons Library. <https://commonslibrary.parliament.uk/research-briefings/cbp-8875/>

- Galante, N., Monroe, S., & López, E. (2013). *The future of online grocery in Europe*. McKinsey. [https://www.mckinsey.com/~media/McKinsey/Industries/Retail/Our%20Insights/The %20future%20of%20online%20grocery%20in%20Europe/The_future_of_online_grocery.aspx](https://www.mckinsey.com/~media/McKinsey/Industries/Retail/Our%20Insights/The%20future%20of%20online%20grocery%20in%20Europe/The_future_of_online_grocery.aspx)
- Gavin, R., Harrison, L., Plotkin, C. L., Spillecke, D., & Stanley, J. (2020). *The B2B digital inflection point: How sales have changed during COVID-19*. McKinsey & Company.
- Gong, W., Stump, R. L., & Maddox, L. M. (2013). Factors influencing customers' online shopping in China. *Journal of Asia Business Studies*, 7(3), 214–230. doi:10.1108/JABS-02-2013-0006
- Hannath, A. (2022). Why CRM has become even more important in a post-COVID world. *Startups Magazine*. <https://startupsmagazine.co.uk/article-why-crm-has-become-even-more-important-post-covid-world>.
- Hernández, B. (2011). Age, gender, and income: do they really moderate online shopping behaviour? *Online Information Review*, 35(1), 113–133. https://www.researchgate.net/publication/239781750_Age_gender_and_income_Do_they_really_moderate_online_shopping_behaviour
- Katz, R., Jung, J., & Callorda, F. (2020). Can digitization mitigate the economic damage of a pandemic? Evidence from SARS. *Telecommunications Policy*, 44(10), 102044. doi:10.1016/j.telpol.2020.102044 PMID:33012958
- Kevin B. (2005). Researching Internet-Based Populations: Advantages and Disadvantages of Online Survey Research, Online Questionnaire Authoring Software Packages, and Web Survey Services. *Journal of Computer-Mediated Communication*, 10(3), 1 doi: 6101.2005.tb00259.x10.1111/j.1083-
- Kohli, S., Timelin, B., Fabius, V., & Veranen, S. M. (2020). *How COVID-19 is changing customer behavior—now and forever*. McKinsey & company.
- LaRose, R. (2006). On the Negative Effects of E-Commerce: A Sociocognitive Exploration of Unregulated Online Buying. *Journal of Computer-Mediated Communication*, 6(3). <https://academic.oup.com/jcmc/article/6/3/JCMC631/4584222>
- Limon, M. (2021). Food safety practices of food handlers at home engaged in online food businesses during COVID-19 pandemic in the Philippines. *Current Research in Food Science*, 4, 63–73. doi:10.1016/j.cfrs.2021.01.001 PMID:33665620
- Lin, X., Featherman, M., Brooks, S. L., & Hajli, N. (2019). Exploring gender differences in online consumer purchase decision making: An online product presentation perspective. *Information Systems Frontiers*, 21(5), 1187–1201. doi:10.1007/s10796-018-9831-1
- Lindgren, B. M., Lundman, B., & Graneheim, U. H. (2020). Abstraction and interpretation during the qualitative content analysis process. *International Journal of Nursing Studies*, 108, 103632. doi:10.1016/j.ijnurstu.2020.103632 PMID:32505813
- Martin-Neuninger, R., & Ruby, M. (2020). What Does Food Retail Research Tell Us About the Implications of Coronavirus (COVID-19) for Grocery Purchasing Habits? *Frontiers in Psychology*, 11, 11. doi:10.3389/fpsyg.2020.01448 PMID:32581987
- Mathew, A. 2022. *How Live Chat can Enhance Customer Service for Online Grocery Stores*. LiveAdmins. <https://www.liveadmins.com/blog/how-live-chat-can-enhance-customer-service-for-online-grocery-stores/>
- Mathew, B. (2015). A Study on Changing Trends in Online Shopping of Indian Customers in Apparel Segment. *International Journal of Applied Research*, 1(9), 207–214.
- Meyers-Levy, J., & Sternthal, B. (1991). Gender differences in the use of message cues and judgments. *JMR, Journal of Marketing Research*, 28(1), 84–96. doi:10.1177/002224379102800107
- Nedelcu, A., Dumitrascu, A.-E., & Cristea, L. (2010). *The Method Used for Measuring the Customers' Satisfaction*. *International Conference on Education and Educational Technologies - Proceedings*. Research Gate. https://www.researchgate.net/publication/267830916_The_Method_Used_for_Measuring_the_Customers'_Satisfaction/citation/download
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*, 78, 185–193. doi:10.1016/j.ijsu.2020.04.018 PMID:32305533

- Public Health England. (2020). Impact of COVID-19 pandemic on grocery shopping behaviours. *Public Health England*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932350/Grocery_Purchasing_Report.pdf
- Scutariu, A., Șușu, Ș., Huidumac-Petrescu, C.-E., & Gogonea, R.-M. (2021). A Cluster Analysis Concerning the Behavior of Enterprises with E-Commerce Activity in the Context of the COVID-19 Pandemic. *Journal of Theoretical and Applied Electronic Commerce Research*, 17(1), 47–68. doi:10.3390/jtaer17010003
- Sheth, J., (2020). Impact of Covid-19 on customer behavior: Will the old habits return or die?. *Journal of Business Research*, 117, 280–283. 10.1016/j.jbusres.2020.05.059
- Sinclair, N. (2022). Moving With Change: Reflections from the book “Who Moved My Cheese?” *Linkedin.com*. <https://www.linkedin.com/pulse/20140813031050-70953588-moving-with-change-reflections-from-the-book-who-moved-my-cheese/>
- Sthle, L., & Wold, S. (1989). Analysis of variance (ANOVA). *Chemometrics and Intelligent Laboratory Systems*, 6(4), 259–272. doi:10.1016/0169-7439(89)80095-4
- Suman, S., Vadera, S., & Srivastava, P. (2019). Age and Gender Influences on Customer Behavior Towards Online Discounts. *International Journal of Recent Technology and Engineering*, 8(2), 5202–5211.
- Teslya, A., Pham, T., Godijk, N., Kretzschmar, M., Bootsma, M., & Rozhnova, G. (2020). Impact of self-imposed prevention measures and short-term government-imposed social distancing on mitigating and delaying a COVID-19 epidemic: A modelling study. *PLoS Medicine*, 17(7), e1003166. doi:10.1371/journal.pmed.1003166 PMID:32692736
- Tighe, D. (2021). UK: Most commonly bought grocery products online 2021. *Statista*. <https://www.statista.com/statistics/1218481/most-common-online-grocery-categories-uk/>
- Tyrväinen, O., & Karjaluo, H. (2022). Online grocery shopping before and during the COVID-19 pandemic: A meta-analytical review. *Telematics and Informatics*, 71, 101839. doi:10.1016/j.tele.2022.101839 PMID:35607591
- White, P. (2017). *Developing research questions* (2nd ed.). Bloomsbury Publishing. doi:10.1057/978-1-137-49048-3

APPENDIX

Full Forms

CCS - Cloud Computing services

CRM - Customer relationship management

CSM - Customer Satisfaction measurement

CV - Customer Value

ECRM - E-commerce, customer relationship management

OGS - Online Grocery Service

PM - Preventive Measure

Table 12. Online questionnaire

Personal characteristics according of customers	What is your age group?	Below 20 20-30 30-40 40-50 Above 50
	What is your profession?	Student Job/ Business Homemaker
	Do you shop for groceries online?	Yes No
	If No, What is the reason?	Costly Delivery takes too long Not much variety of products Online shopping is unreliable Others
	Are you satisfied with the services/products in OGS?	Yes No
Customer perceptions of OGS during COVID-19	Do you think the specifications of the products shown on the website are sufficient and correct?	Yes No Maybe
	Did the frequency of buying groceries online change during the pandemic?	Yes - More during the pandemic No change Less during the pandemic and more after the pandemic due to safety measures
	How satisfied are you with the delivery times followed during the pandemic?	Dissatisfied Somewhat dissatisfied Neutral Highly satisfied Somewhat satisfied
	Which was your go-to online grocery shopping website during the pandemic?	Amazon – Fresh and Morrisons ASDA Ocado Tesco Sainsbury Others
	Which was the important factor in ordering from the same website?	Good discounts and qualityof products Good discounts and reduced delivery times Just good discounts Only reduced delivery times mattered Only good quality of products mattered
Respondents responding to OGS services change during COVID-19	Did you encounter any bad experiences while buying groceries online?	Yes No
	Were you happy with the product recommendations given specifically based on your shopping experiences?	Yes No Maybe
	Did the frequency of product recommendations increase during the pandemic?	Yes No
	Did the website/ applications provide smart assistants or chatbots to help you with your orders?	Yes No
	How frequent were the text messages or emails sent to you based on your grocery recommendations?	Weekly Monthly Not at all Everyday
	Did you get the notifications of your requested products when they were back in stock?	Yes No
	During the pandemic, were you satisfied with the safety precautions taken by the companies?	Yes No

Table 13. Interview Result Summary

No.	Questions		Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5
1	What is your age group?		20 - 30	20 - 30	30-40	40-50	30-40
2	What is your profession?		Other Type	Student	Office	Manager	Researcher
3	Which online stores do you do shopping the most, and how frequent is it per month		Taobao, 10 times per month	Ocado and tesco. 4 times per month	Taobao, Jingdong, Pingduoduo	DINGDONG – every two days, for food vegetables Taobao – once per week at least, for life necessities	Taobao. 20times per month
4	How much did you buy per month in 2020, per month in 2021 and per month in 2022?		10000 RMB	≤500	I buy more with the years passing by, but not remember the number. And in 2022, about RMB 2000-4000 per month.	2020-2021: RMB 157733 2021-2022: RMB 201,360 2022 till now RMB 160,388	8000 RMB
5	What do you buy, and what are the reasons?		Apple	Still water. They are too heavy for myself	clothes, food, fruits, shoes, electronic products and so on - almost anything.	I almost buy everything online, which includes clothes, food, life necessities Reason: convenient, save time	Foods, daily necessities, clothes and so on
6	During COVID-19, what concerns you the most for online purchasing?		No	Vouchers	First, I will worry whether the delivery speed can be on time or not. Second, I will be afraid whether the delivery is safe or not.	Delivery time is not guaranteed	Quality and delivery speed.
7	Please comment on the followings for online groceries (1 is the lowest and 10 is the highest score, and provide reasons)	Reliability of online shopping stores and their food/ items	10	9	10	10, you can almost find everything online, and quality is secured	5
8		Delivery Speed	10	6	8	8, it is largely included by pandemic control rule	6
9		Availability of food/item	10	9	10	10, anything you need can be found online	5
10		Pricing of food/items	10	9	9	9, few items are more expensive than market, but most are good price	5
11	What factors do you think are the most important for online groceries - for you and your organization/ group/family?		Interesting	The most important for myself is if it worth for me to buy from online groceries. For example, I only buy the package item from online groceries.	I will compare the price first if they have the same products;	Quality, variety and delivery time	Quality and safety

Victor Chang is a Professor of Business Analytics at Aston University. He was a Professor of Data Science and IS at Teesside University between Sep 2019 & mid-May 2022. He was a Senior Associate Professor, Xi'an Jiaotong-Liverpool University between June 2016 & Aug 2019. Within 4 years, he completed Ph.D. (CS, Southampton) and PGCert (HE, Fellow, Greenwich) while working on several projects. He achieved 97% on average in 27 IT certifications. He won 29015 IEEE Outstanding Service Award, best papers in 2012, 2015 & 2018, 2016 European award: Best Project in Research, 2017 Outstanding Young Scientist and many awards since 2011. He is a leading expert on Big Data/Cloud/IoT/security. He is a visiting scholar/PhD examiner at several universities, an Editor-in-Chief of IJOCI & OJBD, former Editor of FGCS, Associate Editor of TII, JGIM, IJBSR & Expert Systems, Editor of Info Fusion, Sci Report & IDD, founding chair of international workshops and founding Conference Chair of IoTBDSC, COMPLEXIS, FEMIB & IoTBDSC. He was involved in projects worth more than £14 million in Europe and Asia. He published 3 books and edited 4 books. He gave 30 keynotes internationally as a top researcher.

Ou Liu is currently a Senior Associate Professor in Information Management and Information Systems at Xi'an Jiaotong-Liverpool University. He was with Aston University before this. His current research interests include business intelligence/analytics, enterprise systems & security, mobile computing, social networks, and project management. He has published articles in Decision Support Systems, European Journal of Operational Research, Expert Systems with Applications, Communications of the Assoc for Info Systems, among others.

Kiran Vijay Barbole is a MSc graduate from Aston University, UK.

Qianwen Ariel Xu is a PhD candidate working under Prof Chang's supervision. She has published in numerous high-quality journals.

Xianghua Jason Gao is a MSc graduate graduated from Teesside University, UK. He works under Prof Chang's supervision.

Wendy Tabrizi is a Senior Lecturer and the Head of Marketing & Strategy Department, Aston Business School, Aston University, UK.