RESEARCH ARTICLE

Adaptability and resilience: Insights into Bangladeshi E-commerce customer behavior during COVID-19

Md. Abu Issa Gazi[1,2,5,*], Abdullah Al Masud[3,*], Md. Kazi Hafizur Rahman[3], M.M. Rafikul Islam[4],

Abdul Rahman bin S Senathirajah[1]

[1] *Faculty of Business and Communications, INTI International University, Persiaran Perdana BBN Putra Nilai, Nilai 71800, Negeri Sembilan, Malaysia*

[2] *School of Management, Jiujiang University, Jiujiang 332005, China*

[3] *Department of Management Studies, University of Barishal, Barishal-8254, Bangladesh*

[4] *Branches Control Division, Al- Arafah Islami Bank PLC, Head Office, Dhaka, Bangladesh*

[5] *Department of Business Administration, The International University of Scholars, Dhaka 1212, Bangladesh*

* Corresponding authors: Md. Abu Issa Gazi, dr.issa@jju.edu.cn; Abdullah Al Masud, aamasud@bu.ac.bd

ABSTRACT

This study aims to thoroughly investigate the changes in customer purchasing behavior across digital marketplaces amid the exceptional emergency caused by the COVID-19 pandemic, which has unparalleled influence on e-commerce. This research adopts a quantitative approach, leveraging survey questionnaires to collect data on customer purchasing behavior across digital marketplaces. Analysis of the collected data is conducted utilizing the Statistical Package for the Social Sciences (SPSS) software, enabling comprehensive statistical analysis to discern trends and patterns in customer behavior during the COVID-19 pandemic. It provides vital insights into the complex dynamics of customer behavior during times of crisis. The key findings emphasize the importance of comprehending customer preferences and behaviors in emergency scenarios for businesses in the e-commerce industry. The study demonstrates that, despite the obstacles presented by the pandemic, internet transactions not only remained viable but also acquired considerable significance for customers in Bangladesh. The Bangladeshi e-commerce sector demonstrated the crucial need for adaptability and resilience by effectively adapting to the changing market conditions caused by the pandemic. This study significantly contributes to understanding the Bangladeshi e-commerce landscape by addressing relevant research topics and objectives. It reveals a direct correlation between customer behavior and the success of e-commerce during pandemic-like events. It offers vital insights to organizations on how to modify their advertising, marketing, and promotional methods to effectively address customers' evolving requirements and priorities during times of crisis. In essence, this thorough examination acts as a vital manual for e-commerce enterprises in Bangladesh and other regions, helping them navigate the obstacles and possibilities presented by the COVID-19 era. It highlights the crucial significance of customer behavior in influencing the future of e-commerce, both in Bangladesh and worldwide.

Keywords: E-commerce, consumer behavior, Covid-19 pandemic, sustainable growth, Bangladesh

1. Introduction

In December of 2019, the coronavirus disease known as COVID-19 was found to have been first discovered in Wuhan, China. As a result of the disease's rapid spread across the world in the years that followed, the World Health Organization (WHO) designated it as a pandemic. It belongs to the coronavirus family[1,2]. The coronavirus is an infectious disease that many believe is caused by animals and humans[3,4]. This infection spreads first in Wuhan to an extraordinary degree in December 2019 and January 2020, at that point spread around the world since February bringing about the proceeded with 2019-20 COVID pandemic[3]. This disease is transmitted through human-to-human transmission, hacking, wheezing, contacting, and so forth, which shows the resulting manifestations, i.e., fever, lack of breathing, hacking, and so on Many, more experienced citizens with past ailments, (for example, vexed, persistent respiratory illness or diabetes) a serious illness is at risk, on 11, March 2020 the WORLD Health Organization Declared COVID-19 as a pandemic[3-5]. Now a new variant of COVID -19 has been identified called OMICRON [6]. In Bangladesh, the COVID-19 pandemic disease was reported on March 8, 2020These kinds of cases included a couple of men and a person woman, who was initially, aged 20 together with 35[5,6]. Bangladesh possesses first death owing to coronavirus on March 18, 2020. A 70-year-old gentleman died of this kind of disease[7].

The pandemic has affected each part of human existence and the real effect stays obscure because there is a lot of uncertainty on the progression of the disease, its severity and death rate, as well as reasonable strategic reactions and individual behavior[7,8]. The existence of a pandemic is evidence that the disease has been spreading internationally; it does not, however, indicate that the virus has reached an extremely dangerous stage. It is possible for the virus to spread to other people if they come into direct contact with COVID-19-positive people and interact with them[1]. Additionally, the virus is able to survive on surfaces for a period of several hours (UNICEF). The pandemic caused by COVID-19 is not only a threat to public health, but it is also having a significant impact on our economy and communities in a number of different ways [9-12]. Bangladesh has been affected equally by this epidemic as a poor nation. Bangladesh's institutions for trade and commerce must endure severe losses. Due to COVID-19, $3 billion in work orders have been canceled by international customers, sending the Readymade Garments of Bangladesh (RMG) into a severe crisis that has affected over two million employees and forced many of them to quit their employment [13]. The slowdown in import-export and foreign remittance will have a direct impact on Bangladesh's foreign exchange reserves. E-commerce, or electronic commerce, refers to the practice of companies as well as individual consumers making purchases of goods and services over the internet. Potential clients will require a cell phone and access to the Internet to participate in e-commerce [13-15]. Some researchers have claimed that due to constraints in data transmission, use of the internet in corporate environment is limited [16]. E-commerce in Bangladesh is significantly affected by a variety of business factors, including finances, production, transportation, payment systems, electronic fund transfers, supply chain management, internet marketing, online transaction processing, electronic data interchange, automated inventory management systems, and automated data collection systems [17-19]. Some of these business factors include: E-commerce helps businesses operate better overall by lowering production costs, boosting productivity, enhancing corporate communication, assuring the quality of their goods and services, and lowering their expenses per unit of output [20,21]. According to certain studies, when a website incorporates local language, visitor numbers are four times higher than the average visitor [22-24]. It was found that people who buy online tend to be wealthy, have a higher level of education, and have a high level of literacy in activities that take place online, and spend a significant amount of time in front of a computer and connected to the internet [11,20]. As a direct consequence of this, people now find that buying online is not only more convenient but also more pleasant, and they are less wary of conducting business on various online platforms [25,26]. The methods that

customers use to make decisions were described as being complicated, with a variety of factors having an influence on problem recognition up until a series of activities were taken to arrive at a solution [27,28].

In Bangladesh, there are approximately 10,000 businesses that engage in Facebook commerce (also known as f-commerce), in addition to another 100 e-commerce businesses that are available outside of Facebook. Some of these businesses include Chaldal.com, Meena Bazaar, Rokomari.com, Daraz BD, ajkerdeal.com, pickaboo.com, Othoba.com, and Bikroy.com [29]. E-commerce was also pioneered in this region by foreign investors, including Olx, Daraz, and Kaymu, amongst others. The cloud-based services market has become increasingly competitive as the price of setting up servers and buying personal computers has become more affordable over the course of time [20,29,30]. Bangladesh is now the world's 42nd largest economy, having recently surpassed China in that ranking. In terms of purchasing power parity, Bangladesh is ranked 31st [31,32]. Not only that, but India's per capita income is on the verge of being surpassed by Bangladesh's, with the matching figure expected to rise to $1888 in the near future. It is feasible for such economic growth to occur in a nation that has a very large population. As a direct consequence of this, the e-commerce sector as a whole and the e-commerce business specifically have a significant amount of potential. It would be a fantastic opportunity to accelerate all aspects of e-commerce, including business-to-business, business-to-consumer, business-to-business between consumers, and mobile commerce [33,34]. In light of this, the current part of the research aims to identify the factors that have an impact on online buying in Bangladesh. Consumer behavior in business and e-commerce used to be undefined, and some customers and businesses in some countries still utilize traditional e-commerce methods today. However, in the current circumstances that the globe is experiencing as a result of the massive impact of the Corona virus and the limits imposed as a result of this epidemic, old approaches have become obsolete and must be addressed through new technical methods [17,34]. A web-based survey was created by. Two parts made up the majority of the questionnaire. In the first segment, participants' demographic information was gathered, including their age, gender, income level, degree of education, occupation, employment status, and frequency of online purchases during the COVID-19 epidemic. The participants were also asked by the researcher to select the product categories from which they had made online purchases relevant to this field.

In the second phase, participants were asked about their plans to make online purchases during the epidemic. George[35] investigated the impact of behavioral attitude, subjective norms, and perceived behavioral control in the setting of online shopping. Online shopping provided an opportunity to examine these factors. Since the situations were similar, we made several adjustments to George's study's items concerning behavioral attitude, subjective norms, and perceived behavioral control. When measuring either of these two components, we used eight different items for each one. The following questions were generated in response to the research problem:

RQ1: Is the Coronavirus (COVID-19) affecting e-commerce in Bangladesh?

RQ2: Is there a disparity response on the influence of customer behavior on e-commerce during the COVID-19 crisis in Bangladesh owing to the respondents' general information?

In this study, our primary objectives are twofold. Firstly, we aim to explore the impact of the Coronavirus (COVID-19) on e-commerce activities within the context of Bangladesh. Secondly, we seek to analyze any potential disparities in customer behavior and e-commerce responses during the COVID-19 crisis in Bangladesh, with a particular focus on the influence of respondents' general information. By addressing these objectives, we aim to provide valuable insights into the dynamics of e-commerce in Bangladesh amidst the ongoing COVID-19 pandemic.

2. Literature review

Bangladesh has been regarded as a promising place for the e-commerce industries despite certain significant obstacles. In comparison to earlier times, Bangladesh is currently working to strengthen its standing in the e-commerce industry, as other countries have previously demonstrated [7,36]. The study's primary goal is identify & analyze the variables that are influencing consumer online purchasing behavior in Bangladesh during the epidemic. The study's particular objectives include identifying the variables that influence customers' online buying habits and examining the impacts of the coronavirus illness (COVID-19) pandemic on consumers' online shopping habits in Bangladesh. Researchers from all across the world have documented their larger concerns about COVID-19's devastating influence on global economies. Any commodities, services, people, locations, ideas, information, or business that can meet the requirements or wants of consumers might be considered a product [37].

In China, the epidemic has had a negative influence on consumption across a variety of market segments, which has led to an overall decrease in consumption [21]. In United Kingdom, the majority of economic expenditure has been shifted into essentials like groceries [27,38]. Due to interruptions in the global food supply chain that led to panic purchasing, the pandemic has had a variety of socioeconomic effects on the food industry. Other significant effects include health hazards and labor shortages [39, 40] . Although the pandemic has not significantly hampered the availability of food goods in Canada, it has changed the distribution.

According to the findings of the study, there are a number of elements that have a significant impact on a customer's propensity to make an online purchase. Some of these include privacy concerns, personal hobbies, acceptable pricing, payment methods, social media, and reference groups [11,15,36]. The influence of product attributes on the mobile phone preferences of Kenyan undergraduates attending universities in the country[41]. According to the data, there is a correlation between adjusting product features and the preferences of undergraduate students about mobile phones [42]. There are many product and brand aspects that are evaluated, such as color schemes, name labels that are clearly visible, mobile phones that come in a variety of models, packaging that is designed to be safe, the level of awareness regarding environmental concerns, and the style and design of the phone [34,43]. By offering a variety of items in a simple manner, online retailers guarantee the benefits of their customers. The transaction used to be challenging, but e-commerce has made it simpler than ever[44]. After conducting research on both in-store and internet purchasing, the researchers came to the conclusion that shopping online is more time and effort efficient, not to mention more convenient [45]. Customers often have relatively quick access to any data and information over the internet [40, 42]. Customers who make purchases on the internet are unable to see, touch, or otherwise interact with the product before making a purchase; nevertheless, internet services provide additional details about their products and services, enabling customers to make choices about them at the appropriate time [46]. The vast majority of online services provide customer support around the clock, which enables customers to receive important information about products and services whenever and wherever they choose, thus encouraging them to shop online [47,48] . This was one of the main takeaways from their research. In accordance with [49], the quality of the website is the most important factor that determines how customers will behave when shopping online. It is the first thing that clients who shop online see when they visit a website. Furthermore, the product has an impact on the purchasing habits of customers [50]. Price is an important part of the marketing mix. When attempting to influence price, businesses should take into account the other components of the marketing mix because any action that affects other components will also effect price [51]. As a result, organizations must evaluate the marketing mix plan when using the target costing method, especially when considering price. Instead of examining product characteristics first, corporations

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might define the ideal selling price for specific customers first, then build the product to fit that price. Target costing is the name of the method. The influence of location on the choice of product, pricing, advertising, and distribution on consumer purchasing decisions is significant [52]. How their products are distributed must be decided by producers and merchants. The product can be anything that seeks attention and tries to fulfill the requirements, wants, or wishes of the client. Examples of things that can fall into this category include goods, services, people, locations, ideas, information, and organizations. A product of good quality may be described as one that is devoid of flaws and defects and can be recognized by eight main criteria, including product performance, features, dependability, confirmation, durability, usability, aesthetics, and perception of quality. A product can only be said to be of high quality if it can satisfy the demands and desires of its customers [51]. Any items, services, people, locations, ideas, information, or company that may satiate the requirements of customers might be considered a product. According to the findings of recent studies, buyers' decisions to make purchases online are substantially impacted by three primary factors: shipping costs, product accessibility, and product variety [53,54]. Research also reveals that the factors that have the most impacts on customers' intentions to make online purchases are security, personal interests, payment methods, reasonable price, privacy, social media, and reference groups [12,55]. Retailers and sellers will be persuaded more diligently as competition becomes more severe. Trade honesty will deteriorate. This necessitates a re-evaluation of present distribution channels and the enhancement of new channels, as well as consideration of improvement strategies and policies. It's also known as delivery, and it refers to a set of business actions aimed at ensuring the availability of a product, which will then be given to customers in the appropriate quantity, at the right time, and in the correct location. The research focuses on how to make products and services more accessible to customers. E-commerce is a topic that university students are interested in. This study's objective is to determine the criteria that undergraduate students consider important while deciding whether or not to engage in virtual shopping [47,55]. The quantitative research uncovered a number of aspects, including early trust, perceived riskiness, perceived website attractiveness, and perceived convenience and attractiveness of the website. According to the findings, initial trust has no bearing on online purchase intention, despite the fact that perceived riskiness, considered website attractiveness, and perceived convenience all play a role in influencing it. It is suggested that future study could include a behavioral model or a technology acceptance model (TAM), as well as a bigger sample size. Online business is a very common type of business, and it is strongly promoted [57]. According to the findings of this quantitative study, product risk, convenience risk, and return policy risk each have a sizeable impact that is to the consumer's advantage when it comes to their online buying behavior. Consumer behavior was determined to be insignificant and bad as a result of financial risk. In addition, it was shown that the possibility of not receiving an item had a significant influence, one that proved counterproductive to the practice of shopping online [55]. The purpose of this article is to present a helpful model for analyzing and controlling perceived risk in online buying by discussing a number of managerial implications as well as the potential for further study in this area. In the current global context, the internet has added new measurements to company, notably in e-commerce [54]. The number of people who use the internet is rapidly growing as a direct result of the proliferation of e-commerce websites. The purpose of this study was to investigate, within the framework of worldwide business standards, the effects of cognitive trust and e-WOM on purchase intent inside a company-to-consumer (C2C) online shopping environment. A model to explain purchase intent in a business-to-consumer (C2C) e-commerce context was developed as part of the study [58]. The customer's confidence in the vendor is an essential factor that plays a role in determining whether or not the buyer will make a purchase. Specifically, this discovery was made in the present day. Outbreaks of disease have an effect on consumers' choices regarding purchases [59,60].

If regular customers become infected early in the outbreak and the infection does not spread quickly to other areas, it accelerates worldwide transmission. According to the findings, trust is a factor that has a positive and significant bearing on the likelihood that consumers will complete a purchase. This discovery came about as a result of research that was conducted on buyer trust [61]. To be more specific, this finding was made in the current day and age. The decisions that customers make regarding their purchases are influenced by the occurrence of illness outbreaks [11,12 62]. We utilized the following Model to identify the true impacts influencing customer behavior and e-commerce during covid-19 pandemic in Bangladesh.

2.1. Conceptual framework

Figure 1 depicts the conceptual model that will be used in this investigation. This model is based on prior research on Customer Behavior and E-commerce. The framework recognizes the following elements customer behavior as an independent variable and e- business as a dependent variable.
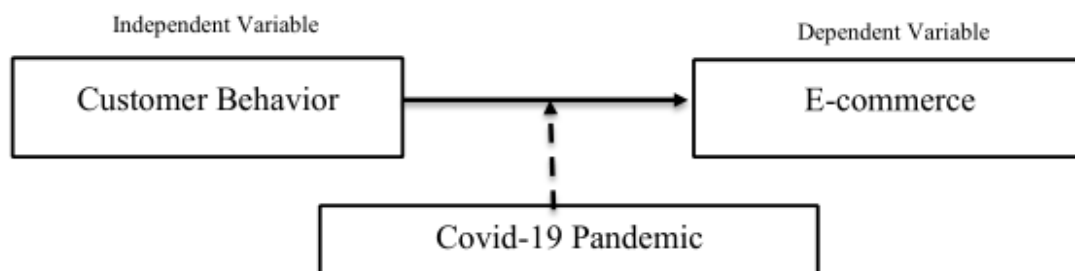
Figure 1. Conceptual framework.

2.2. Hypotheses development

2.2.1. Customer Behavior

The COVID-19 pandemic had a substantial impact on consumer behavior across a variety of businesses. According to research, people have shifted to online shopping as a result of lockdown measures and safety concerns [18,33]. According to studies, there is a greater reliance on digital channels for purchasing, as well as an increase in demand for necessities and home entertainment items [43,34.] Furthermore, there is evidence of changes in purchasing priorities, with health and safety taking precedence [63]. Consumers are also becoming more interested in sustainable and socially responsible brands. Understanding these alterations in customer behavior is critical for businesses to properly adapt their strategy during and after the pandemic. In this manner, the actions of customers have a sizeable bearing on the demand for various company services. On the other hand, the closure of businesses all over the world has an effect on consumer purchasing behavior in a world where there are limited quantities of items and services [33,64,65.] As a direct consequence of this, customers will place a significant amount of reliance on online platforms to fulfill their requirements. Customer participation, in the end, creates repercussions and precedents in the process of creating shared value. This changes the value of co-creation as it reflects customer behavior, emotion, and perception [66]. Customers are encouraged to make purchases online by e-commerce websites if they meet certain criteria, the most essential of which are security, attractiveness, speedy loading, sitemaps, and validity [12,18,33]. Customers often have relatively quick access to any data and information over the internet [67]. The majority of online services offer 24/7 customer care, allowing users to get the information they need about products and services at any time and from any location, which encourages users to make purchases online. Several studies indicate that customers' decisions to buy online were significantly influenced by the convenience of the Internet [69,70]. That is why, we suggest:

H1: During the COVID-19 crisis, customer behavior has a big influence on e-commerce. The research employed basic linear regression to evaluate this hypothesis, with the findings displayed in Table 5.

2.2.2. E-commerce

Based on the existing literature, it is evident that e-commerce encompasses a broad spectrum of activities related to online business operations, including transaction management, digital order processing, and user interactions [68]. While e-commerce shares similarities with online business, it extends beyond mere buying and selling activities conducted over the internet. Moreover, it is worth noting that the term "e-commerce" can refer to various components such as a company's network, the internet, intranet, or extranet, either individually or collectively [65]. In light of the COVID-19 crisis, the significance of e-commerce has become increasingly apparent. Countries that have robust e-commerce infrastructures are better equipped to mitigate the impact of infectious diseases like COVID-19, as evidenced by the case of Bangladesh [25,69,70]. The ability to conduct business transactions and access essential goods and services online has played a pivotal role in ensuring the survival and resilience of economies and communities during the pandemic [4,67]. As the crisis persists, there has been a noticeable surge in the adoption of digital services facilitated by e-commerce platforms. This trend underscores the growing reliance on online channels for meeting various needs, ranging from shopping for essentials to conducting remote work and education [71-73]. Consequently, it is reasonable to hypothesize that during the COVID-19 crisis in Bangladesh, individuals' perceptions regarding the influence of customer behavior on e-commerce will exhibit significant variance. This variance can be attributed to the diverse characteristics and experiences of survey participants, reflecting their unique perspectives and interactions within the e-commerce ecosystem. That's why, we proposed:

H2: During the COVID-19 crisis in Bangladesh, the respondents' average beliefs regarding the effect of customer behavior on e-commerce exhibited a statistically significant amount of variance. This variance is caused by the individual features of the survey participants.

3. Research methods

3.1. Sample

The researchers utilize the sampling design, which is essentially a framework, to select the sample for the survey. For this study, the sample size for conducting the survey is 100 people. These individuals are aiding the research team in gathering data on the impact of the coronavirus (COVID-19) on Bangladesh's ecommerce industry. The survey questionnaire is built using a 5-point Likert scale; if the answer is to a very big degree, this shows that the degree of approval is quite high, and is gradually reducing, to what was indicated in the preceding paragraphs. It aids in the collection of survey data from the respondents who have been chosen for the study. The data replies provided by the respondents are likewise collected using the random sample technique in this study. This data gathering strategy is thought to be used by the researcher in order to achieve the research goals.

3.2. Research procedure

Quantitative research methodology was chosen to provide a systematic and objective analysis of the impact of consumer behavior on e-commerce in Bangladesh during the COVID-19 pandemic. Quantitative methods allow for the collection and analysis of numerical data, facilitating the identification of trends, patterns, and relationships among variables. Specifically, descriptive statistics were employed to summarize and describe the characteristics of the sample, including measures of central tendency, dispersion, and frequency distributions. Additionally, inferential statistics, such as correlation analysis and regression

modeling, were utilized to examine the relationships between variables and to test hypotheses regarding the impact of the pandemic on consumer behavior and e-commerce outcomes. As a consequence of this, a quantitative research approach was applied since the objectives of this article are to explore the impact of consumer behavior on e-commerce during Bangladesh's COVID-19 issue. Specifically, the paper will focus on Bangladesh.

3.3. Research instrument

The development of our survey questionnaire was meticulously guided by an in-depth examination of existing literature about e-commerce and consumer behavior amidst the COVID-19 pandemic, with a specific emphasis on studies conducted within Bangladesh. Drawing upon insights gleaned from this literature review, we identified pivotal themes and constructs relevant to our research objectives. To ascertain the validity and reliability of the questionnaire items, we initiated a pilot testing phase before the main data collection. During this pilot testing, a small representative sample of respondents from our target population was invited to provide feedback on the clarity, relevance, and comprehensibility of the questionnaire items. Subsequently, necessary revisions and refinements were implemented based on their feedback to enhance the questionnaire's suitability within the Bangladeshi context.

The questionnaire is divided into two sections. Respondent information: A collection of five questions about the respondent's demographics. Survey0questions: It consisted of 16 items that were divided into two categories: the first category, which focused on consumer behavior during the COVID-19 crisis, contained eight items, and the second category, which focused on e-commerce during the COVID-19 crisis, contained eight items.

4. Analysis and results

It is commonly understood that the quantitative data analysis approach is utilized in the data analysis process. The researcher chose to conduct this investigation using a quantitative methodology since it enables him to collect data more expediently. The researcher will be utilizing the SPSS application, which stands for the statistical package for social science. It enables the researcher to collect data in a manner that is consistent with logic. The researcher is able to more properly depict the data thanks to the survey questionnaires that he makes use of.

4.1. Reliability & validity test

The researcher able to ascertain, through the use of the reliability test, whether or not the variables can be relied upon. The findings of the reliability examination are presented in **Table 1**. As a consequence of this, the Cronbach's Alpha coefficient index for all variables falls somewhere in the range of 0.74 to 0.77, and the correlation between items that belong to the same variable is greater than 0.30. It indicates that there is reliability in each of the variables that were included in the research model. The KMO coefficients are more than 0.50, and the sig. value of Bartlett's test is 2.220 with a 0.000 margin of error. Validity and reliability of the construct were found to be high according to Nguyen and Chang's (2017) research. As a consequence of this, all of the variables have sufficient dependability and can be utilized for more in-depth research. The findings of the reliability test, often known as Cronbach's alpha, are presented in **Table 1**. As can be seen in **Table 1**, the Cronbach's alpha values for the questionnaire sections all had values greater than 0.77 for the

Likert items. According to the SPSS reliability statistics, these values are within acceptable ranges. As a result, the researcher's positive hypothesis is chosen in conjunction with the rejection of the null hypothesis.

Table 1. The reliability and validity test.

Factor	Item	Cumulative variance (%)	loading	KMO	Eigen-values	Bartlett's (sig.)	Cronbach's alpha	Item-total correlation
Customer Behavior during of the COVID-19 crisis	8	57.2	0.63–0.81	0.505	2.912	0.220	0.64	**0.48–0.67**
E-commerce during of the COVID-19 crisis	**8**	**72.04**	**0.79–0.90**	**0.789**	**3.562**	**0.00**	**0.77**	**0.68–0.83**

4.2. Demographic analysis

This part contains a description of the respondents' general characteristics. It covers five different items, ranging from the respondents' gender range to the extent to which they make use of internet shopping. The demographic variables that the researcher picked to represent the respondents' gender, age group, income, and educational attainment are some examples of the demographic data that may be found in the survey. It is a list of the detailed information that the researcher opted to collect from the respondents. The researcher has the ability to keep track of both the frequency of responses from male and female participants as well as their respective percentages. The demographic characteristics of the surveyed population are detailed in **Table 2**. The gender distribution indicates a slight majority of males, accounting for 56.66%, while females represent 43.33%. In terms of age, the majority of respondents (71.66%) are under 25 years old, with 25 to under 35 years old coming in second at 20.00%. A smaller proportion falls into the age groups of 35 to less than 45 (06.66%) and higher than 45 (01.66%). In terms of educational qualification, the majority hold a bachelor's degree (64.1%), followed by an intermediate diploma or less (26.9%), a master's degree (6.9%), and a PhD (2.1%). When it comes to income, the largest segment reports income levels much lower than most other households (76.66%). A smaller percentage report slightly lower (10.00%) or about the same as most other households (08.33%) income levels. Fewer respondents report slightly higher (03.33%) or much higher (01.66%) incomes compared to other households. Regarding online purchase behavior, the majority (75.00%) buy online, when necessary, followed by those who don't buy online (11.66%), those who buy online every month (08.33%), and smaller percentages who buy online every week (03.33%) or daily (01.66%).

Table 2. Demographic haracteristics.

	Variable	Frequencies	%
Gender	Male	56	56.66
	Female	44	43.33
Age	less than 25	43	71.66
	25 - less than 35	12	20.00
	35- less than 45	04	06.66
	higher than 45	01	01.66

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Qualification	Intermediate diploma or less	13	26.9
	Bachelor	26	64.1
	Master	20	6.9
	PhD	01	2.1
Income	Much lower than most other households	46	76.66
	Slightly lower than most other households	06	10.00
	About the same as most other households	05	08.33
	Slightly higher than other households	02	03.33
	Much higher than other households	01	01.66
Frequency of Online Purchases	I don't buy online	07	11.66
	I buy online when necessary	45	75.00
	I buy online every month	05	08.33
	I buy online every week	02	03.33
	I buy online daily	01	01.66

4.3. Customer behavior in the COVID-19 crisis

In **Table 3**, the nuances of customer behavior during the COVID-19 crisis are elucidated through mean scores, standard deviations (SD), the Relative Importance Index (RII), and associated p-values for each statement. Among respondents, there was substantial agreement regarding the statement "The Corona crisis enhanced my propensity to purchase food," reflected in its mean score of 3.53 (SD = 1.049) and an RII of 70.66%. Similarly, the sentiment of indulging in non-essential spending during the crisis, expressed in the statement "I indulged in some of the less necessary spending that I was accustomed to doing before the Corona problem," garnered a moderate level of agreement, with a mean score of 3.20 (SD = 0.988) and an RII of 61.33%. Additionally, the statement "Even if they are more expensive, I only purchase items that meet my standards for quality," which received a high mean score of 3.73 (SD = 0.989) and an RII of 70.06%, demonstrated that respondents had a strong tendency to prioritize quality over price. Similarly, respondents agreed moderately with the notion of imposing financial restraint during the crisis, as stated in "In the midst of the Corona crisis, I became my own expenses," with a mean score of 3.38 (SD = 1.091) and an RII of 67.66%.

The statement "I was able to put up a significant amount of money despite the Corona crisis," with a mean score of 3.12 (SD = 1.059) and an RII of 62.33%, interestingly indicated that respondents had a moderate ability to save money during the crisis. Furthermore, the importance of customer retention was underscored, with respondents strongly agreeing with the statement "I take good care of the orders that customers make over and over again," which received a high mean score of 3.43 (SD = 0.871) and an RII of 70.33%. Conversely, respondents showed moderate agreement that debt accumulation occurred during the crisis, as stated in "A significant amount of debt was racked up during the Corona crisis," with a mean score of 2.97 (SD = 1.149) and an RII of 59.33%. Notably, the statement "The Corona crisis did not have a significant impact on my life" received the lowest RII of 48.33%, indicating a moderate disagreement among

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respondents regarding its minimal impact. Furthermore, all p-values associated with the statements are 0.000, signifying significant differences in respondent agreement across all items.

Table 3. RII, Mean, p-value & SD Results for customer behavior.

Items	Mean	SD	RII (%)	p-value
The Corona crisis enhanced my propensity to purchase food.	3.53	1.049	70.66	0.000
I indulged in some of the less necessary spending that I was accustomed to doing before the Corona problem.	3.2	0.988	61.33	0.000
Even if they are more expensive, I only purchase items that meet my standards for quality.	3.73	0.989	70.06	0.000
In the midst of the Corona crisis, I became my own expenses.	3.38	1.091	67.66	0.000
I was able to put up a significant amount of money despite the Corona crisis.	3.12	1.059	62.33	0.000
I take good care of the orders that customers make over and over again.	3.43	0.871	70.33	0.000
A significant amount of debt was racked up during the Corona crisis.	2.97	1.149	59.33	0.000
The Corona crisis did not have a significant impact on my life.	2.42	1.154	48.33	0.000

4.4. E-commerce in COVID-19 crisis

This section has a total of eight paragraphs devoted to the topic of online business activity during the COVID-19 crisis. In **Table 4**, an in-depth analysis of customer behavior in response to the COVID-19 crisis is provided through mean scores, SD, RII, and corresponding p-values for each statement. The statement "After the Corona incident, there has been a significant shift toward the utilization of online commercial sites" received a high mean score of 4.15 (SD = 0.777) and an RII of 80.33%, indicating that respondents strongly agreed with it. This underscores the substantial transition towards online commerce following the outbreak. Similarly, respondents expressed a high level of agreement with the statement "E-commerce websites make available to me absolutely everything that my life may require of me," with a mean score of 3.73 (SD = 0.918) and an RII of 74.66%, indicating the perceived comprehensiveness of e-commerce platforms in fulfilling various needs during the crisis.

The statement "During the Corona issue, there was a huge amount of opposition on online business sites," which received a mean score of 3.88 (SD = 0.715) and an RII of 77.66%, indicates that respondents also noted significant opposition on online business sites during the crisis. Furthermore, concerns regarding product representation on websites were highlighted, with respondents expressing agreement that "When I buy from websites, the image doesn't always match the product," reflected in a mean score of 3.92 (SD = 0.787) and an RII of 78.33%. In terms of online browsing habits, respondents demonstrated moderate agreement with statements such as "Every day, I browse many websites that are related to online business," which received a mean score of 3.27 (SD = 1.039) and an RII of 65.33%, and "I look out for many e-commerce websites in order to compare prices," with a mean score of 3.75 (SD = 0.932) and an RII of 75.00%. The statement "Only for recreational purposes do I look at websites related to online businesses" received a mean score of 2.97 (SD = 0.938) and an RII of 59.33% from respondents, indicating a lower level

of agreement. Additionally, respondents generally found the operation of websites for online businesses to be straightforward, with a mean score of 3.95 (SD = 0.811) and an RII of 79.00%. Importantly, all p-values associated with the statements are 0.000, signifying significant differences in respondent agreement across all items.

Table 4. RII, Mean, p-value & SD Results for customer behavior.

Items	Mean	SD	RII (%)	p-value
After the Corona incident, there has been a significant shift toward the utilization of online commercial sites.	4.15	.777	80.33	0.000
E-commerce websites make available to me absolutely everything that my life may possibly require of me.	3.73	.918	74.66	0.000
During the Corona issue, there was a huge amount of opposition on online business sites.	3.88	.715	77.66	0.000
When I buy from websites, the image doesn't always match the product.	3.92	.787	78.33	0.000
Every day, I browse many websites that are related to online business.	3.27	1.039	65.33	0.000
Only for recreational purposes do I look at websites related to online businesses.	2.97	.938	59.33	0.000
I look out many e-commerce websites in order to compare prices.	3.75	.932	75.00	0.000
The operation of websites for online businesses is quite simple to me.	3.95	.811	79.00	0.000

4.5. Hypothesizes testing

H1: During the COVID-19 circumstance, the manner in which online commerce is done is significantly impacted by the decisions and actions of customers. In the course of the research, a straightforward linear regression was applied in order to test this hypothesis; the findings are summarized in **Table 5**. Table 5 shows that the independent variable, Customer Behavior, has a substantial impact on E-commerce during the COVID-19 crisis (P-Value = 0.05), and the coefficient of determination is 0.721. This is demonstrated by the fact that the table shows the coefficient of determination. This suggests that variations in consumer behavior can account for 72.1% of the variation in e-commerce that took place during the COVID-19 crisis. The activities of customers have a considerable influence on e-commerce during the COVID-19 issue, which brings us to our last and most important point. The overall model fit is evaluated using the F-test, which assesses the significance of the regression model as a whole. The F-value is 370.247, with a corresponding p-value of 0.000, indicating that the model is statistically significant.

Table 5. Simple linear regression results-customer behavior.

Dependent Variable	Independent Variable	Unstandardized Coefficients		T value	p-value (sig)	Decision
		B	Std. err			
E-commerce during of the COVID-19 crisis	Constant Customer	1.957	0.321	6.087	*0.000	Supported
	Behavior	1.515	0.079	19.242	*0.000	Supported
F= 370.247	Sig=0.000	R2=72.1%				

H2: This variance can be attributed to the fact that the respondents were asked about the impact of Customer Behavior on E-commerce in Bangladesh. The fact that the people who responded to the survey are individuals accounts for this variation. Both of these tests were carried out with the purpose of determining whether or not this hypothesis is correct. The findings of these tests are summarized in the table below (6). The results of the tests that are shown in the table indicate that the P-values do not constitute statistically significant evidence (P-value > 0.05). With the exception of the variable titled "usage of online purchase," which has a p-value of 0.05, there are no statistically significant variations attributable to demographic characteristics that can be found between the means of their perspectives on Customer Behavior on E-commerce during the COVID-19 crisis. This holds true even though the level of significance for this level of significance is set at 0.05. This demonstrates that the variable has a considerable impact on the statistics. This suggests that there are differences in favor of buying online every week due to the use of online purchases that are statistically significant at the level of 0.05. These differences can be attributed to the fact that online purchases are made more frequently.

Table 6. Impact on customer behavior on E-commerce.

Demographic variables		Test statistic	Sig.
Gender	Male	T=0.755	0.451
	Female		
Education Level	Intermediate diploma or less	F=0.683	0.564
	Bachelor		
	Master		
	PhD		
Age	Less than 25 years	F= 0.229	0.876
	25-less than 35 years		
	35-less than 45 years		
	45 years or more		
Income	Much lower than most other households	F= 1.068	0.375
	Slightly lower than most other households		
	About the same as most other households		
	Slightly higher than other households		
	Much higher than other households		
Use of online purchase	I don't buy online	F= 4.382	0.002*
	I buy online when necessary		
	I buy online every month		
	I buy online every week		
	I buy online daily		

5. Discussion

Gender was a significant issue in this case, as the research sample included both male and female participants. According to the findings of a previous study, gender is a significant role in the adoption of internet-based technology [74]. The majority of the 100 research participants were young, with an average age of less than 25 years. Age is a crucial element in the acceptability of innovation, according to several study studies on the emergence of innovations [75]. The state of the economy has a significant impact on the e-commerce industry. 76.66 percent of the participants in the study have an annual income of less than $10,000.

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The survey also discovered that those that apply internet-based innovation are from high-income families [70]. Cronbach's Alpha was found to be either below or very close to 1.00 on the basis of the data that was obtained. The findings of the reliability test, often known as Cronbach's alpha, are presented in **Table 1**. For Likert items, the Cronbach's alpha values for the survey questions were higher than 0.7, which is acceptable in SPSS reliability statistics. As a result, the researcher's positive hypothesis is chosen in conjunction with the rejection of the null hypothesis. As can be observed in **Table 3**, the item "Tendency to buy food grew during the Corona crisis" has the greatest RII of 70.66 percent, indicating that respondents are in agreement on this paragraph. With a RII of 70.06 percent, it was followed by the item "I consider the quality of the things I buy, even if their prices are expensive." With 48.33 percent, the item "The Corona crisis didn't affect my life significantly" had the lowest RII.

Furthermore, all of the p-values in the table are 0.000, indicating that a significant difference exists, implying that there is general agreement on all of the customer behavior during the COVID-19 crisis, with the exception of the paragraph that stated, "The Corona crisis didn't affect my life much." As can be seen in **Table 4**, the item "There is a considerable tendency toward the usage of E-commerce sites after the Corona crisis." has the highest RII with 80.33 percent, indicating that respondents agree strongly on this text. With a RII of 78.33 percent, the item "I am concerned when I buy from websites that the image does not always match the thing obtained" came in second. With 59.33 percent, the item "Check out e-commerce sites for entertainment exclusively" had the lowest RII. In addition, all of the p-values in the table are 0.000, indicating that a substantial difference exists, implying that there are some general agreements on all of the E-commerce during the COVID-19 crisis.

The determination coefficient is 0.721, which indicates that changes in consumer behavior may be able to explain 72.1 percent of the changes that took place in e-commerce during the COVID-19 crisis. During the COVID-19, the independent variable Consumer Behavior has a significant influence on E-commerce (P-Value = 0.05), and the determination coefficient is 0.721. The results of the tests that are presented in Table indicate that the P-values do not meet the criteria for statistical significance (P-value > 0.05). (6). It would appear that there are no variations that are statistically significant owing to demographic characteristics at the level of 0.05 between the means of their viewpoints on Customer Behavior on E-commerce during the COVID-19 crisis. This is the conclusion that can be drawn from the data. The one and only exception to this is the variable known as "use of online purchase," which has a p-value that is less than 0.05, indicating that there are statistically significant differences due to use of online purchase at the level of 0.05 in favor of buying online each week. This is the only exception to this rule.

As a result of what has come before, we are able to discern that, despite total immobilization of movement, internet purchases continued to be common and commonplace all through the Corona outbreak. This is due to the fact that there will always be difficulties that a bespoke solution will not be able to solve.

6. Conclusion

This study looked into how the coronavirus (COVID-19) affected e-commerce in Bangladesh and examined any possible differences in consumer behaviour during the COVID-19 outbreak, especially in reaction to respondents' personal data. Important insights have been obtained by looking at a number of variables, such as consumer demographics, food shopping habits, and pandemic-specific traits like sickness dread and anticipated food shortages.

The results of this investigation show that e-commerce in Bangladesh has been significantly impacted by the COVID-19 outbreak. Our study discovered that low income had no effect on the frequency or use of online grocery purchasing during the pandemic, in contrast to earlier studies that suggested a link between

low income and lower use of the service. This implies that the pandemic may have had a particular impact on low-income households' decision-making processes, increasing their inclination to buy for food online—a behaviour they had previously shown little interest in.

Additionally, the data analysis for this study demonstrates that the COVID-19 epidemic has had a favourable effect on Bangladeshi e-commerce sales and consumer purchasing behaviour. Online purchases have increased as a result of less people purchasing in person due to safety concerns and mobility difficulties. This shift in customer behaviour has also been influenced by increased awareness of food safety and the convenience of e-commerce platforms.

It is clear from addressing the study's goals and research questions that the COVID-19 pandemic has accelerated Bangladesh's e-commerce development. The observed shifts in customer behaviour and purchase patterns highlight how crucial it is to comprehend changing market dynamics and make necessary adjustments, especially during difficult times. To further understand the long-term effects of these changes in consumer behaviour and to investigate methods for boosting the sustainability and resilience of Bangladesh's e-commerce ecosystems, more research is required.

6.1. Practical implications

Notably, during crises such as the COVID-19 pandemic, the practical implications of this research are substantial for e-commerce enterprises in Bangladesh and comparable developing nations. In the first place, it is fundamental to comprehend and adjust to the preferences and behaviors of customers. Successfully adapting offerings to changing consumer demands necessitates a steadfast commitment to investing in surveys, data analysis, and market trend monitoring. Furthermore, it is critical to priorities adaptability and resilience. In order to remain competitive and satisfy customers, e-commerce businesses must promptly adapt their strategies, operations, and product offerings. Additionally, it is critical to make substantial investments in digital infrastructure to expedite operations and improve the overall customer experience. This includes establishing dependable digital platforms, secure payment gateways, and effective logistics systems. In order to successfully captivate consumers amidst crises, marketing strategies must be modified. Beneficial strategies encompass capitalizing on digital platforms, providing tailored promotional offers, and placing a premium on security and convenience within marketing communications. Moreover, in order to cultivate consumer trust and loyalty, it is imperative to give precedence to responsive customer support, transparent communication, and expeditious resolution of issues. Finally, e-commerce enterprises can become more adept at navigating obstacles by nurturing collaboration and partnerships with other organizations, government agencies, and stakeholders.

6.2. Limitations and future research guidelines

Despite its insights, this study has certain limitations. Firstly, the sample size and representativeness of survey respondents may restrict the generalizability of findings. Future research could aim to increase sample diversity and size for broader applicability. Secondly, while this study focuses on Bangladesh, the findings may not be universally applicable to other regions with different socio-economic contexts and e-commerce landscapes. Future research should explore similar themes in diverse contexts to enhance generalizability. Thirdly, investigating the long-term impact of the pandemic on e-commerce adoption and consumer behavior remains a valuable area for future research. Additionally, complementing quantitative approaches with qualitative insights can offer a deeper understanding of customer motivations during crises. Fourthly, exploring emerging technological trends and their implications for e-commerce in developing countries presents an avenue for further research. Lastly, examining policy implications and regulatory environments for the e-commerce sector in Bangladesh can provide valuable insights for stakeholders. Addressing these

limitations and pursuing future research in these areas can enrich our understanding of customer behavior in digital marketplaces during crises, informing strategic decision-making for e-commerce enterprises globally.

Author contributions

Conceptualization, Abdullah Al Masudand, Md. Abu Issa Gazi and Md. Kazi Hafizur Rahman; Data curation, Abdul Rahman bin S Senathirajah, Md. Kazi Hafizur Rahman and M.M. Rafikul Islam; Formal analysis, Md. Abu Issa Gazi and Abdullah Al Masud; Funding acquisition, Md. Abu Issa Gazi and Abdul Rahman bin S Senathirajah; Investigation, M.M. Rafikul Islam, Abdul Rahman bin S Senathirajah and Abdullah Al Masud; Methodology, Abdullah Al Masudand, Md. Abu Issa Gazi and Md. Kazi Hafizur Rahman; Project administration, Md. Abu Issa Gazi; Resources, Abdul Rahman bin S Senathirajah, Abdullah Al Masudand, M.M. Rafikul Islam; Supervision, Abdullah Al Masud; Validation, M.M. Rafikul Islam and Abdullah Al Masud; Writing – original draft, Abdullah Al Masud and Md. Abu Issa Gazi; Writing – review & editing, Md. Abu Issa Gazi, Abdullah Al Masudand, Abdul Rahman bin S Senathirajah and Md. Kazi Hafizur Rahman

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Data availability statement

Data will be provided upon request.

Disclosure of interest

Authors are declaring there is no Conflict of Interest.

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