

Examining the Impacts of COVID-19 on Retail Industry and E-shopping

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Abstract: One of the many sectors that has been highly affected by COVID-19 is retail industry. Fearful of contracting the virus, people are seen to avoid traditional bricks and mortar trades, which led to rapid diffusion of various online businesses. People are found to be more comfortable in online shopping than going to shopping malls physically during the pandemic. These sudden changes in shopping behavior have had crucial implications on business operations. It is important to understand how retail industry is transforming due to the pandemic for suggesting sustainable planning interventions for reconfiguration of urban core. This research conducts an exploratory analysis using public discourse data in Twitter to understand how retail is changing in the time of COVID-19 and e-commerce. First, using Twitter API, tweets related to COVID-19 crisis, in-store shopping, e-shopping and retails are extracted. Then, text mining and topic modelling is applied on the tweets to analyze general people's real-time concerns, opinions and sentiments related to shopping in the time of pandemic. Multiple analytical frameworks are used, such as, wordclouds, to identify frequently occurring words and topics in those discussions. This research also identifies challenges as well as solutions for safe reopening of conventional retails through analyzing general public opinions. Results of this study will assist policy makers to reshape retail structure with an aim to help revive economy in the post-COVID time. Outcomes will also offer insights on how to utilize the shopping behavior change during the pandemic to reorganize downtown areas of cities with a focus on promoting sustainable travel behavior.

Keywords: COVID-19 Pandemic, Retail Industry, E-shopping, Economy, Sustainable Cities.

1. BACKGROUND

E-commerce has been growing exponentially in recent years, signaling a paradigm shift in consumers' shopping behaviour. E-commerce is the biggest shock that brick and mortar stores experienced in recent times (Rao, 2019). Brick-and-mortar retailers attempted to adapt by implementing changes to their businesses due to this emerging change in retail industries (Rao, 2019). In 2020, the situation has been amplified by the COVID-19 pandemic, such as social distancing and closure measures (Alvarez and Marsal, 2020). The World Health Organization (WHO) declared COVID-19 as a pandemic in March 2020 (WHO, 2020). To restrict the spread of the virus, governments ordered people to maintain social-distancing in store or even shut-down businesses in some places (Houssain and Habib, 2021). Fearful of catching the virus, people are hesitant and refraining from going to stores (Business Wire Inc., 2020). According to Statistics Canada (2020) report, there is an economic activity decline in Canada due to the COVID-19 pandemic (Lafrance et al., 2020). Moreover, there are widespread business closures across provinces and territories. As of August 2020, 88,187 businesses closed in Canada after the start of the pandemic. The number of store closures in April 2020 doubled compared to the number of business closures in 2019 (Lafrance et al., 2020). In the United States approximately 140,000 to 317,000 business closed since the pandemic started (Fairlie and Yelp, 2020).

Retail has always been a central part of urban life (Rao, 2019). Business closures and fear of public spaces due to COVID-19 have the potential to permanently change the way cities look and operate (Mayer, 2020). Conventional retail businesses such as clothing, grocers, and cafes have a significant role in maintaining main streets' liveliness (Atkinson et al., 2020). The COVID-19 pandemic has led to drastic changes in the way we live, work and shop. Conventional retail and retail land-use were already going through changes due to e-commerce. The general public are the primary user of the retail and e-commerce industries. It is necessary to consider their opinions and concerns while tackling retail related planning issues, especially during the uncertain times of the COVID-19 pandemic. Social media is a free and prolific source for finding public discussions about any given topic (Ahmed et al., 2017). People like to share their views, ideas and thoughts on almost every topic on social media networking sites (e.g. Facebook and Twitter). Besides, people nowadays prefer to express their opinions about planning interventions in social networking sites (SNSs), rather than conventional focus group discussions (FGDs) (Anik et al., 2020). Therefore, collecting and analyzing social media public discourse on COVID-19 can be a practical approach for assessing the public's opinion and experience on current matters (Habib and Anik, 2021).

This study aims to explore how the retail sector is transforming in the age of e-commerce, and how retail and e-commerce are evolving during the COVID-19 pandemic. This research uses public discourse data extracted from Twitter. Twitter is a popular social media application that provides vast public discourse data through public conversations (Ahmed et al., 2017). This study used Twitter to identify how shopping behaviour is changing and the impact of that behaviour change on conventional retail and e-commerce. In addition, this study explored the challenges and opportunities faced by the conventional retail during the pandemic lockdown period. The findings will offer planners and policymakers ways to develop strategies to tackle retail challenges in cities to help revive the economy and face the recovery stages of COVID-19. The following are the two primary research questions explored in this study: a) How is the retail sector transforming as online shopping activity increases?; b) How are conventional retail and e-commerce evolving during the COVID-19 pandemic? By examining the answers to the above questions, this study suggests what strategies could be useful in planning for conventional retail and online shopping moving forward. The study also explores the interventions governments can take to support local businesses, shops, and online ventures, and bring economy to life in the post-COVID time.

2. METHODOLOGY

This study uses a mixed-method approach, i.e., a combination of both qualitative and quantitative analysis process. Qualitative analysis follows manual coding of collected tweets, whereas quantitative analysis follows applying text mining and topic modelling on the tweets. Text mining is a method for extrapolating new data from text-based sources using computer algorithms . This study uses secondary data sources such as government statistics and planning documentation to provide context to the thematic data collected from Twitter to answer the first research question. To answer the study's first question, secondary source data provided context to how conventional retail and online shopping were interacting during pre-COVID times. Government reports and scholarly journals were used to supplement Twitter's public discourse. Twitter data are retrieved from Twitter's application programming interfaces (API). Twitter API provides an option to extract tweets with no time limitation. Tweets in only 'English' language are considered in the study. 25 keywords sets are initially tested, yielding a total 7,500 tweets. After reviewing the test keywords, two most relevant keywords are selected. For this study, tweets are collected from December 1 to December 30, 2020 under the assumption that tweets from the holiday shopping season will provide more insights into the emerging shopping behavior. The following keyword-sets are used: 'online shopping and COVID-19, 'retail, e-commerce, and COVID-19'. In total, 300 tweets for each keyword-sets are considered in the analysis. The tweets are extracted using the Twitter API and exported to a spreadsheet. Each tweet is manually assessed, and irrelevant tweets are discarded. All non-English tweets, and retweets are discarded. Spelling mistakes are corrected, and redundant words are removed from the corpus. Themes (nodes) and sub-themes (sub-nodes) of discussion are generated by applying manual coding on the collected tweets. Text mining and topic modelling techniques are applied to the tweets to identify frequently occurring words in the discussions. Thematic analysis is done using NVivo-12 pro software. Text mining (word cloud) analysis is done in NVivo-12 pro and topic modelling analysis is carried out in open-source statistical analysis software R. NVivo-12 pro is used to find clusters of common themes or patterns that cannot be done manually (NVivo, 2020).

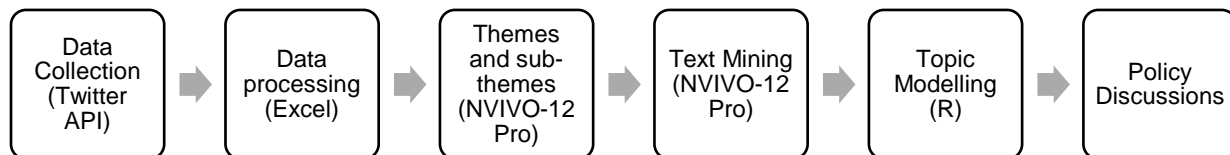


Figure 1: Workflow of the study.

3. DISCUSSION OF RESULTS

The following section presents results of nodes and sub-nodes, word clouds, and topic modelling. Nodes and sub-nodes are displayed in Table 1. Topic modelling results are presented in Table 2 which shows the most prominent eight topics for each keyword-sets.

3.1 Nodes and Sub-nodes

Nodes are created by applying manual coding, and each node may or may not have sub nodes coded within it. In Table 1, each key term's nodes and sub-nodes are listed, with their respective

occurrence percent in the key term. Node occurrence (in square brackets) is represented as a percent of the total number of tweets of each key term, while the occurrence of each sub-node is displayed as a percentage of the total number of its parent node's aggregated tweets. All nodes are aggregated, and their percent value adds up to 1. Sub-nodes are not aggregated and may or may not add up to 1 since some tweets may be associated with more than one sub-node and some may not be associated with any sub-node.

3.1.1 Retail, E-commerce, and COVID-19

Table 1 shows that challenges faced by businesses [24.2%] have been discussed the most. People urged companies to combine both in-person and online services. Conventional retail challenges (26.8%) such as, lack of financial aid, being put out of business or overtaken by big box giants, lack of online platforms is identified by the general public. E-commerce challenges (19.5%) were discussed by many users, especially the increased rate of online purchase returns. Moreover, e-commerce lacks the physical experience that conventional retail offers. A decrease in demand for retail jobs and an increase in demand for e-commerce jobs are mentioned (7.3%). Many users noted that due to a shift in shopping habits [13.2%], conventional stores without online presence might become irrelevant. The exponential growth of e-commerce is a prominent theme [23.6] of discussion among public. Discussions are also found on Amazon (12.8%), Grocery shopping (15.4%), mobile commerce (7.7%) and Shopify (2.6%). Interestingly, discussions on possible land use transformation [4.8] due to online market growth are also discussed which indicate that people have their own opinions regarding urban core planning. Discussions also included urge for demand increase in warehouse space (25%), the need for retail spaces to transform to a hybrid model (25%). Some discourses are recorded on new opportunities for combined traditional retail and e-commerce [20%]. Some users expressed that new technologies (e.g. VR) could be used to enhance online shopping (14.3%) as well as recommendations for local retailers (11.4%). Omni-channels are another solution mentioned (25.7%). Consumers noted their desire for online retailers to adopt sustainable practices and packaging (34.3%). The retail shift is another emerging theme [16.4%]. Some users expressed that COVID-19 restrictions are the "last nail in the coffin" for brick and mortar retailers (11.4%). Some people suggested that traditional retailers should adapt and offer new customer services (14.8%).

3.1.2 Online Shopping and COVID-19

'Online shopping and COVID-19' is another key term used in the analysis. Table 1 indicates that, the need to support local retail stores and the need for businesses to invest in digital platforms [34.0%] such as websites and omni-channels (21.4%) are discussed the most. Retail decline (42.9) is a major concern associated with retail businesses – users noted that many stores are closing and transferring their operations to online platforms. Job losses in association with retail trades are also mentioned (2.4%). A shift in shopping habits, favoring online shopping and its exponential increase since the onset of the pandemic is also discussed [13.2%]. An increase in online shopping is noted by many users [32.8%] and presented user preferences for different online shopping platforms available in the market. Discussions are found on online shopping future trends such as mobile commerce (4.2%). Many users noted Amazon as being the company that has benefited the most from the pandemic (18.8%), making its first ever \$100 billion quarter. Users also mentioned an increase in social media shopping (6.3%), Shopify (2.1%) and online grocery shopping (6.3%). Due to COVID-19 lockdown and fear of contracting the virus, many people preferred shopping online [20.7%] that includes buying essential items (44%).

Table 1: Nodes and sub-nodes of tweets with global percentages for nodes (in square brackets) and local percentages for sub-nodes (in round brackets).

Online Shopping and COVID-19		Retail, E-commerce and COVID-19	
Node and Sub-Node Names	Percentage of Tweets (%), N=300	Node and Sub-Node Names	Percentage of Tweets (%), N=300
1. Retail store	[34.0]	1. Challenges	[24.2]
1.1. Omni-channels	(21.4)	1.1. Conventional retail challenges	(26.8)
1.2. Retail decline	(42.9)	1.2. E-commerce challenges	(19.5)
1.3. Job loss	(2.4)	1.3. Retail job loss	(7.3)
2. Shift in shopping Habits	[13.2]	1.4. Shift in Shopping habits	(46.3)
3. Online shopping increase	[32.8]	2. E-commerce	[23.6]
3.1. Social media shopping	(6.3)	2.1. Amazon	(12.8)
3.2. Shopify	(2.1)	2.2. Grocery shopping	(15.4)
3.3. Online grocery shopping	(4.2)	2.3. Mobile-commerce	(7.7)
3.4. New normal	(6.3)	2.4. Shopify	(2.6)
3.5. Mobile-commerce	(4.2)	3. Land Use	[4.8]
3.6. Amazon	(18.8)	3.1. Retail space	(25.0)
4. COVID-19 regulations	[20.0]	3.2. Warehouse	(25.0)
4.1. Essential stores	(44.0)	4. Opportunities	[20.0]
		4.1. E-commerce opportunities	(14.3)
		4.2. Omni-channels	(25.7)
		4.3. Retail opportunities	(11.4)
		4.4. Sustainable practices	(34.3)
		5. Retail shift	[16.4]

3.2 WordClouds

For each keyword-set, a wordcloud is constructed. Each wordcloud included the most prevalent words used in all the tweets within the set. Words with higher occurrence are displayed in a larger font. Figure 2(a) represents the most highly occurring words from the tweets making up the keyword-set 'online shopping and COVID-19'. The most highly occurring words were 'stores', 'grocery', 'market', 'malls', 'retail', 'local', 'Amazon', 'sales', 'trend', 'holiday', 'e-commerce' and 'people'.

here to stay”. General public also showed concern about retail market growth. One individual tweeted: “Who to believe as some open-air shopping center owners report strong-leasing momentum in the 3rd quarter despite COVID-19.....”.

3.3 Topic Modelling

Topic modelling is conducted for the Twitter posts for both keyword-sets. The most prominent eight topics are extracted and listed in Table 2. The topics are listed in order based on their conditional probability.

According to Table 2, for ‘online shopping and COVID-19’, Topic 1 words are COVID-19 (0.07), Stores (0.045), Malls (0.024), Empty (0.022), Online (0.019). These words suggest that due to COVID-19 and online shopping, stores and malls became empty. Topic 2 words are Online (0.075), Shopping (0.030), Triggered (0.015), Surge (0.012), Mask (0.009). indicating that there is an online shopping surge triggered by COVID-19 crisis. Topics 3 and 4 are similar to Topic 2. Topic 5 associated words are Amazon (0.024), Business (0.021), Holiday (0.018), Commerce (0.011), Season (0.011) suggest that during the holiday season Amazon had increased sales. Topic 6 words are Online (0.051), Grocery (0.022), Local (0.008), Momentum (0.008), Retail (0.008) indicates local retail and grocers’ momentum to provide online platform services. Topic 7 associated words are People (0.037), Local (0.031), Social (0.011), Closed (0.011), E-Commerce (0.011) was similar to Topic 6 and strengthening the idea that by stores being closed, people moved to online shopping solutions. Topic 8 words are, Shopping (0.012), Global (0.011), Shift (0.011), App (0.011), Season (0.008) postulating that there is a global shift in technological adaptation as people are using apps to shop.

Table 2: Top 8 topics from Twitter for each keyword-sets obtained through topic modelling on respective tweets (probability value of each word is given in the parenthesis):

Topic number	Topic word clusters and their associated probabilities
	<i>Online Shopping and COVID-19</i>
1	COVID-19 (0.07), Stores (0.045), Malls (0.024), Empty (0.022), Online (0.019)
2	Online (0.075), Shopping (0.030), Triggered (0.015), Surge (0.012), Mask (0.009)
3	Online (0.058), Trends (0.015), Due (0.015), Sales (0.015), Store (0.009)
4	Shops (0.017), Retailer (0.014), 2021 (0.011), Consumer (0.011), Café (0.011)
5	Amazon (0.024), Business (0.021), Holiday (0.018), Commerce (0.011), Season (0.011)
6	Online (0.051), Grocery (0.022), Local (0.008), Momentum (0.008), Retail (0.008)
7	People (0.037), Local (0.031), Social (0.011), Closed (0.011), E-Commerce (0.011)
8	Shopping (0.012), Global (0.011), Shift (0.011), App (0.011), Season (0.008)
	<i>Retail, E-Commerce, and COVID-19</i>
1	E-commerce (0.064), Retail (0.063), Online (0.027), Shopping (0.014), Consumers (0.012)
2	Increasing (0.007), Build (0.005), Company (0.005), Consumption (0.005), Experience (0.005)

3	Changing (0.008), Hit (0.008), Close (0.005), Rapidly (0.005), US (0.005)
4	China (0.008), Shift (0.008), Amazon (0.006), Global (0.006), December (0.005)
5	Grocery (0.006), Plan (0.006), Quarter (0.006), Adopting (0.004), Endless (0.004)
6	Investor (0.008), Industry (0.006), Changing (0.004), Contactless (0.004), Digital (0.004)
7	Behavior (0.007), Companies (0.005), Consumer (0.005), Impact (0.005), Jumped (0.005)
8	Free (0.007), Retailers (0.007), Cyber (0.005), Level (0.005), Touch (0.005)

Most prominent words in Topic 1 for 'retail, e-commerce, and COVID-19' are E-commerce (0.064), Retail (0.063), Online (0.027), Shopping (0.014), Consumers (0.012). Topic 1 associated words suggest that consumers' habits shifted from shopping in-person to online. Topic 2 words are Increasing (0.007), Build (0.005), Company (0.005), Consumption (0.005), Experience (0.005). They postulated that companies need to build and enhance their shopping experience service to answer consumers demand. Topic 3 words are Changing (0.008), Hit (0.008), Close (0.005), Rapidly (0.005), US (0.005). This topic highlights that in the U.S. there is a rapid hit of business closures. Topic 4 keywords are China (0.008), Shift (0.008), Amazon (0.006), Global (0.006), December (0.005). Topic 4 discusses that since the onset of the pandemic and by December there has been a global change. Moreover, according to some tweets, China's ability to stable the economy is due to their spending on advanced e-commerce platforms that is constantly improving. Also, since Amazon is already a well-established online shopping platform, it has reached record breaking profits since the start of the pandemic. Topic 5 key words are Grocery (0.006), Plan (0.006), Quarter (0.006), Adopting (0.004), Endless (0.004). Topic 6 major words are Investor (0.008), Industry (0.006), Changing (0.004), Contactless (0.004), Digital (0.004). This topic suggests that due to the pandemic, the industry is changing, and more people are investing in digital platforms than conventional retail. Topic 7 key words are Behaviour (0.007), Companies (0.005), Consumer (0.005), Impact (0.005), Jumped (0.005). Topic 7 articulates the change in consumers' habits towards online shopping that could impact conventional retailers which do not operate on digital platforms.

4. DISCUSSION AND CONCLUSION

With the exponential growth in e-commerce, some conventional retail businesses were previously struggling before the COVID-19 pandemic outbreak. This study showed that the prevalence of online shopping is exponentially growing and is substituting traditional in-person shopping. This research found that consumers who have never shopped online prior to the pandemic are doing so for the first time. This phenomenon in large-scale may lead to vacant retail stores in the urban areas. Consequently, reduction of retail stores may trigger land-use transformation in downtown which may result in reconfiguration of business centers. Transport and land-use systems of urban cities are heavily dependent on downtown areas, and reconfiguration of these urban cores will significantly affect mobility dynamics in cities. Based on the results, this study proposes some suggestions to help recover retail businesses in cities focusing on sustainable transport practices:

- Expanding sidewalks so that people feel comfortable entering roadside retail shops maintaining social distancing. This will encourage people in communities to walk more.
- Research shows that COVID-19 virus may spread more within closed spaces of retail shops. To solve this issue, pedestrian zones should be built in urban areas to enable outdoor

- markets and outdoor sitting. The opportunity of this strategy is that it will promote complete street concept in urban areas, and provide the pedestrians a sense of place.
- Provide Wi-Fi kiosks that provide free Wi-Fi in downtown areas with high pedestrian volumes to help people stop online and pickup their purchase while helping people to navigate better in the city.
 - Digital markets for local businesses to enable local companies to provide customer services online and help people to shop locally.
 - Reconfiguration of under-utilized spaces such as malls, parking lots. This will help to build more resilient and public-friendly urban areas.
 - Enforce regulations and provide educational programs to increase awareness and increase social solidarity.
 - Omni-channels - most favorable option for the business companies to expand their reach during the pandemic periods.
 - Amend bylaws that enable business to use sections of the sidewalk for display, outdoor sitting and 10 min curbsied pickup.

Analyzing public discourses in Twitter showed that there is a widespread lack of enforcement and social responsibility in adhering to pandemic restrictions and regulations. Such disregard to regulations is found describing overcrowding and the lack of social distancing at shopping malls or grocery stores. The outcomes of this paper showed that supporting local businesses should be a priority for governments. Results suggest that conventional retail businesses need to adapt to the new reality and take pragmatic strategies to maintain their sales during the pandemic . It became apparent that retailers who adopted an omni-channel approach and had invested in online retail platforms are more successful under the pandemic restriction measures. It is well known that local economies are heavily dependent on conventional retail. Thus, to help local businesses survive through the crisis and its aftermath, municipalities need to implement development plans with retailers' needs in mind. Furthermore, governments need to implement such plans with the new realities imposed by the growth of e-commerce. As mentioned above, online shopping has become substantially more significant, and businesses that did not adhere to new normal adaptation measures, struggled more than businesses that did. Therefore, governments and retailers should collaborate together during the pandemic to prevent the fall of retail markets and help revive economy.

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