TO BROWSE OR TO PURCHASE? WHICH DEVICE IS THE ANSWER?

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ABSTRACT

The purpose of this research is to answer the questions "Which device is predominant for online browsing and online purchasing?" and "What do these device preferences mean to businesses?" Online shopping is ubiquitous. Mobile devices such as tablets and smartphones can provide the services needed to users as equivalently as desktop computers. In this research, we conducted a survey study. Once we collected the data, we analyzed and investigated the common habits of online browsing and shopping. Specifically, we focused on which devices are predominantly used for browsing and purchasing items online in certain age groups. We believe the findings of this research help inform organizations about consumers' technology usage habits and needs.

Keywords: online shopping, devices, browsing, purchasing, e-commerce

INTRODUCTION

Technology has become an integral part of our daily routine and impacts every aspect of our lives. "People now expect connectivity wherever they are and on whatever device they choose — this is the new norm." (Spero, 2014) The use of technology among people for general communication and information gathering or sharing has grown exponentially in recent decades. However, technology has grown in use beyond that concept and this is most evident in how important a tool it has become in the world of commerce. The desktop computer is capable of accessing the internet and was prevalently used in the early age of digital technology. Information was accessed through websites and a boost of communication rose via internet. Subsequently, portable smartphones and tablets were released from companies like *Apple* and *Samsung* that unraveled new potential in the types of functions we can utilize through the internet. Applications were created for entertainment and business related activities that even inexperienced users were capable of operating with these devices. With a large variety of applications available in different devices, we have reached a point where online shopping has become an important part of technological development and the norms in our society.

The great influence of evolving technology on people has affected the performance and habits in our daily lives. It has changed the method in which humans have communicated and thrived throughout generations. The importance and usage of technology has also increased and has formed a dependence to it in our everyday routine. The speed of computers has helped to revolutionize our online experience from socializing convenience, ease of navigation and accessibility to information. Online shopping has established itself to be a growing trend, as there is a clear correlation between the increasing use of technology (especially among information and communication-based platforms), and society's implementation of it as an important tool to reach people through those platforms. We have seen increasing retail advertisements on social media like Facebook, Twitter, and many other websites.

For this research, we incorporated three main ideas: device preference for online browsing, device preference for online purchasing, and reasons for device preferences. These main ideas were the basis of the questions posed in our survey instrument for data collection and analysis about online shopping as they pertain to shopping habits and use of technology.

LITERATURE REVIEW

"The Internet has changed the role that technology plays in fashion retail" (Blázquez, 2014) and general commerce. Consumer shopping habits are changing, and people are increasingly turning to different types of electronic devices to meet their shopping needs. Previous studies have shown that mobile use for browsing and purchasing has become an increasing trend for consumers. While it appears that laptops and desktops are still in the lead, it may not remain there. Whether it be in a developing country such as Thailand, where mobile technology is still fairly new and the laptops are considered the norm (Assarut & Eiamkanchanalai, 2015); or in a developed country such as the United States, where laptop use was at a 67% and barely won over mobile use which was at a 66% (Tesseras, 2015), the mobile device is quickly gaining in popularity.

Digital commerce has slowly carved a niche for itself in the global market. There are two distinct parts: electronic commerce (also called e-commerce) and mobile commerce (also called m-commerce). In the United States, the preliminary estimated amount of e-commerce was $119,021,000,000 for the fourth quarter 2017 alone, which accounted for 9.1% of total retail sales in that period (U.S. Department of Commerce, 2018). The portion of e-commerce is growing steadily from year to year. We found three major studies in regards to m-commerce specifically. Mobile commerce was found to offer better "mobility, reachability, and the shopping value" (Dennis et al., 2017) in comparison to a desktop computer for individuals with a disability. Mobile commerce also made up one third of online purchasing during the holidays in 2015 and currently 62% of mobile users used their phone for purchasing in the last 6 months (Smith, 2018). However, serious commerce is not considered to be associated with a mobile device. It is seen as a convenience device whereas a laptop device is perceived to allow more time and more interface surface to interact with (Ozok & Wei, 2010).

One study found some interesting statistics on Americans and their online habits. "Some 15% of Americans say that they make purchases online on a weekly basis (4% do so several times a week, while 10% do so about once a week) and 28% shop online a few times a month. On the other hand, nearly six-in-ten Americans say they buy online less often than a few times a month (37%) or they never make any online purchases (20%)" (Smith & Anderson, 2016). It also found that a key driver for online purchasing was for pricing but two thirds of Americans still preferred shopping in-store, so they could ask questions and physically compare the products. For age group comparison, it found that "some 90% of 18- to 29-year-olds ever buy items online, while 77% have purchased something using their cellphones…By contrast, a majority (59%) of those 65 and older ever generally make online purchases–but only 17% have bought something using their cellphones".

Studies also help identify the need for businesses to improve and innovate their e-commerce. Consumers have a "multichannel behavior" where they use a combination of e-commerce and brick-and-mortar commerce (Blázquez, 2014) and 80% will even browse online for reviews, price comparison, or alternative store locations while in the store (Smith, 2018). It is important for businesses to adapt to the consumer device flexibility (Spero, 2014) as well as keep up and improve on the growing concern for online purchasing security (Hosea, 2014). To do this, desktop browsers will be the key to providing, testing, and supporting websites and will also therefore remain a major tool of businesses (Preimesberger, 2017).

One issue we encountered during our research was finding empirical data on different types of devices and the frequency or preference of usage by a person for that device. While there were numerous studies on e-commerce and m-commerce for desktops and mobile phones, we were unable to find direct comparisons for usage between mobile, tablet, and desktop/laptop devices in terms of why one was preferred over the other. We hope that our survey research will fill that void and provide more concrete data analysis for the type of device that is predominant in both browsing and purchasing merchandise, and the reasons for the preferences. This information would be valuable for businesses as online shopping trends continue to rise.

METHODOLOGY

This study stems from a need to examine the shopping habits of consumers in relation to device preference; more specifically which type and how much are consumers utilizing preferred devices for browsing and purchasing for online shopping.

In our study, we developed a survey to identify the shopping habits of the subjects. The survey questions consist of two parts. The first part contains the demographic questions related to the subject: gender, age, education, and region of residence. The survey does not have any specified targeted subjects which means all ages, genders, races, ethnicity, and locations are qualified to take the survey for this research. The first question of the second part divides the participants into two sampling units: online shoppers or non-online shoppers. The survey implements answer logic to direct the participants to the appropriate questions. If the subject selects "I don't shop online", the logic directs the subject to the question asking the reason/s of not making purchases online. The participant can choose multiple options and the option of "Other" provides subjects with a space to explain their reasoning.

After subjects answer how often they shop online, the questions then began to determine device usage for browsing and purchasing online. The responses for some questions are in an interval scale from zero to a hundred percent with an interval of 10 for bottom and top ten percent and with intervals of 20 between 10 percent and 90 percent. Responses for questions about security, speed, and user friendliness ask subjects to specify which device they utilize for each topic. We also give the subjects the opportunity to explain why they utilize the preferred device for online shopping habits. A copy of the survey instrument is attached in Appendix A.

We utilized a variety of mechanisms to gather data. We created the survey using Qualtrics, a third-party software and database surveying tool. The survey was sent out to a contact email list of all students enrolled in a mid-western university in the Spring 2018 semester, as well as all faculty, and staff employed by that university. The survey was also posted on popular social media platforms: Facebook, Twitter, and Reddit. Personal accounts were used to share the survey to friends and acquaintances. Some respondents were also personally approached and asked to voluntarily participate in the survey. The survey instrument was reviewed and approved by the University IRB (Institutional Review Board).

The data retrieval and analysis process began soon after we distributed the survey. Each survey answer, except comment answers, was giving a numerical value. Those values were then exported into an Excel spreadsheet with specific variable names for each column. We then utilized SPSS software to analysis the data. Basic statistics such as frequencies were the first values that we examined. The next step of our data analysis utilized T-Tests so that we could find significant differences within our survey answers among certain genders and age groups of respondents.

RESULTS

Table 1 displays that the majority of our sample was comprised of 61.9% female respondents, 37.0% male respondents and 1.1% for "Other" gender. The largest age range was 18-21 at 44.7%, and the smallest being 45-49 age range at 1.4%. North America was chosen by the majority of respondents with a percentage of 93.4%. Since most of the sampling group is from Midwestern Universities the percentage of respondents that answered "Some College" was 47% with "Certificate" being our lowest percentage at 3.2%.

Table 1. Research Participant's Demographic Data

		Frequency	Percent			Frequency	Percent
Gender	Male	129	37.0	**Residence**	Asia	17	4.9
	Female	216	61.9		Africa	1	0.3
	Other	4	1.1		North America	326	93.4
Age	Under 18	6	1.7		South America	1	0.3
	18-21	156	44.7		Antarctica	1	0.3
	22-24	58	16.6		Europe	0	0.0
	25-29	34	9.7		Australia	3	0.9
	30-34	16	4.6	**Education**	High School	32	9.2
	35-39	24	6.9		Some College	163	47.0
	40-44	17	4.9		Certificate	11	3.2
	45-49	5	1.4		Associate's Deg.	37	10.7
	50+	33	9.5		Bachelor's Deg.	62	17.9
					Graduate Deg.	42	12.1

Table 2 shows that the most significant results from our survey showed that respondents used their Desktop/Laptop for security 71.2% of the time while browsing, and 74.5% of the time for purchasing. Respondents only utilized their tablet for security 3.9% of the time for browsing, and 3.7% of the time for purchasing. The only area that the respondents did prefer their phone over their Desktop/Laptop was speed when browsing. Tablets came in last place in all areas of use with its highest percentage at 4.6% when used for navigation purposes in the category of purchasing merchandise online.

Table 2. Research Participant's Frequency of Browsing and Purchasing Data

		Frequency	Percent			Frequency	Percent
How frequent do you shop online?	Daily	2	0.6	Browsing Options Device	Phone	51	15.5
	Once a Week	90	25.8		Tablet	13	3.9
	Once a Month	152	43.6		Desktop/Laptop	266	80.6
	Once Every 3 Months	74	21.2	Browsing Speed Device	Phone	182	55.0
	Once a Year	19	5.4		Tablet	12	3.6
	Never	12	3.4		Desktop/Laptop	137	41.4
Secure Browsing Device	Phone	82	24.8	Secure Purchasing Device	Phone	71	21.8
	Tablet	13	3.9		Tablet	12	3.7
	Desktop/Laptop	235	71.2		Desktop/Laptop	242	74.5
Browsing Navigation Device	Phone	118	35.5	Purchasing Navigation Device	Phone	90	27.7
	Tablet	18	5.4		Tablet	15	4.6
	Desktop/Laptop	196	59.0		Desktop/Laptop	220	67.7

Table 3 shows that there is a significant difference between percentage of time spent browsing and percentage of time purchasing using phone and desktop/laptop (p-value < 0.001). People tend to use phone to browse (mean = 4.59) but not as much to purchase (mean = 3.93). For purchasing, people mainly use desktop or laptop (mean = 4.70). When we divide the respondents based on age (> 30 vs. >= 30), we found respondents 30 or older tend to use tablets more for browsing and purchasing than respondents under 30. See results in Table 4.

Table 3. T-Test on Browsing and Purchasing (all data)

	Browsing Time	Purchasing Time			
	Mean (std.error)	Mean (std.error)	Mean Difference	t-value	p-value
Phone	4.59 (.095)	3.93 (.118)	0.666	8.07	<0.001
Tablet	1.83 (.098)	1.78 (.10)	0.055	1.12	0.26
Desktop/Laptop	4.09 (.098)	4.70 (.112)	-0.611	-8.25	<0.001

Table 4. T-Test on Browsing and Purchasing (age < 30 vs age >= 30)

	Browsing				Purchasing			
	Mean (std error)		t-value	p-value	Mean (std.error)		t-value	p-value
	Age < 30	Age >= 30			Age < 30	Age >= 30		
Phone	4.56 (.10)	4.33 (.20)	1.07	0.28	3.86 (.13)	4.13 (.25)	-0.96	0.34
Tablet	1.58 (.10)	2.63 (.22)	-5.04	<0.001	1.52 (.09)	2.46 (.46)	-4.39	<0.001
Desktop/Laptop	4.11 (.11)	3.82 (.20)	1.30	0.19	4.77 (.12)	4.39 (.24)	1.45	0.15

Our survey also implemented a comment section at the end that allowed participants to state whether they had a device preference and to specify the reason why. It also allowed participants that do not shop online to voice their opinion on why they prefer not to shop online.

Table 5 provides a breakdown of the comments and gives numerical data for the type of device participants stated they preferred. Desktop/Laptop had the highest count with 158 participants stating it was their device of choice, while phone had 91, and tablet had 11. Participants that indicated they did not shop online also had the opportunity here to discuss why they used the device(s) that they do.

Table 5. Research Participant's Device Choice in Comments Section

Phone	Tablet	Desktop/Laptop	No Purchase	No Comment
91	11	158	1	36

Table 6. Research Participant's Reason why they chose the device

	Phone	Tablet	Desktop/Laptop	Total
Convenience	55	2	19	76
Speed	10	6	7	23
Accessibility	20	-	17	37
Navigation	2	1	47	50
Screen Size	1	-	22	23
Security	-	4	34	38

Table 6 lists the top 6 reasons provided by participants for their device preferences, which are: Convenience, Speed, Accessibility, Navigation, Screen Size, and Security. When looking into why participants preferred the devices that they do, some factors overlapped but, for the majority of responses, each device had its own strengths. The table shows that convenience had the highest count for reason why they use a certain device. "I've been using a desktop for majority of my life and I'm much more comfortable on it vs using a phone for browsing," was said by an anonymous participant who chose desktop as their most convenient device. Another eye-catching comment from a different participant is, "the phone is always with me and I'm hardly on my PC/laptop". This sentiment of a phone

being convenient and accessible because it's always with them is strongly resonated by many participants in the comments section. Mobile phones have evolved rapidly over the past years, and so has the different types of usage it provides. The phone has become a multi-purpose device since it can be used as a camera, web browser, and a calling device. It has now evolved into a small, portable computer that we can take everywhere. Our data tells us that convenience is a big factor to a person's preference of device and that it crosses all demographics such as age, location, and education.

Navigation had the second highest mentions with 50 counts. Out of those 50 participants that said navigation was important, 47 chose the desktop/laptop as their preferred device. Comments like "it is easier to scroll on my laptop and have multiple screens open to compare prices and brands" was a popular theme for those that specified navigation. Participants felt that it was easier to navigate due to the bigger screen and provided an overall better shopping experience because of its capabilities to apply discounts, find order errors, switch between tabs, scroll on the page, and use a mouse. Their past order history is also more easily accessed and will, therefore, suggest related products for them.

Lastly, we had Security being a major factor in device preference and it played a big role towards the total count for desktop/laptop. One respondent said "Laptop, I make all purchases on my laptop at home where i have a secure wifi connection." Analyzing the comments, we can determine that 34 participants expressed a feeling of better security in shopping on their desktop/laptop device. One response states "I feel safer on buying online with a laptop" while another says "Laptop because I feel it is more secure and won't accidentally charge me for anything that I'm not supposed to be charged for." Security was definitely a factor in the preference of desktop/laptop.

A common reason why certain participants shopped online was simply because they did not have to travel to the store. In comparison, participants who do not shop online provided the following reasons why: because they did not want to; someone else in their family already did the online shopping; and that they were trying to limit their chances of catching a virus or have their information stolen from hackers.

Tablet users did not discuss much about why they used this device other than how it provided a faster and more secure browsing experience for them and was a convenient device.

DISCUSSION

Our survey had two key components. The first component was to ask the questions "Which device is predominant for online browsing purposes and which device is predominant for online purchasing purposes?" Within those questions, we also wanted to determine some factors as to why the research participant preferred that device. The second component was to identify the implications of this data for the corporate world and answer the question "What do these device preferences mean to businesses?" To evaluate this, we analyzed some commerce elements such as shopping frequency and percentage of certain merchandise purchased online.

For questions regarding device popularity, we found that desktop/laptop was used predominantly; however, the reasons varied for this choice of device. In the instance of browsing, participants stated that navigation and screen size allowed them to view items better using a desktop/laptop. When it came to purchase, security seemed to be the dominant reason why they preferred desktop/laptop. This shows that businesses have to focus on navigation and security in order to improve customer experience across different platforms. These findings resonate what we discovered during our literature review. The cross-platform sentiment is best described in a 2014 article in The Harvard Review by Jason Spero, which states that:

> Companies need to reevaluate their business metrics in terms of today's consumer behavior and keep consistently learning how their customers get to a sale. Measurement tools need to be ready for a customer that will search for their products and services at a moment's notice, and then jump from screen to screen, web to app, online to store as they move toward a purchase. Just as

technology has enabled new consumer behavior, it is also needed to help businesses operate effectively. (Spero, 2014)

Our survey was also interested in the frequency of online purchases. The most common response was "about once a month". Businesses have the opportunity to maximize on that by running monthly promotions for e-commerce, or by enticing consumers to purchase items more frequently by adapting different marketing strategies. Many corporations are already embracing e-commerce and are battling to stay ahead of the trend. Options like free delivery, or free in-store pickup by large companies like *Walmart*, *Best Buy*, etc., has helped them increase e-commerce and compete with exclusively online retailers like *Amazon*. These companies are also capitalizing on the online shopping trend by offering incentives like a 10% off discount to customers for online purchases.

Another important implication for businesses is the need to capitalize on m-commerce. This is a relatively new and emerging market which has the capacity to grow exponentially over the next few years. Our survey results show that a large portion of participants reported the mobile device was preferred more in relation to convenience for both browsing and purchasing. The mobile phone was preferred due to speed and convenience, mainly because they could use it on the go and always had the device with them. Businesses could optimize mobile commerce for those impulse purchases with better navigation and security.

Since consumers were shown to be utilizing tablets but not as frequently as the other two devices, this provides an immense opportunity for companies to focus and expand on. There is a whole segment of consumers not fully being reached like they are in mobile phone and desktop segments. Tablets offer the ideal combination that our survey participants have listed as their desired preference for devices: it has the larger screen that consumers are seeking to optimize navigation and view items, along with the flexibility of being more portable. If companies were able to enhance the navigation platform for tablets, then total online sales have the potential to grow at a more rapid rate.

CONCLUSION

This research provided us a better understanding of a person's choice of electronic devices in online browsing and purchasing. Prior research reveals that technology has changed consumer habits and made online shopping easier in terms of navigation and information gathering. In our research, we created a survey to help us answer two questions: "Which device is predominant for online browsing and online purchasing?" and "What do these device preferences mean to businesses?"

Our survey results show six factors greatly influence a subject's choice of device. The six factors are: convenience, speed, accessibility, navigation, screen size, and security. We found among the six factors convenience was the biggest factor affecting a person's choice of devices. Desktop/laptop was predominantly used for purchasing as well as browsing. These results applied to all demographics such as age, location, and education.

We believe findings on the device preferences help businesses understand the importance of improving shopping experience on all platforms. Businesses should focus on improving customers' mobile and tablet experience. Businesses can be more cost-effective on their monthly marketing promotions since m-commerce sales are increasing in not just popularity but also for their overall sales.

LIMITATIONS AND FUTURE RESEARCH

The major limitation for our survey was that responses were primarily from students, faculty and staff from a Midwestern University. This accounted for the data being predominantly from 18 to 21-year-olds and the residence being North America. This leads to a population sample that has shared ideologies and similar habits in terms of online shopping. For instance, we saw a higher percentage for purchases in the category of books, because that is a necessary item for students. We would probably have different shopping trends if our sample population included more participants that were over the age of 30, as they are more likely to have steady jobs and more disposable

income. This would change the type of goods they purchase and possibly the frequency of purchases. Also, more responses from a global audience, for example, Asia, may change the predominant device used, as data shows that phones are more popular in that region compared to desktop/laptop.

The term "shopping" also needs to be defined more clearly at the start of the survey because people may be purchasing or browsing for goods that they don't consider as "shopping". For example, a person may order a pizza using his/her phone or laptop, but not consider that as "shopping". Any online purchase falls into the e-commerce transaction category and participants need to be aware of that. Same with monthly online subscriptions like Netflix. Including these types of goods may change the number of online purchases or browsing activity people have reported.

For future research, we would recommend having a larger, more diverse sample population and more precise wording of the survey questions that define the terms shopping, browsing, and purchasing. Having a more diverse sample would also allow us to have more variation in age, economic standings, and residence/location in order to reflect the global trend of buying and purchasing habits among different device platforms. Our survey also relied heavily on responses from digital sources, thereby limiting people who would have responded through traditional paper surveys.

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APPENDIX A – SURVEY INSTRUMENT

[Demographics]
Gender – Male, Female, Other
Age - Under 18, 18-21, 22-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50+
Education - High School, Some College, Certificate, Associate's Degree, Bachelor's Degree, Graduate Degree
Continent - Asia, Africa, North America, South America, Antarctica, Europe, Australia

Scales: Daily, About once a week, About once a month, About once every 3 months, Once a year, I don't shop online
Q1. Which of the following most accurately describes how often you PURCHASE online?
Scales: 0%, 10%, 30%, 50%, 70%, 90%, 100%
Following items: Groceries, Clothing, Jewelry, Electronics, Books, Toys, Household Essentials, Other
Q2. What merchandise do you typically PURCHASE online?

Percentage on which device: Phone, Tablet, Desktop/Laptop
Q4. What device do you use to BROWSE for online shopping?
Q5. What device do you use to PURCHASE for online shopping?

The choices are: Phone, Tablet, Desktop/Laptop
Q6.
I believe it is more secure browsing online on my _____.
My _____ provides the easiest way to navigate online browsing.
I believe that using my _____ gives me more options for browsing.
I use my _____ for online browsing because it is the fastest.
Q7.
I believe it is more secure making purchases online on my _____.
My _____ provides the easiest way to navigate online purchasing.
I believe that using my _____ gives me more options for purchasing.
I use my _____ for online purchasing because it is the fastest.