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## **Buying behavior during online visits at two retail websites: Possible effects of COVID-19**

*(Work-in-Progress)*  
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### **ABSTRACT**

For two years has COVID-19 brought chaos to the world. While there has been remark on its effect on online retail transactions, there is no empirical work gathering actual buying behavior to verify it. Hence, the current research's goals are to use panel data at two online retail stores and subsequently to compare two buying variables between those in 2019 when the pandemic was not known and those in 2020 when it was officially confirmed. The study gathered usable 69,397 transactions at Walmart.com and Bestbuy.com during the two years. The comparisons of the basket value and the purchased units between the two years confirmed in part the significant effects of COVID-19 on the two buying behaviors.

*Keywords:* Basket Value; Purchased Units; COVID-19; Online Retail Transactions.

### **INTRODUCTION**

Since the first confirmed case at the end of 2019 followed by the substantial number of fatalities, COVID-19 has had a massive impact on human. The largest one could be on how we must live our lives under the new normal condition. In March 2020, nearly all health management organizations had to officially confirm the pandemic and to provide guidelines to the public in order to minimize the health crisis. Governments around the world must balance their effort to alleviate the health problem and to resuscitate the economic downturn.

People are supposed to follow the public announcements closely and to observe certain measures to manage their own safety. Such announcements cover how people could get vaccinated, or how long a lockdown period will be. Many restrictive policies have been enforced including residents having to wear proper masks in the public area, workers working from home using network applications, or corporate decision to slash down executives' salary, or to layoff sizable portions of staff. Vietnamese people, for example, have lived their lives by themselves in order to keep members of families safe from COVID-19 and their daily accomplishments were mainly done via online channels (Nguyen, et al., 2021). These examples have validated that the online behavior has been intense since March 2020 when the world officially experienced COVID-19.

Because of the pandemic, the high volume of business transactions had been disrupted. Investigations on its effects cover various issues ranging from general purchasing behavior to online buying transactions to online purchase of specific items such as medical supplies or groceries (Chang & Meyerhoefer, 2021; Boyle, et al., 2022; Gu, et al., 2021). For instance, during the lockdown, many residents of Oman purchased their groceries online (Al-Hawari, et al., 2021). A review of previous literature addressing the pandemic effects on online retail transactions reveals major limitations. They may have validity problems when collecting basket values during visit sessions. In general, people are sensitive if asked about their financial amounts. Also, no specific work testing possible effect of COVID-19 on buying behavior at retail websites is found. Hence, our main objective is to test if visitors' buying behavior during their visits at retail websites are changing, perhaps, due to COVID-19.

### **LITERATURE REVIEW**

COVID-19 has disrupted the world enormously. An airplane pilot known as one of the most secured careers has been suspended indefinitely. People are instructed and later enforced by law to stay isolated from, or to have little physical interaction with, the others. This is one of the key measures to control the spread of the pandemic. In early 2020, the world was alarmed by a mysterious disease that attacks a person's upper respiratory system and spreads easily through personal physical contact. Until the early 2021 when the first dose of vaccine was introduced, the situation appeared to have no solution. However, the arrival of Omicron in early 2022 has delayed the triumph over the pandemic.

Online retail is no exception. Given little physical contact we must have, an online platform has been the best communication channel during the pandemic. According to Gu, et al. (2021), web-based businesses have been drastically increased. Yet, the growth as measured by the increased basket value or the high number of purchased items per visit has never been addressed. Because of COVID-19, Vietnamese prefer to do online shopping for the health-related concern (Nguyen, et al, 2021). Using transactional data from one UK-based retail website, Boyle, et al. (2022) verified that the basket value during the lockdown in UK was significantly higher than that outside the period. However, England experienced multiple slots of lockdown so this work may not be the test of the COVID-19 effect on spending amounts at the website. Nonetheless, the online transactions with the average basket size of 30 pounds or less was only 1% in 2019 when the world was free from COVID-19, but it was

7% in 2020 when the pandemic was officially confirmed. Such sharp increase could be due to the COVID-19 (Boyle, et al., 2022).

Using data from one retail website in Taiwan, Chang and Meyerhoefer (2021) found that the pandemic had contributed to the substantial increase in food purchase through online channels. According to the survey in Pitts (2022), American shoppers in rural areas did grocery shopping during the COVID-19 significantly less than those in urban cities. The reason behind this finding could be those in rural areas have access to the grocery supply through many more channels than the online ones as compared to those living in the urban area. Tangmanee and Iam-Opas (2022) analyzed the panel data from two retail websites and confirmed that retail shoppers had significantly larger basket amounts in 2020 than those in 2019. However, they failed to address the number of purchased items in one visit session. Using interviews, Al-Hawari, et al. (2021) revealed that shoppers in Oman mainly shifted from the offline to the online channels for health-related reason. Changes in online purchasing behavior perhaps due to COVID-19 was also evident in Sayyida, et al. (2021, p. 2266). People whose income became limited abruptly because of the pandemic admitted that they had longer visit sessions in search of the products that suit their budget. Nonetheless, their purchase volumes per visit were less during the COVID-19 than during the period when it was not recognized (Sayyida, et al., 2021). In early 2022, Omicron (i.e., the recent mutation of COVID-19) had arrived. It caused the new wave of fatalities, despite many predictions in which it could be the final stage of the pandemic. The only effective preventive measures are to be vaccinated and to maintain social distancing from the others.

Electronic commerce scholars have remarked that the effects of COVID-19 on the transactions at online retail stores (Gu, et al, 2021; Boyle, et al., 2022; Nguyen, et al., 2021). Such remarks have been on the general purchase (Sayyida, et al., 2021; Alam, 2020) and on the specific purchase of the four items including groceries (Chang & Meyerhoefer, 2021; Macdonald, 2020; Gu, et al., 2021), sports items (Gu, et al., 2021), fashion and apparels (Nguyen, et al., 2021) and jewelry or watches (Nguyen, et al., 2021; Gu, Et al., 2021). For instance, it is speculated that more groceries were bought online during the COVID-19 than those before its time (Macdonald, 2020). For the luxurious items, the pandemic should not accelerate the sale since the other products such as medical supplies deserve higher purchasing priority.

Despite the past research, three research gaps were identified. First, the large portion of previous literature has addressed the impact of COVID-19 on online transactions using a survey approach. While valid, a questionnaire asking subjects to recall their online behavior appears problematic. This is because visitors may be unable to recall what they have done during the visit, or it is difficult to verify if their responses to the survey are genuine. A visit to pornography websites (Tangmanee, 2017) may be the example when visitors want to keep the visit detail to themselves. Second, a fair number of publications have used secondary data including the panel detail or the store transaction data (Boyle, et al., 2022). The only minor defect in using the panel data is that their main purposes were not to examine the effect of COVID-19 on online transactions. Finally, there is no specific work that directly inspects how visitors spend money during their visit sessions at retail websites or attempts to verify if there are the pandemic impacts on the basket amounts. As a result, our objectives are to compare two buying variables in 2019 when the world was free from COVID-19 to those in 2020 when it was officially confirmed. The two variables are the basket value (BV) in US dollars and the number of units purchased in one visit session (NU) at retail websites. These two buying variables are of our interest for two reasons. First, the basket value is of an online store's central concern. Yet, no seller wants to share the value publicly. We are fortunate to have it from a reliable source. Second, no study has examined the number of purchased units per visit. In this study, it is defined as the total number of all units a visitor purchased during his or her visit session. The unit can be varied depending on the product type or its packaging. A purchase of detergent may have a unit of a box or that of a pack while liquid soap could be a bottle or a gallon. In addition to the total comparison, we also performed similar comparison of the buying variables in four product categories: groceries; sport items; fashion and apparels; and jewelry and watch.

## RESEARCH METHODOLOGY

### Research Approach and Data Preparation

To gather the basket value (BV) which retail website visitors spent and the number of units purchased (NU) in one visit session, we obtained the session-level household panel data from the comScore service. It has been subscribed by Chulalongkorn Business School in Thailand. Managed by Wharton Business School at the University of Pennsylvania, the service obtained permission to record a member's visit behavior at many websites including online retail stores. We are particularly interested in two retail websites: Walmart.com and Bestbuy.com. We selected these two for their wide acceptance as they have been listed among the world's top ten retail websites (Ecommerce guide, 2022; Similarweb, 2022). We deliberately exclude Amazon.com, despite its dominance in online retailing, because it has already been examined heavily while Walmart.com or Bestbuy.com was overlooked.

We extracted the detail of the visits to the two websites only if the visitors had purchased at least one unit of any product during their visit sessions. As such, a unit of analysis is an actual transaction made during his or her visit. Our data collection covers all visits from January 1, 2019, to December 31, 2020. We treated the data in 2019 as the buying behavior before the pandemic was still unknown and those in 2020 as the buying behavior when the disease was officially confirmed. In each collected visit session, we recorded the product name, the product category, the number of purchased units (NU), and the basket value (BV), together with the comScore member's demographic details. Based on the collected demographics of the participating shoppers at Walmart and BestBuy in 2019 and 2020, they all reside in the US. The buying behavior thus reflects

those of the US residents. 43% of the participating shoppers are seniors over 60 years of age. 70% have the household size of three members or less. 6 in 10 have the annual income of at most US\$ 60,000 and 5 in 10 live in the south.

### Data Analysis

To detect the possible effect of COVID-19 on BV and NU, we used the independent t-test to compare these two variables between those in 2019 and in 2020. The comparisons were on the total purchase and the purchases of the four product categories.

## RESULTS

The two-year data extraction from Walmart and BestBuy yielded the large dataset of 89,157 online transactions. Since we are interested in the purchases of the four product categories, we selected them using the comScore's product categories scheme. It resulted in the dataset of 69,397 records for the subsequent analyses. Based on Table 1, the online transactions in 2020 when COVID-19 was confirmed appeared more frequent than those in 2019 when the disease was not known yet. Also, as expected, the sessions at Walmart were larger than those at BestBuy. Table 2 reports the frequency of all 69,397 records classified by the years, the product categories and the retail websites. The data still fall in the same direction as those in Table 1.

Table 1: Frequency distribution of key variables (n=69,397)

Variables	Value	Counts (%)
Product categories	Groceries	43,593 (62.8)
	Sports items	3,856 (5.6)
	Fashion and apparel	20,206 (29.1)
	Jewelry and watches	1,742 (2.5)
Year	2019	17,348 (25.0)
	2020	52,049 (75.0)
Retail websites	Walmart.com	48,988 (70.6)
	Bestbuy.com	20,409 (28.4)

Table 2: Frequency of transactions classified by the product categories, the retail websites and the years.

Product Categories	Retail websites				Total
	Walmart		BestBuy		
	2019	2020	2019	2020	
Groceries	7,408	23,819	2,680	9,686	43,593
(row %)	(17.0)	(54.6)	(6.1)	(22.2)	(100)
(column %)	(58.2)	(65.7)	(58.1)	(61.3)	(62.8)
Sports items	1,088	2,687	25	56	3,856
(row %)	(28.2)	(69.7)	(0.6)	(1.5)	(100)
(column %)	(8.5)	(7.4)	(0.5)	(0.4)	(5.6)
Fashion	3,981	8,941	1,761	5,518	20,206
(row %)	(19.7)	(44.3)	(8.7)	(27.4)	(100)
(column %)	(31.3)	(24.7)	(38.2)	(34.9)	(29.1)
Jewelry	262	797	143	540	1,742
(row %)	(15.0)	(45.8)	(8.2)	(31.0)	(100)
(column %)	(2.1)	(12.2)	(3.1)	(3.4)	(2.5)
Total	12,739	36,249	4,609	15,800	69,397
(row %)	(18.3)	(52.2)	(6.6)	(22.8)	(100)
(column %)	(100)	(100)	(100)	(100)	(100)

Reported in Table 3 are descriptive statistics of BV and NU, classified by the four product categories. During 2019 and 2020, shoppers at Walmart and BestBuy spent 89.51 US\$ to purchase 1.35 units per visit session in average. Among the four product categories, they paid the highest amount of 149.15 US\$ for sports items with the average number of 1.43 units per visit. The other three categories were bought at the comparable amounts of BV. Considering NU, the average number of the units purchased are in between 1.6 to 1.54 units per visit. This is regardless of what the products are. Also in Table 3, the absolute values of the skewness and the kurtosis statistics are all greater than one. They signify that both BV and NU are not normally distributed. We thus used the natural logarithm function to transform them, after which their distributions appear normal, and a parametric test can be used for the comparisons.

To detect the possible effect of COVID-19 on BV and NU, we used the independent t-test to compare those in 2019 and in 2020 and the outcomes are in Table 4. In total, the BV in 2020 was significantly higher than that in 2019 ( $p = .000$ ). A look at the four product categories shows that (1) the BV of the groceries and that of the fashion categories in 2020 are significantly higher than those in 2019 ( $p$ -values = .000) but those of the sports items ( $p$ -values = .189) and those of the jewelry ( $p$ -values = .168) in 2019 and in 2020 are about the same.

Table 3: Descriptive statistics of the basket value (BV) and the number of purchased units (NU) per visit session

Product categories	Average	Standard deviation	Skewness	Kurtosis
Groceries (n=43,593)				
BV	83.68	137.816	15.575	385.374
NU	1.43	1.715	27.036	1,378.101
Sports items (n=3,856)				
BV	149.15	427.196	17.642	440.828
NU	1.54	5.673	22.106	575.221
Fashion and apparels (n=20,206)				
BV	90.66	142.724	18.496	582.143
NU	1.16	0.886	43.879	3,806.081
Jewelry and watches (n=1,742)				
BV	90.01	108.587	3.367	15.059
NU	1.18	0.813	8.398	87.741
Total (n=69,397)				
BV	89.51	168.863	24.793	1,222.679
NU	1.35	1.975	41.580	2,733.865

In Table 5, we performed the similar tests but on NU. In total, the number in 2020 is significantly larger than that in 2019 ( $p$ -value = .000). Considering the four categories, only the NU of the fashion group in 2020 is significantly larger than that in 2019 ( $p$ -value = .000). The comparisons on the other three groups show no significant findings.

Table 4: Comparison of means of the basket value (BV: US\$) between 2019 and 2020

Product categories	Means in 2019	Means in 2020	Testing statistics (df)	P-value (One-tailed)
Groceries	82.76	83.96	-3.987 (15,806.15)	.000
Sports items	124.38	159.20	-0.881 (3854)	.189
Fashion and apparels	83.39	93.55	-4.144 (11,236.82)	.000
Jewelry and watches	88.87	90.36	-0.961 (629.57)	.168
Total	85.78	90.75	-4.822 (29,309.41)	.000

Table 5: Comparison of means of the number of purchased units per visit (NU: items) between 2019 and 2020

Product categories	Means in 2019	Means in 2020	Testing statistics (df)	P-value (One-tailed)
Groceries	1.45	1.43	-0.361 (43591)	.360
Sports items	1.42	1.58	-0.813 (3854)	.208
Fashion and apparels	1.13	1.17	-3.587 (11,764.6)	.000
Jewelry and watches	1.21	1.17	0.590 (1740)	.277
Total	1.34	1.36	-3.809 (30,746.76)	.000

### CONCLUSION AND DISCUSSIONS

Using the panel data from comScore, we gathered 69,397 actual transactions at Walmart.com and Bestbuy.com during the two years of 2019 and 2020. 25% of the collected transactions were from 2019 when the world was unaware of COVID-19 and the rest were from 2020 when the pandemic was officially confirmed. The relatively high number in 2020 is likely to result from the pandemic during which folks around the world were instructed to work from home or to minimize a physical contact with the others. Given the business volume of Walmart and BestBuy, it can be expected that 71% of the collected transactions were from the former and the rest from the latter. The demographics (e.g., age groups, annual income, or household sizes) greatly tap the profiles of the American online retail shoppers (Similarweb, 2022).

The basket value per transaction observed in the current research is approximately 89.51 US\$. Tangmanee and Jongtavornvitaya (2022) reported the basket value of 77.86 US\$ per session at Amazon.com. While Amazon's basket value was slightly less than our findings, it is possible since the sessions in Tangmanee and Jongtavornvitaya (2022) included those sessions with transactions and those without the transactions. Nonetheless, we offer no discussion regarding the number of units for which shoppers had made a purchase during their visits. This is because there is no published work in the past that reported this buying variable. We further encourage scholars to include it in their studies.

The comparisons of whether the total of BV and NU in 2019 were less than those in 2020 confirmed the significant findings. In other words, once the pandemic was recognized, BV and NU were significantly increased (see Tables 4 and 5 for details). This could be an empirical validation of the COVID-19 effect on online retailing. Our findings are also in line with previous work (Nguyen, et al., 2021; Al-Hawari, et al., 2021; Boyle, et al., 2022).

When the similar comparisons were performed on the four product categories, the findings added new exciting facets. First, the pandemic may force individuals to do more of grocery shopping online. This is because the grocery purchase's BV in 2020 was significantly higher than that in 2019. This is an empirical addition to previous work which discovered the increase in online grocery shopping possibly because of the pandemic (Nguyen, et al., 2021; Chang & Meyerhoefer, 2021). Nevertheless, NU of the grocery shopping was not significant between these two years. It may have to do with a variety of how the units of grocery shopping are measured. It could be a bag of fruit, a carton of milk or one kilogram of meat. Yet, this is our speculation awaiting additional empirical work.

Second, the two buying behaviors of online fashion shopping in this study has validated the effect of COVID-19 on online purchasing behavior. That is, BV and NU in this category in 2019 is significantly less than those in 2020. These findings lie in the same direction as the comparison outcomes when all four product categories are combined. Initially, we expected the insignificant findings because people must stay home for the pandemic. They should not be in need of shopping for new clothing. However, our comparisons validated that people did more online shopping for fashion and accessories when the pandemic were officially recognized than when the world was free from it. Our conjecture would be people may consider online shopping of this category as a recreation from staying home all the time. Nonetheless, we need more empirical work to verify it.

Third, the comparisons of BV and NU in 2019 for online retail shopping of sports items and those in 2020 were not significant. Based on Gu, et al., 2021, sports products should be in great need during the lockdown. This is because individuals are unable to visit a gym or a park for routine workout. Hence, they have to purchase sports items of their choices to have a session at home. However, the data in our study fail to verify Gu, et al. (2021)'s claim. We suspect that shoppers who participated in our research may not have an active workout lifestyle. As such, they have no problem staying (or working from) home without the workout or they might be able to figure out how to do the workout at home without the need to purchase extra sports items.

Finally, the comparison outcomes of BV and NU in 2019 for online shopping of jewelry and watches and those in 2021 were trivial. Previous research (Nguyen, et al., 2021; Gu, et al., 2021) has remarked that many firms have cut-off their staff's salary in order to survive the difficult time of COVID-19. The staff may suddenly be on limited budget and must subsequently watch out their expenses carefully. Such luxurious items like jewelry or watches may receive less attention during the pandemic than before its time. Still, the data in this research fail to verify this statement, possibly, because BV and NU of such shopping in 2019 and in 2020 are about the same. Our discussion on the insignificant finding may be due to the fact that general shoppers at Walmart or BestBuy may not be the targets of such luxurious items as jewelry or watches (Pitts, 2022). Our guess is based on the small proportion (2.5%) of jewelry shopping in our dataset (see Table 1 for details).

Our findings have both theoretical and practical contributions. Theoretically, they provide validation for which COVID-19 appears to have impact on online retail, especially the basket value of the grocery and the fashion shopping. A look at all four product categories, the significant differences of the basket value and the purchased units between those in 2019 when COVID-19 was still unknown and those in 2020 when it was officially confirmed could be the other validation. However, the effect of the pandemic on the online retail of the sports items or the jewelry products need additional evidence since our findings are unable to validate it. This is in the opposite of the remark made by a few online retail scholars (Nguyen, et al., 2021; Sayyida, et al., 2021). The second theoretical contribution is that our analytic outcomes can confirm the moderation of product categories on the correlation between the pandemic effect and the online retail behavior. In other words, researchers must observe the distinctive effects of COVID-19 on various types of online retail products. For instance, people must acquire a large volume of medical supplies after the disease was recognized. Yet, this statement still needs empirical validation.

Our findings offer two practical contributions. First, online retailers should feature the product categories, of which the sale volume has been significantly increased because of COVID-19. Grocery online merchants, for example, must ensure their online stores' proper functionality to accommodate large groups of shoppers during a lockdown. Second, online retailers of sports items may be on alert since the lockdown may not drive people to do more shopping on this workout equipment. However, we contemplate that the target of these sports items may not have their transactions at Walmart or BestBuy. Practitioners have to accurately recognize their target groups.

Our research does have limitation for its own scope. Our analytic outcomes and discussions are based on the online transactions of the four product categories at Walmart and BestBuy during 2019 and 2020. Although valid, they do not allow us to offer insights beyond this scope. Hence, fellow researchers are welcome to do similar projects on different settings.

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