IMPROVING E-COMMERCE WEBSITES WITH ALGORITHMS AND CIBER SECURITY APPROACHES

SOCIAL IMPACT OF DEVELOPING E-COMMERCE (THE END OF THE SHOPPING MALL ERA)

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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With the recent pandemic, people understood how the internet plays an important role in shopping and had to lean more toward online shopping. This situation helped e-commerce companies observe their deficiencies and fix them, so they started investing more to increase their profit by using this opportunity. The Article “The Impact of the COVID-19 Pandemic on Amazon's Business” revealed that Amazon has increased its order capacity by over 60 percent due to COVID-19 until April 12, 2020. More than 175,000 people have been hired by Amazon from March 16 to April 12 to meet the increasing demand. As a result of this sharp investment, Amazon hit net sales of 75.5 billion in the first quarter of 2020 (Isik, 2021, p.3). As this example shows, online shopping has been growing so fast and the belief is that one-day e-commerce will dominate physical shopping. According to David Marshall’s research in the article “Is online shopping killing the retail stores?” online purchases are growing three times faster than in-store purchases, leading many to believe that the internet will take over (Marshal, 2019, p. 1). Even if this situation is undeniable, it will not happen soon because the internet still has so many defects that companies work on.

Some people already think online shopping is easier compared to physical one, for some, it is vice versa. There are still a lot of safety and usability issues with e-commerce websites. People think that checkout in online shopping is complicated, particularly returning an item, and they do not want to share their credit card information on every website for safety reasons, etc. These statements are not wrong, plus users want to try the product on to see if it fits and if the product is high quality, and they do not want to wait for a long delivery time. If e-commerce websites still have disadvantages, which factors can be minimized by high-quality software and cyber security tools to improve them, and what would be the outcomes on social aspects?

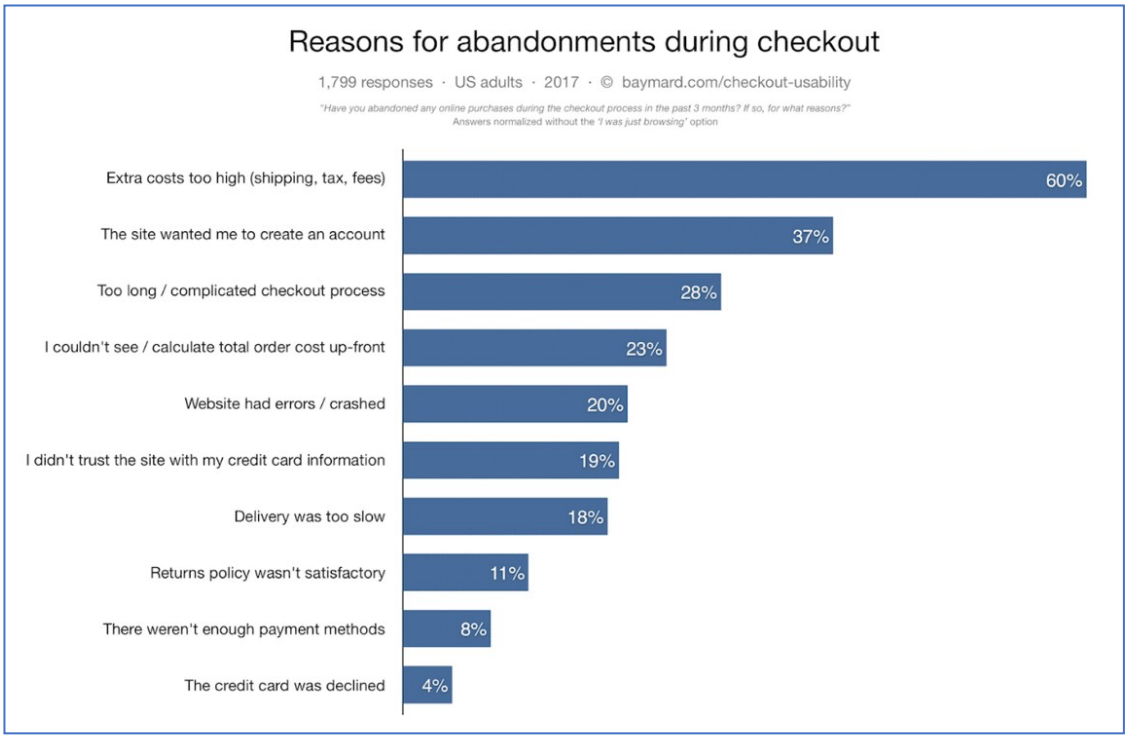

Figure 1: Survey results for shopping cart abandonment in 2017. This figure illustrates the main factors why people do not prefer online shopping. (Created by Osman, 2022).

Figure 1 shows the software and security portion of why people do not precede to check out online shopping. It reveals that safety and usability factors have big impacts right after extra high costs (shopping, tax, fees). These are all related to the designed software of e-commerce websites which can be fixed with better algorithms and website designs. Computer science engineers play a big role here to make the e-commerce environment more useful for the users.

First, the safety of using online e-commerce websites still causes controversy because of their crypto problems. Whenever clients use their credit cards, they might feel unsecured about the information shared on online platforms. They do not feel comfortable since their information is always stored on the websites by cookies and other web-tracking systems (Xie, 2022, p.7). Cookies, flash cookies, and beacons, which are Web-tracking and information-gathering

technologies, enable personal information to easily be obtained from web users, with or without their knowledge. Hein's article about cookies' usage in the US shows the privacy issues that tracking technologies cause. Unfortunately, more than 55% of users accept sharing personal data via cookies without making sure of their safety (Hein, 2021, p.1). Sometimes cookies get even activated automatically without the user's intention when they click the website.

Researchers at Villanova University indicate the concern of internet users caused by the tracking systems. They show that the number of cookies stored is limited to a total of 300 and once the total limit is reached, the oldest cookies are automatically cleaned to allow new cookies to be stored. However, 75% of flash cookies might be stored in the user's hard drive permanently after they expire which can take up to 12 months supporting many users' concerns about their privacy (Sipior, Ward & Mendoza, 2011, p. 10). When HTTP cookies are limited to 4 KB to be stored, this can increase up to 400 KB for flash cookies which is enough capacity to obtain people's private information. Session cookies do not even get expired if the website is not closed and some unprotected session cookies can be used by a malicious attacker to obtain unauthorized access to web sessions and accounts. This attack is called as cookie hijacking. Some marketers with bad intentions will have chance to capture a lot of customer data thanks to web-tracking systems and can share this stored data to unsafe illegal third-party websites like social media, marketplaces, etc.

Engineer Chris Palmer Reveals how newly designed programs should have the feature to avoid cookies' safety issues with browser extensions to maintain secure session management. Before starting shopping, the browser extension will be turned on and the program will check the

malfunctioning cookies and reject them automatically, and it'll delete the cookies that have not been used for more than 2 or 3 days depending on the user's preference. If the session cookie is not reliable, then the program will warn people before revisiting that website. Since the program only deletes the unsafety and usable cookies, it will not affect the user's shopping experience, and the shopper will not see undesired advertisements if he's not interested, so the program will make sure that cookies do not give harm their privacy and improve their shopping and internet surfing experience (Paler, 2008, p.5).

The other reason why people avoid online shopping is the complicated usage of e-commerce websites. To pull more online customers, the design of the website should be creative, and easy to use. When people click the website very the first time, they want to see a simple, not eye-tiring page that leads the user to the different products, product comparisons, or check-out easily. If the users think the website is not easy to use, they do not want to get used to the website but just exit and forward to another website or do physical shopping. For example, users mostly want to compare two items easily, and it feels hard for some users to compare online, so they prefer to do physical shopping (Susser & Ariga, 2005, pg. 405). For some people, the check-out process is overwhelming since it makes people try to enter credit card information every time and confirm the purchase via email and phone. Even though this process is designed to avoid possible fraud attempts, it sometimes makes users suspicious. On the other hand, this process may not be %100 reliable for credit card safety and causes some cards to get declined irrelevantly when the system detects a suspicious attempt if the user tries to enter the card information multiple times. Despite the cautions taken by e-commerce websites, online fraud rates are so high, and they are not still inevitable at a good rate so far.

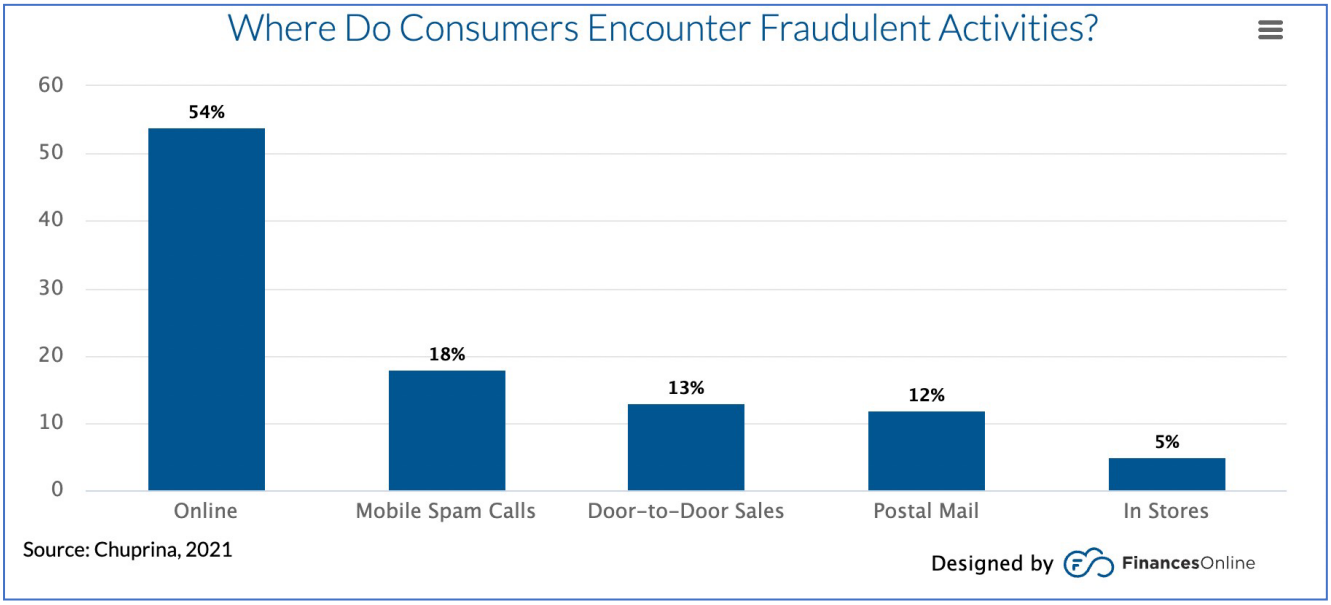

Figure 2: General e-commerce fraud statistics. 54% of consumers said they encountered fraudulent or suspicious actions on the Internet. Other forms of contact methods included mobile spam calls (18%), door-to-door sales (13%), postal mail (12%), or stores (5%) (Chuprina, 2021).

Users have various concerns when using credit cards for understandable e-commerce websites. As it seems in figure 2, the gap in fraud rate between online and in-store shopping is too much and that supports why people don't prefer online shopping regarding credit safety issues. Once they share their credit card information, they can never delete it if hackers store or use it. However, there has been a lot of improvement that people must be informed. The online fraud problem can also be solved by creating the credit card's online version on a computer with IP and router encryption which secure the credit card against scammed websites (Anas, 2011, pg. 3359). Engineers have brought up some solutions to avoid possible fraud and reduce the risk of using a credit card for online purchasing as much as possible considering the time and cost issues. They programmed a model to implement fingerprinting and biometrics in the authentication system of credit cards. The consumer uploads their credit card information online

along with their fingerprints and biometrics so whenever they need to purchase online, the website will require them to confirm their fingerprints or biometrics. The authorization code and fingerprint features will be unknown to the attacker and known only for the matching e-commerce website. The overall accuracy of the program is 99.48% with a 0.52% error rate which is pretty accurate (Anas & Shihab, 2011). If users download one of these browser extensions, they can upload their credit cards to the application and this application will securely autofill the check-out payment method and only request confirmation to finish check-out.

Figure 3: The impact of developed e-commerce websites on economy and society (Adapted by Mehmet Yaylagul from J. Sanburn 2017)

With the improving software programs, e-commerce will not only be beneficial for the buyer but also seller because the tracking and collection of data about the buyers would be beneficial for sellers so they can focus on demanded products more without wasting more time and money (Ngwe, 2019, pg.5). This transition will impact retail chain to break because sellers will focus on wholesale since they already know the demanded product of their customers and they'll provide more products and store them beforehand. As it seems in figure 3, this situation will grow the production rate exponentially, leading people to buy on a higher scale, and spend more money. With a higher production rate, shoppers give more promotions to users like buy 2 get 1 one free for their favorite products which will increase the consumption rate (Sasvari, 2012, p.2).

The change will not only affect the economy but also society's social habits because people will realize that they save more time and money with online shopping. If online shoppers feel secure about their payments, most of them will exclusively shop online and stop going out. The sharp transaction from e-commerce to physical commerce will harm socializing since malls give people a chance to get to know people and spend time with them rather than just shop. Malls are an ecosystem that unties themselves, a combination of community and commercialism peddling everything you needed...(Sunburn, 2017, pg. 2) With the increasing demand for online shopping, there will be a visible reduction in the number of physical shops which cause the fall of shopping malls.

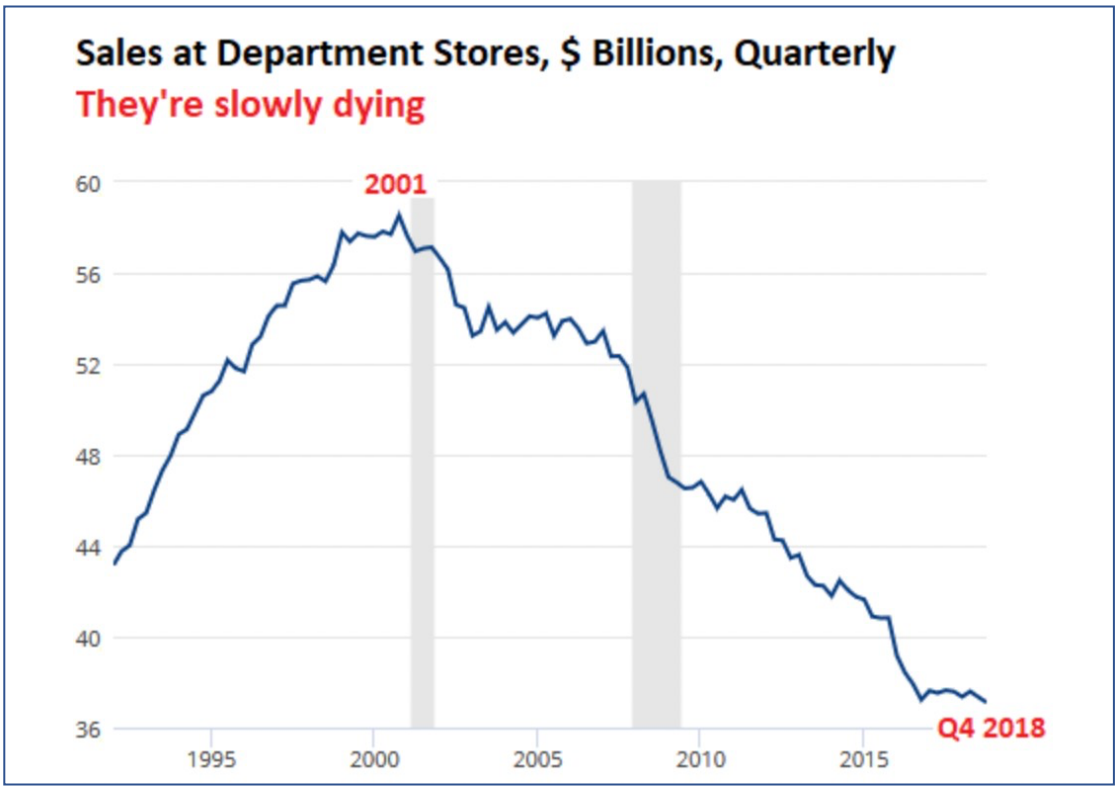

Figure 4: Sales at the department stores since 1990 showing how retail store sales have dropped sharply in 20 years. It shows statically how shopping malls are dramatically dying (Richtar, 2019)

As it seems in Figure 4, sales have dropped since 2000 and the speed of this reduction got fastened with better e-commerce websites and opportunities. People started using online shopping more if they don't have to try them on or they try the product in the physical shop but they still buy it online from third-party e-commerce websites like amazon, and e-bay. Some people will continue shopping in malls just for fun and to spend time with friends but that will not be enough income for malls to survive. Shopping malls must pull a decent amount of customers to pay their fees and make a profit and at the of the day, people might not find enough malls to hang around and experience physical shopping as they used to do.

CONCLUSION OF E-COMMERCE IN DIFFERENT ASPECTS

Online shopping has been growing exponentially, and we've already seen the results in real life, but e-commerce websites should still improve their software and cyber security deficiencies. The main issues are usability, privacy, and security but these problems can be fixed by externally designed applications. These programs should also be encouraged to use during online shopping to prevent fraud and information leaks.

As technology improves, and new artifacts are invented, they get their old versions' places, and it leaves society with how to use these new technologies. From the Social Construction of Technology SCOT aspect of Clicks and Mortar, people choose online shopping over malls since e-commerce fits their needs and standards better with less time and money spent. Once the users trust e-commerce and adapt themselves to it, they will only go shopping in malls with friends for fun and try the products on but still buy them online since the products become cheaper. In this controversy, technology causes Malls to fall and open a new era for a new shopping lifestyle, People will tend to shop in their homes more and this situation will cause malls to not make enough profit and go bankrupt. As technology changes society's lifestyle, society changes its economic model, and this will probably result as the end of the shopping mall era in the next years.

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