



Technology Usage for Sustainable Health and Well-being in Ecommerce Throughout the COVID 19 Pandemic

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Abstract. In the recent COVID-19 pandemic, the world has seen the importance of technology usage where multiple activities were conducted virtually for life sustainability. There is an increase of activities happening in the virtual platform, supporting different types of businesses including retail and services. The activities encompass digitization of businesses with the implementation of new technologies. This research is a review of existing studies regarding e-commerce in current pandemic times. This research is expected to produce dominant activity segment(s) in e-commerce and explore further into that topic. The findings shall provide a starting point for other research topics related to e-commerce and technology.

Keywords: E-commerce · Business · Consumer · Covid-19 · Technology

1 Introduction

The onslaught of the pandemic has been accompanied by transformations from offline activities to online activities, primarily in the e-commerce context. This is supported by recent literature which points to the significance of digital transformation for businesses and consumers. The Covid-19 pandemic has influenced the way people shop, skewing towards e-commerce [1, 2], due to the reduction in outdoor activities to contain the spread of the virus [2].

This paper addresses the usage of technology during the Covid-19 pandemic in e-commerce-related activities. The objective of this paper is to explore the multi-dimensional activities on technology usage during Covid-19. It seeks to answer the following research questions:

- (1) What are the dominant activities carried out leveraging the current technology during Covid-19?
- (2) How are these identified activities carried out?

- (3) How have these activities changed the normal practices/lifestyle of the user?
- (4) Who are the main stakeholders in these activities? And how has the relationship of the stakeholder changed due to Covid-19?
- (5) What are the open challenges of the technology usage during Covid-19?

The findings shall give a deeper understanding of the e-commerce-related activities during the pandemic and help businesses foresee future transactions, enabling more enhanced preparedness for post-pandemic times.

2 Dominant Activity

E-commerce consists of multiple activities including online shopping, internet banking, electronic payments, and others. Three published journal articles were studied to determine the most common activity in e-commerce, in which all the studies adopted a quantitative methodology. Table 1 summarizes the articles.

Prior to the pandemic, shopping was primarily executed conventionally, in an offline manner. From the studies as summarized above, it is found that the frequency of online shopping has increased during the pandemic. Online shopping is a form of e-commerce which utilizes technologies for a digital experience. The digitization of processes to

Table 1. Summary of articles on e-commerce activities

Author(s), year	Aim/purpose	Sample size	Geographic location	Summary of results
Dinesh and MuniRaju [3]	To understand the factors that drive an update in e-commerce transactions and to understand consumer behavior in the pandemic	N = 195	Mysore, Karnataka	Online shopping frequency increased
Moon et al. [4]	To understand consumer patterns in offline and online shopping during the pandemic	N = 251	Korea	Online sales have increased
Mouratidis and Papagiannakis [5]	To understand the importance of online activities and the frequency of the usage of these activities before and during the pandemic	N = 1201	Greece	Importance and frequency of online shopping has increased

reduce face-to-face contact has encouraged consumers to shop online [6]. With restrictions in place such as lockdowns and social distancing, consumers options to retrieve necessary items are narrowed down, which has propelled the adoption of digital technologies and has made commerce a ‘store comes home’ concept [7].

According to Dinesh and MuniRaju, they found that 180 of 195 of their respondents purchased items online during the pandemic [3]. Moon et al. found that with undesirable circumstances such as Covid-19, sufficient knowledge of Covid-19, and high regard of government policies such as social distancing and compulsory face masks, offline shopping has decreased as they opt for online shopping channels as an alternative [4]. According to Mouratidis and Papagiannakis, the importance of online shopping has increased during the Covid-19 pandemic, despite their findings that online shopping was one of the most important online activities prior to the pandemic as well [5]. Internet usage, social media, and smartphones increased in the pandemic [5], which tallies with the increased frequency of online shopping found in all three studies.

As online shopping is done through digital platforms, the process of online purchases is made significantly easier due to the usage of standard technologies such as mobile phones, laptops, and computers.

3 Method of Execution

One of the most dominant activities in e-commerce during the pandemic is online shopping. Consumer behavior is studied in 2 published journal articles which is summarized in Table 2.

Table 2. Summary of articles on consumer behaviour

Author(s), Year	Aim/purpose	Method	Geographic location	Summary of results
Rao et al. [8]	To understand consumer behavior in situations involving purchasing from direct e-stores and indirect e-stores	Quantitative (Survey, N = 800)	Pakistan	Consumers are more satisfied when shopping via direct e-stores than indirect e-stores
Sayyida et al. [9]	To analyze the effects of the pandemic on consumer behavior in retail	Quantitative (Dataset)	United States United Kingdom France Canada Latin America	Trend of consumer behavior is increasing in webrooming and pure online shopping

In the context of the study by Rao et al., a direct e-store is a business which sells their own products (brand store) such as Walmart, whereas an indirect e-store are third-party stores such as Shopee and Amazon [8]. People purchase through online channels from both the direct vendor (business-to-consumer (B2C)) and a third party (consumer-to-consumer (C2C)). Consumers feel more comfortable purchasing from a direct e-store (B2C) compared to an indirect e-store (C2C) as indirect e-stores may promise to provide more than what is received [8].

Webrooming is a form of shopping in which consumers find information about a product online but makes the purchase in a physical store. On the other hand, show-rooming is the opposite, whereby the consumer finds information regarding a product offline but makes the purchase online. These two forms of shopping are a hybrid of both offline and online shopping. Pure online shopping is where the information gathering process and purchase are both conducted through digital means. Sayyida et al. found that in all the 5 countries as stated in the table above, there is an uptake in webrooming and pure online shopping during the pandemic in retail [9].

Although these findings show an uptake in in-store retail purchases and online retail purchases, it indicates that consumers have a sense of awareness of the risks that come with physical store visits, as, from the rise in both shopping types, it can be concluded that less time is spent physically visiting the store.

This increase in online shopping shows that consumers may adopt it due to factors such as avoidance of crowds and public spaces, and to find high-demand items easily [10] due to the various online platforms available. On the other hand, the low satisfaction levels of buying from indirect e-stores and the increasing levels of webrooming may be due to concerns including the likelihood of inaccurate information about a product online, shipping fees, and the inability to view the product before making a purchase [10].

The findings from [8], 9 indicate an apprehensiveness due to the sudden shift in lifestyle such as social distancing and fear of contracting the Covid-19 virus, and, due to this, an increase in online shopping, involving both B2C and C2C transactions. On the flipside, in the 5 countries as stated in [9], there is a larger increase in webrooming compared to pure online shopping, although both show an upward trend.

To summarize, both B2C and C2C e-commerce has increased during the pandemic. However, B2C e-commerce is the preferred method for consumers as it increases customer satisfaction and reduces risks of fraud. Webrooming will not be discussed further as it is beyond the scope of e-commerce.

4 Changes Due to Online Shopping

Online shopping, although existing prior to the pandemic, has always been an alternative to physical shopping rather than a necessity. With freedom of movement, no fear with regards to the virus, online shopping was previously a desire more than it was a necessity.

A study [11] found that the elderly was familiar with technology, however highly reluctant to use it due to privacy and security concerns, or they are of the opinion that conventional methods are better than adopting digital solutions. The same study reported that the participants (elderly) were more inclined towards ordering groceries from local

shopkeepers via the phone, whereas e-commerce sites such as Amazon and Flipkart (C2C) were utilized for the purchase of other items [11].

Another study [12] centered in the Portland-Vancouver-Hillsboro Oregon-Washington Metro Area found that the elderly and retired participants show increased openness to home deliveries in the pandemic, however, it is found that they are less likely to use online shopping compared to the rest of the general population. This supports the high reluctance levels found in [11]. A study by Erjavec and Manfreda [13] studied older adults and concluded that the pandemic caused the rapid adoption of digital solutions such as online shopping due to the disruption of consumers' daily lives.

A study [14] has concluded that there has been an increase of online purchases by 3 to 10 times the normal amount in a month which is in line with the reduction of other activities including mall and store visits to avoid face-to-face interactions. This shows a drastic change from purchases made in-store to online purchases. Online shopping has proven to be an effective alternative for people to make purchases, reducing the anxiety of uncertainty and fear of contracting the virus.

A study which niched on psychological factors and consumer behavior found that the sudden changes in consumer behavior was explained by fear and anxiety due to Covid-19, in such a way that it pushed consumers to purchase necessities products [15] such as hand sanitizers and face masks. This was detailed out further by Erjavec and Manfreda [13] by stating that fear induced by Covid-19 has no direct influence on consumers' intention to adopt online shopping. Instead, it is found that the consumers' fear of Covid-19 has a direct influence on the imitation of other's behavior when considering the adoption of online shopping and dismiss their own information, primarily due to the ever-increasing uncertainty during the pandemic.

As such, it can be said that the changes in consumer behavior primarily openness to online shopping has undergone a massive shift from being an alternative approach to shopping to a necessity in the pandemic. The pandemic has forced the adoption of digital solutions to carry out shopping online. Previously, consumers would be able to make in-store purchases without the worry and fear of the virus. During the pandemic, adoption of online shopping has become prevalent due to the uncertainties that comes with these uncertain times, thus causing herd behavior which is essentially where people follow the majority, hence directly affecting the decision to use online shopping platforms instead of the conventional method.

In adults of more mature ages, it is found that they are more reluctant to adopt online shopping, as for them, there is a steep learning curve and adapting may be difficult for them. This is supported by a study by Sinha et al. [11] which found that the elderly's most common problem in the adoption of technologies was a proper support system. Although the pandemic has driven them away from conventional methods, it is found that older adults find it easier to shop online [11].

Amidst the fear and uncertainties brought by the pandemic, online shopping has become a way to alleviate the psychological effects of the pandemic as consumers do not have to worry about being unable to purchase items online and the nuances of going out during the pandemic. Despite the accessibility and ease of use of online shopping platforms, be it B2C or C2C, some consumers have some reservations for online shopping, as reported in [12].

When looking through the viewpoint of the impacts of online shopping on peoples' lives during the pandemic, it is inarguably positive. This is due to the restrictions imposed by most, if not all countries across the globe such as lockdowns and social distancing. Uncertain times caused an unprecedented increase of levels of fear and anxiety in people across the world [16]. Thus, the prevalence of online shopping has helped soothed these fears by providing a different approach to purchasing essential and non-essential items through the utilization of common technologies which are the mobile phone and personal computers.

However, this has its cons as well. The adoption of technologies to shop online has amounted to new fears and worries, increasing reluctance to shop online. From the perspective of the consumers, particularly older adults who prefer conventional means of shopping, the fact that online shopping has become the new normal may be a difficult reality for them to accept and adapt to, hence, the higher levels of reluctance as discussed previously. Overall, it can be said that online shopping has substantially changed the peoples' lifestyle both positively in the sense that it soothes fears and negatively as for some, it may cause new worries.

5 Stakeholder Relationship

A stakeholder is defined as someone who affects a business or is affected by a business's decisions and performance. There are two types of stakeholders, internal and external. In business, the main stakeholders are (1) employees (2) customers (3) suppliers (4) community, and (5) investors [17]. This can also be applied to online shopping, in which the e-commerce model which must address all the stakeholders is B2C. This section will address the relationship of the business with each of the stakeholders.

5.1 Employees

A study on FoodPanda in Malaysia has concluded that employee loyalty is imperative to a business's success and sustainability [18]. Widjanarko and Febriansyah studied burnout factors of employees in e-commerce, and they found that each of the factors of burnout listed were directly linked to the company's management of employees, in which the two main factors of burnout were frequent overtime and overbearing pressure [19]. With the execution of policies to curb the spread of the virus, many companies have effectuated a full or hybrid Work from Home (WFH) rule, where a relatively significant amount of people felt that the working hours were longer than working in office [19], hence depriving employees of a work life balance.

In the Covid-19 pandemic, retail businesses are ensuring a constant stream of revenue by increasing the management and accessibility of online platforms [20]. Businesses and entrepreneurs must consider employee safety and thus adopt new communication tools [19]. For retail businesses to adapt to the current situation, businesses have adopted telework tools for communication purposes and provide training to employees to upkeep the e-business [20].

5.2 Customers

General e-commerce sales have substantially increased with people avoiding physically going out and instead adopting online shopping, for example, Walmart e-commerce sales have increased by 74% [21]. For businesses to adopt digital solutions successfully and generate revenue, a business must understand its potential customers and tailor their website to address user experience to retain and gain customers [21]. Thus, it is imperative that businesses understand human computer interaction (HCI) and be able to implement it in their transition to e-commerce.

In mass media, advertising activities have substantially decreased, with financial expenses towards television advertisements decreasing by 25% [22]. Advertisements are a method of communication with customers and potential customers, to attract interest towards a business's product or service. Whilst it is reported in [22] that communication has shifted its focus from the acquisition of new customers to retaining current customers instead, there are companies that have instead expended more funds towards advertising.

The adoption and utilization of online platforms to sustain business in the pandemic has brought about the generation of large amounts of data [22]. This data can be analysed to understand customer behavior, create market segments, and generate personalized recommendations to increase customer experience and thus, retain existing customers. The use of the acquired data can be expanded to create new relationships with new customers [21, 22]. The optimization of online data to retain and acquire customers will consequently increase customer lifetime value.

5.3 Suppliers

A study in Malaysia [23] has found that the hampering of import and export processes has drastically impacted Malaysia's economy, including businesses, especially as Malaysia is highly dependent on China. Another study conducted on multiple companies, one of which being a US-based small-to-medium-sized e-commerce company which exclusively sources from China has had trouble with factory shutdowns and transportation challenges from China [24]. The company reports that the pandemic increased supply risk and that suppliers from China increased uncertainties in strategic issues [24].

It was reported in [22] that the Netherlands is highly dependent on foreign markets on both the demand and supply side. As an example, China's supply of semi-finished and finished products was temporarily halted [22]. A qualitative study conducted in Kuwait in the hospitality and tourism sectors found that the supply chains were disrupted as suppliers were unable to provide their services as usual [25]. However, it was found from the analysis that some participative suppliers found alternate methods to maintain relations with businesses [25] despite the pandemic.

It was suggested in [26] that businesses should build a resilient supply chain with local suppliers. This is to ensure a constant flow of materials or goods despite the disruptions brought upon by the pandemic which halted the supply processes by foreign markets. An interview with an expert as reported in [26] said that they were creating a network of local suppliers as a risk mitigation measure. This shows the changes from high levels of dependency on foreign markets to approaching local suppliers to sustain their business.

5.4 Community

Businesses have a social and environmental responsibility, which is a concept defined as corporate social responsibility (CSR). A report on multiple countries across the globe stated that in the search for suppliers, the supplier's CSR policy is not the top priority, although they are becoming increasingly aware of its importance and do have some considerations of that aspect when conducting purchase transactions [27].

The engagement of a business in CSR is not only the distribution of products or services that is for the betterment of society and the environment, but to ensure that the operations prior to the distribution (selling) phase also comply by CSR policies.

According to a study conducted on female students in Italy in 2020 [28], the interviewees were found to be critical of commercial brands and their adoption and compliance to CSR policies. Furthermore, one-third of the participants have dropped the purchase of body and beauty care products since the pandemic started [28]. Awareness on sustainability concerns and issues among the younger generation is found to be increasing, hence making them more critical and observant in finding out if the commercial brand complies with sustainability standards before making a purchase [28].

In these times where online shopping has become prevalent and businesses have now adopted digital solutions, it is easy for potential and existing customers to find information online, including regarding a business's sustainability practices. Therefore, it is imperative for businesses to make sustainability a priority, both to benefit society and the environment, and because awareness levels are increasing.

5.5 Investors

The pandemic has created a widespread panic ultimately leading to a costly declining trend in the overall stock market [29]. The uncertainties and fear festered in investors due to the pandemic have let people to react negatively which caused the price shares to drop in the stock market [29]. A study in Indonesia [30] found that one of the fears of the domestic investors was risk of a global economic shutdown. This shows that the capital market all around the world has been significantly impacted by the pandemic.

Even though typically, markets will recover after a downfall, such as the stock market crash in 2020, investments at this point of time can be risky. Fluctuations of a stock price can go in one of two ways, either (a) the demand (buy) is more than the supply (sell), and the price increases, or (b) the supply (sell) is greater than the demand (buy), and the price will decrease. Therefore, the rising panic is what pushed investors to sell their stocks before stock prices decreased any further and they would face a loss. A study which researched on the Shanghai stock market, Nikkei, and Dow Jones in 2020 confirms the relationship between the downward trend in stock market globally and investors' psychological pressure [31].

However, many businesses have adopted e-commerce since the pandemic began. Therefore, investments in these businesses could rise again as e-commerce has become prevalent. According to a study by Tashanova et al., there are four industries which are holding up well in these tough times, which are (a) Online entertainment (b) Online education or online job market (c) Food, and (d) Healthcare, which investors could start investing in [29].

6 Challenges in Technology Usage

The transition to online shopping was not a fully smooth process. The adoption of digital processes and technologies to adapt to the current situation comes with its own set of challenges. This section will discuss the challenges from the business as well as the consumer side.

6.1 Business

Businesses have had to adapt to the ever-changing circumstances since the pandemic started. This section discusses a couple of challenges that businesses face in the context of available technology.

6.1.1 Digital Transformation

Almeida et al. reports that businesses adoption of technologies is dependent on its external stakeholders, namely, the community which includes its employees, suppliers, customers, and business partners [32]. The challenges identified include the adoption of telework and a distance working model that could overcome geographic difficulties and still maintain efficiency and interactivity [32]. Businesses must be able to generate a constant stream of revenue to be able to sustain their business in the pandemic. This has driven businesses to move forward with digital transformation, which requires a major remodeling of virtually the whole business, which is no easy feat.

Countries such as China and the United States have implemented robotic delivery services for specific products although this is not the case for all e-commerce sectors [33]. In fact, there is a significant increase and decrease in traffic (digital visits) in certain sectors [33]. This proves that businesses must act accordingly to increase customer engagement with their business. At the same time however, a study in Pakistan found that businesses face several challenges especially in terms of the supply chain, subjecting them to a loss of inventory and thus loss of profit gain and liquidity [34].

Although businesses must sustain through profit gained through sales operations, thus adopting digital transformation, it is important that investments in technology must benefit the business in the sense that it retrieves faster ROI, sufficient to bear the costs of maintenance, pay employee salaries, and satisfy supply and demand.

6.1.2 Consumer Trust

Consumer trust is essential to a business's survival. Without it, customers will not go through with transactions and businesses will lose profit. A study found that e-service quality and e-security are significant factors in gaining consumer trust [35]. It is crucial for businesses to understand the importance of not only adopting digital solutions, but to ensure that the implementation considers customer service and security, to ensure a high-quality customer experience.

According to Irawan, businesses must consistently work towards constant communication with consumers via social media, sustainability videos, and promotions [36]. Constant communication is an important effort to maintain relationships with existing customers and to procure new customers. Chawla and Kumar add on to this by stating that constant development of consumer protection mechanisms must be put into place to protect consumers from fraudulent, misleading, and unfair practices online [37].

Consumer trust is the most difficult thing to obtain [36]. With the prevalence of online shopping, data collection is more widespread and frequent. Some consumers may be more aware of this and be reluctant to give their personal information to businesses. Therefore, e-commerce platforms should provide a comprehensive guideline on internal procedures and policies on the acquisition, storage, and analysis of personal data [35], to provide those reluctant with the reassurance needed regarding the handling of information and security before giving up personal information.

6.2 Consumer

As discussed in previous questions, consumers' lives have changed to accommodate online shopping. This section discusses challenges that consumers face in light of the pandemic, in the context of the adoption of technologies for online shopping.

6.2.1 Perceived Importance

Among the challenges of the usage of technology from a consumer's perspective is the sense of awareness on the importance of technology. A study based in South Korea studies the difference of the digital divide between people with disabilities (PWD) and those without (PWOD). The study found that the perceived importance of the Internet and digital technologies before and during and pandemic for PWOD has increased whereas PWDs' perception has not changed [38].

Peoples' perception is important in the adoption of technologies. If technology is not seen as important, the likelihood of people utilizing it will decrease. This is proved by the incentive theory of motivation, which suggests that people are more likely to engage in behaviors if they receive a reward for it. Therefore, the less beneficial technology adoption is perceived, the less likely people will adopt it. This is supported by the findings in [38] that concluded that PWOD were more aware and utilized digital services compared to PWD.

6.2.2 Lack of Confidence in Online Protection

Consumers lack confidence in the security and reliability of online services, which makes them feel less safe in the online space. A study in India found that while the trend of online transactions has been increasing globally, consumers in India are found to be reluctant to place their full trust in online transactions [37]. These cybersecurity concerns are valid because ever since online shopping became online, many businesses are actively collecting data without the consumer even knowing.

An estimated 93% respondents out of 290 in the study in India prioritized how businesses provided security solutions whilst 52% of the total respondents cared about

the issue of privacy concerns with regards to their personal information [37]. These concerns do give rise to reluctance when executing online shopping. Although at some point online shopping became a necessity, this does not mean that consumers make online transactions without concerns. Therefore, it is important that businesses acknowledge these worries and take proactive measures to reduce the risk of cyberattacks and provide secure transactions. This will not only increase customer's confidence but also satisfaction, increasing customer retention.

7 Conclusion

In conclusion, the activity with the highest increasing global trend in the Covid-19 pandemic is online shopping. This has driven not only businesses, but consumers as well to adopt technologies to sustain themselves in the pandemic.

These drastic changes in lifestyles have aided in alleviating Covid-19 related fears, although new fears arise due to having to adapt to new normalcies such as online shopping. Digital transformations have changed stakeholder relationships, in which more work must be put in to maintain those relationships.

Although many challenges have arisen from the usage of technology, both for businesses and consumers, technological advancements have helped to overcome these challenges. Additionally, it has shed a new light on business-consumer relationships especially in the retention and procurement of new customers.

Post pandemic, online shopping will likely be at the forefront of dominant activities due to its convenience and the increasing adoption worldwide. However, this is still under discussion although studies have suggested that e-commerce may replace conventional shopping.

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