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The use of mobile technologies in online shopping during the Covid-19 pandemic - an empirical study.

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Abstract

The contemporary mobile phone has absolute capabilities to go beyond its core role as an ordinary voice communication device. With the smart concept and mobile application technology, the contemporary mobile phone makes users' lives easier than ever before. WHO declared the Covid-19 situation as a pandemic on 11 March 2020 and it has been an ongoing global pandemic since December 2019. People all around the world are experiencing direct and indirect consequences of the Covid-19 pandemic. However, mobile phone technology can provide sophisticated solutions to cope with a pandemic environment. Thus, as a pilot study in this research, the author focused on Polish consumers’ mobile phone usage behaviour towards their online shopping buying behaviour before and during the Covid-19 pandemic time. An online field survey was conducted to collect primary data from the respondents during the month of April 2021, and the total number of participants was recorded as 102. In order to reach conclusions, mainly two types of statistical hypothesis tests were carried out. Hypothesis test 1 was conducted to determine whether the respondents were demonstrating a significant usage increase in the average number of online shopping transactions per month and during the Covid-19 pandemic time. Hypothesis test 2 was conducted to determine whether there was a difference in the average number of online shopping transactions per month during the pandemic time of the respondents based on their age group. Descriptive and inferential statistics, including the matched-pairs test and one-way ANOVA, were applied to the analysis. The researcher is in a position confirm that there is a significant difference in the average number of online shopping transactions per month before and during the Covid-19 pandemic time. However, there is no significant difference in the average number of online shopping transactions per month during the pandemic time made by representants of two generations, generation X and Millennials. The results of the study were significant since the primary data collection was done during April 2021. The pilot study will help to understand how the respondents online buying behaviour through mobile phone usage changed during the pandemic. The added value of the conducted pilot study involves filling in a gap regarding the differences and similarities between generational groups on mobile shopping during the Covid-19 pandemic time.

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1. Introduction

Mobile devices such as smartphones and tablets have become one of the most frequently used tools that accompany consumer in their every-day life. The increase in their popularity has led to the rise in m-commerce activity as well, which has evolved into an alternative for product searching, comparing, and purchasing [1]. The use of mobile devices is so extensive that they have started to replace computers.

The functionality of smartphones has been expanding because, among other things, they offer an abundant selection of mobile applications [2], they provide the option of using the device anywhere, they enable quick and uninterrupted access – instantaneity of use [3-4], which drives the growing popularity of mobile devices [5]. Mobile devices also have certain limitations, chief among them being: a smaller interaction space (screen) and the use of mobile devices during various activities, e.g., a walk, a meeting – “anytime & anywhere” [6-8], which results in decreased concentration on the content conveyed.

Since consumers have been using devices such as smartphones and tablets more and more frequently, the amount of daily information assimilated has increased as well. Access to the information and services offered by mobile devices is obtained through mobile applications. Nowadays, every company that wishes to reach their customers has a mobile app. Mobile applications are, on the one hand, the most frequently downloaded programmes, but they are also the quickest to lose their appeal. According to studies, approximately one third of mobile apps are used after they have been downloaded, and only 4 precent of them are still used one year later [9-12]. It needs to be stressed that without the development of digital telephony network, including the mobile web, such growth in the use of mobile devices and mobile apps would not have been possible.

Enormous interest in mobile devices caused the volume of mobile commerce (m-commerce)\(^1\) and mobile shopping (m-shopping)\(^2\) to rise as well. It is estimated that the value of the m-commerce market in Poland has grown by PLN 57 million from 2019 to 2020 (which constitutes an increase of 56 precent) [13]. The reason for such a significant rise is the COVID-19 pandemic; however, it is forecasted that the trend will persist and consumer will continue buying via mobile devices after the pandemic ceases. According to the Pricewaterhouse Coopers report, the value of the Polish e-commerce market will grow to PLN 162 billion by 2026 [14]. Currently there are 150 000 enterprises in Poland selling their products online. Such growth does not place Poland high in the international rankings. Nevertheless, Poland remains a country with a low share of online sales, even though in 2019 smartphone ownership in Poland reached the level of 80 precent [15]. For comparison, in the USA nearly 72 precent of Americans owned smartphones in 2020 [16].

Most frequently downloaded apps include those dedicated to games, according to the Statista 2021 reports, they account for more than 289 000 applications (in 2020). In the course of two quarters of 2019 and in 2020 over 2 billion apps were downloaded globally [17].

According to a 2020 study, nearly all Internet users between the ages of 16 and 64 claimed to have visited an online store at least once. Nearly 82 precent decided to make a purchase that way [18]. Mobile commerce has been recognized as yet another dimension in business growth [19].

The rise of interest in m-commerce has not yet been reflected in the results of research on customer satisfaction among m-commerce users. Furthermore, there are numerous studies examining the issues of m-commerce during the COVID-19 pandemic. [20]. There are studies describing a shift from offline to online activities [21] as well as the changes in consumer behaviour in that regard [22-24], or the ones analysing the question of trust in online activities [25-28].

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1 Mobile commerce is a business model which allows to purchase, sell and exchange goods and services through applications installed on mobile devices.
2 Mobile shopping means purchase done via mobile devices, such as smartphone, phablet, tablet, smartwatch.
It seems that the new reality (during the pandemic) is going to permanently alter many types of consumer behaviour. The reason for such changes might have involved the sense of uncertainty and fear caused by the lack of vaccine in the first 11 months of the pandemic, as well as social distancing, self-isolation, limited time spend at stores [29]. Separate events, according to the theory of psychology (the psychology of survival), could have triggered the changes in consumer behaviour. Therefore, it seems important to analyse and describe those changes as well as their scale, since they will constitute the basis for creating new strategies.

Growing interest in mobile apps inspired the author to undertake a study on how Polish consumer use m-commerce, whether the continuing pandemic situation, the sense of threat and the lockdown had an impact on the rise in shopping via mobile apps.

The research problem can be defined as how did Polish consumers adapt towards online shopping transactions via mobile phone apps during the Covid-19 pandemic? Therefore, in this pilot research study, the author focused on research concerning mobile phone apps usage for online shopping transactions among Polish consumers. Thus, this research answered the following questions: Has the ongoing Covid-19 pandemic influenced the use of mobile shopping apps more than before the Covid-19 pandemic? Are the respondents’ ages significant when it comes to mobile online shopping during the Covid-19 pandemic?

This manuscript is organized as follows. Section 2 presents the theoretical background. Section 3 Research Objectives. Section 4 Methodology, Section 5 Analysis provides the discussion of the findings as well as limitations of the study and directions for future research.

2. Theoretical background

Digitization, which finds application in every sphere of life, is one of the currently significant factors of development, but also of social progress [30]. The advances of information technologies make it possible for mobile phone to offer an increasingly greater range of options for establishing relations between an enterprise and a customer [31]. New technological solutions enabled marketers to modify the operating strategy from customer-centred strategies to the ones that add value and build relations [6;32]. The change is facilitated by e-marketing, which operates increasingly more powerfully in the mobile sphere, where users’ activities are tracked, along with their reactions and decisions, in order to learn their behaviour patterns and to ensure the best possible matching of products to customers’ needs [33].

Broadly understood, m-commerce involves conducting monetary transactions via wireless telecommunication network as well as searching, browsing, comparing products and services online [34-35]. At present, mobile commerce also includes such services as: mobile banking [36], agency, transfers made by phone, mobile tickets, loyalty cards, or mobile auctions [37]. Therefore, it is possible to differentiate between: m-shopping, m-banking and m-payments. Furthermore, m-commerce transfers ownership rights as well as the rights to use and it initiates business transactions [36]. Mobile applications that provide users with quick access to information, products and services form the basis for the operation of e-commerce. Increasingly more contemporary applications are multi-purpose, e.g., product information, comparison engine, electronic payment, geolocation of offline shopping outlets, other customers’ opinions, direct contact with a seller, etc. However, the application market is a difficult place to operate in on account of strong competition, a very broad range of applications on offer, a very short application life cycle and ever-growing customers’ expectations, who are becoming more and more conservative and are not willing to install everything on their phones. Recent studies demonstrate that consumers install the apps which they intend to use and which are free [38].

The factor that strongly influences a choice of an app are emotions, and more precisely emotions linked to aesthetics or a trend [39-42], but so are those linked to trust, fear, and even panic [43]. Apart from the emotional aspect of decision-making, application functionality and its usefulness in every-day life both play an important role. It becomes particularly noticeable in the circumstances of the COVID-19 pandemic, when on the one hand consumers fear getting infected (the aspect of strong emotions), while on the other hand they need to function in the present situation (usefulness). Moreover, the restrictions imposed, such as the lockdown, limited number of customers allowed into a store, regulations relative to quarantine and enforced stay at home caused consumer shopping behaviour to change.
The most significant changes in consumer behaviour include the attitude to online shopping, door-to-door delivery, interest in regional products, and the use of non-contact payments (by card, telephone, blik, or smartwatch).

The use of technologies varies among generational groups, since they demonstrate different personalities, patterns and consequently types of consumer behaviour [44]. The use of m-commerce is determined in particular by personality, which constitutes a key factor in the acceptance of new technologies [7;45]. The study of generational groups in terms of mobile behaviour is still a new research area [42]. The knowledge of psychological profiles of individual generational groups is especially important for marketing, since on the basis of those profile products can be matched to consumer needs and marketing strategies can be created in order to target groups of customers using suitable distribution channels [42].

In the literature of the subject generational groups are divided into five generations: Traditionalists, Baby Boomers, Generation X, Generation Y and Generation Z. Traditionalists were born between 1922-1945, Baby Boomers between 1946-1964, Generation X between 1965-1983, and Millennials between 1984-2002 [46-49].

However, the subject of defining groups, generational identity or the method of measurement is still under discussion [50]. Defining generational identity is helpful in evaluating consumer behaviour in a given generational group, yet the fact that there are groups born at the border of two generations displaying identities that differ from the remaining part of the group needs to be taken into account.

The generational division most frequently used in the article involved the year of birth [51-53]. Age additionally affects the inclusion of new technologies [54] as well as the preferences and shopping behaviour online [55-56]. The scale of trust towards activities online will also depend on an age group as well as on relational ties existing within a generational group [45]. Those ties are unique to each generational group. Trust may also be transferred through satisfaction, for instance, from an online payment onto a mobile payment [57]. What is more, customers’ attitudes and interests vary depending on age. More importantly, each of those groups uses mobile devices differently.

The division of generations according to age groups, but taking into account their attitudes and convictions arising from life experience is defined in literature as the generational cohort [58-59]. The generation market segmentation was already used for the assessment of consumer behaviour online [42,55].

The Baby Boomer cohort shares traditional values and buys well-tested brands, they have a high inclination to consumerism, they seek products that make life easier. This group also includes pensioners who reject the traditional role of a senior and who seek new experiences, who are open to trying, friendships and risk-taking. In comparison to younger generations, they have greater experience in shopping. Generation X was growing up before the Internet was launched, but they learned to cope in an online environment. This is a group that seeks social relations, needs an explanation of product characteristics before making a shopping decision, reads the opinions of others and looks for convenience. Generation Y grew up with the Internet in their lives and are used to online activity, the group very quickly assimilates the information found online. Generation Y are also called digital natives. Generation Z includes not only the individuals functioning online, but also those active in the social media, i.e., those who are a part of the digital world. They are described as being industrious and cooperative. The younger age groups (Y, Z) are more willing to take advantage of user-generated content, i.e., they create and use the content made available by their communities [60]. In turn, the older generations choose company-generated information [61]. Furthermore, it needs to be emphasised that the research conducted on online behaviour so far chiefly focuses on individual generational groups, and less often on the differences among generational groups [61].

3. Research objectives

This pilot study focused on the Polish consumers’ mobile phone usage behaviour towards their online shopping buying behaviour before and during the Covid-19 pandemic time. The primary research objectives were to determine whether the respondents were demonstrating a significant increase in the amount of usage of online shopping through mobile phone app before and during the Covid-19 pandemic time and also to determine whether there was a difference
in the average number of online shopping transactions per month during the pandemic time among respondents based on their age group.

4. Methodology

The field survey method was used to collect the primary data from the population by using a structured questionnaire which was based on the Microsoft Office internet platform. The questionnaire was in the Polish language to ensure that all the respondents are Polish. The Polish consumers have been defined as the population of the study, and the convenience sampling method was applied at the time of launching the survey through social media. The social media survey was launched on the 5th of April 2021, and it reached 102 respondents by the end of the 18th of April 2021. The structured research questionnaire was designed to collect nominal, ordinal, and ratio scale data from the respondents. Both descriptive and inferential statistics were applied for the analysis.

Two kinds of statistical hypothesis tests were conducted to obtain the conclusions. Hypothesis test 1 was conducted to determine whether the respondents were demonstrating a significant usage increase in the average number of online shopping transactions per month before and during the Covid-19 pandemic time. Moreover, the Matched-pairs test was used for hypothesis test 1, and alpha was set to 0.01. The Shapiro-Wilk test was selected to determine the normality of the difference between the two populations. Hypothesis test 2 was conducted to determine whether there was a difference in the average number of online shopping transactions per month during the pandemic time among the respondents based on their age group. Based on the principles of completely randomized design, the researcher ran a one-way ANOVA for hypothesis test 2, and alpha was set to 0.01. The Shapiro-Wilk test was selected to determine the normality of the respondent's age distribution. Furthermore, Microsoft Excel and SPSS application software packages were used to analyze the primary data.

5. Results

5.1. Hypothesis test 1: The average number of online shopping transactions per month before the pandemic time and during the pandemic time.

The first hypothesis test was carried out to determine whether the respondents were demonstrating a significant usage increase in the average number of online shopping transactions per month before the Covid-19 pandemic time and during the Covid-19 pandemic time. According to the field survey, 71 out of 102 respondents (Approximately 69.61% of respondents) said that they are using online mobile shopping apps to buy things. According to the descriptive analysis, total online shopping transactions per month before the pandemic was 235, average online shopping transactions per month before the pandemic was 3.31 and the standard deviation was 2.91, and total online shopping transactions per month during the pandemic was 439, the average online shopping transaction per month during the pandemic was 6.18, and the standard deviation was 5.27.

The hypothesis test 1 was designed to determine whether there was a significant difference between two critical scenarios including average number of online shopping transactions per month before the pandemic time and average number of online shopping transactions per month during the pandemic time. Based on this situation the research has selected dependent sample, or related sample or more commonly called matched-pairs test. The Shapiro-Wilk test was selected (Since N = 71 < 2000) to find out the normality of the difference between the two populations (Online shopping transactions per month before the Covid-19 pandemic / Online shopping transactions per month during the Covid-19 pandemic). According to the Shapiro-Wilk test, the p-value was .000. Thus, the null hypothesis was accepted and the alternative hypothesis was rejected, and it was concluded that the data comes from a normal distribution.

The critical t value was obtained from the t distribution table in the usual way, with the exception that, in the degree of freedom (n-1= 71-1 = 70), n is the number of matched pairs of scores. D donated as a Mean Population Difference. Accordingly Formulated hypotheses are:

\[ H_0 : D = 0 \]
\[ H_a : D \neq 0 \]
The Appropriated Statistical test is a matched-pairs test. According to that, the observed \( t \) value was -6.08. In this test, the alpha value was set as \( \alpha = 0.01 \) and the test was two-tailed, \( \alpha/2 = 0.005 \) was used to obtain the table \( t \) value. With 71 pairs of data \( n = 71 \), \( df = n-1 = 70 \). The table \( t \) value was \( t_{0.005, 70} = \pm 2.65 \). Thus, the decision rule was, if the observed test statistic is less than -2.65 or greater than +2.65, the null hypothesis will be rejected. The calculated observed value of the test statistic was \( t = -6.08 \). Because the observed \( t \) value was less than the critical table \( t \) value in the lower tailed \( (t = -6.08 < t = -2.56) \) value, it was in the rejection region. Thus, the null hypothesis was rejected. Meaning, there is enough evidence from the data to declare a significant difference in the average number of online shopping transactions per month before the Covid-19 pandemic and average number of online shopping transaction per month during the Covid-19 pandemic. The analyst estimated with a 99 percent level of confidence that the average difference in the number of online shopping transactions per month before the Covid-19 pandemic and during the Covid-19 pandemic in respondents may be somewhere between -4 and -2 per month.

\[ -4 \leq D \leq -2 \]

5.2. Hypothesis test 2: The average number of online shopping transactions per month during the Covid-19 pandemic time of the respondents based on their age group.

According to the field survey, 71 out of 102 respondents (approximately 69.61 percent) said that they are using online mobile shopping apps to buy things. Accordingly, no respondents belonged to Traditionalists generation, one respondent belonged to Baby Boomers generation, 20 respondents belonged to the X generation, 49 respondents belonged to the Y generation (Millennials), and one respondent belonged to the age 18 category (Z generation). The Shapiro-Wilk test was selected (Since \( N = 71 < 2000 \)) to find out the normality of the respondent's age distribution those who said that they are using online mobile shopping apps to buy things. According to the Shapiro-Wilk test, the \( p-value \) was .000. Thus, the null hypothesis was accepted and the alternative hypothesis was rejected and it was concluded that the data comes from a normal distribution. Moreover, according to the descriptive analysis for the respondents who said that they are using mobile shopping apps to buy things, the average age was 32.12, median age was 30, standard deviation was 11.39, minimum age was 18, maximum age was 65, the age range was 47, interquartile range was 17, standard error was 1.35 and at 99 percent of confidence interval for average (lower boundary was 28.54 and upper boundary was 35.70).

The Hypothesis test 2 was designed to determine whether there is a difference in the average number of online shopping transactions per month during the Covid-19 pandemic time of the respondents based on their age group. Thus, the researcher selected only Generation X and Millennials (Y) for the test. The accordingly formulated hypotheses are:

\[ H_0 : \mu_1 = \mu_2 \]
\[ H_a : \text{at least one of the means is different from the others.} \]

The researcher ran a one-way ANOVA, and the apocopate test statistic was the \( F \) test calculated from ANOVA. The Alpha = 0.01 and the degree of freedom for this problem is 2-1 = 1 for the numerator and (20-1) + (49-1) = 67 for the denominator. The critical \( F \) value is \( F_{0.01,1,67} = 7.03 \). Since ANOVA is always one-tailed with the rejection region in the upper tail, the decision rule is to reject the null hypothesis if the observed value of \( F \) is greater than 7.03. \( F_{0.01,1,67} = 7.03 \). This value is the critical value of the \( F \) test. The decision rule is to reject the null hypothesis if the observed \( F \) value is greater than the critical \( F \) value (\( F_{0.01,1,67} = 7.03 \)). For the hypothesis test 2, the observed \( F \) value of 0.02 was less than the table \( F \) value of 7.03. Therefore, the null hypothesis was not rejected. All means are equal; there is enough evidence from the data to declare that there is no significant difference in the average online shopping transactions per month during the Covid-19 pandemic time by two of the generations including generation X and the Millennials.
6. Conclusions

The contemporary mobile phone has absolute capabilities to go beyond its core role as an ordinary voice communication device. With the smart concept and mobile apps technologies, the contemporary mobile phone makes users' lives easier than ever before. WHO declared the Covid-19 situation as a pandemic on 11 March 2020 and is an ongoing global pandemic since December 2019 [62]. People all around the world are experiencing direct and indirect consequences of the Covid-19 pandemic. However, mobile phone technology can provide sophisticated solutions to cope with a pandemic environment.

The ongoing Covid-19 pandemic influences respondents to use their mobile phone apps for online shopping. Based on hypothesis test 1, it can be concluded that there is a significant difference in the number of average online shopping transactions per month before the Covid-19 pandemic and the average number of online shopping transactions per month during the Covid-19 pandemic. The analysis clearly shows the number of times that the respondents use their mobile phone apps for online shopping transactions during the Covid-19 pandemic time is higher than the time before the Covid-19 pandemic. Nevertheless, based on the hypothesis test 2, the researcher was in a position to conclude that there is no significant difference in the average number of online shopping transactions per month during the Covid-19 pandemic time by two of the generations, including generation X and the Millennials. This means that the respondents try to cope with the pandemic situation and also avoid the negative consequences, which were created as a result of the Covid-19 pandemic situation by using their mobile phone apps to do online shopping transactions more often than before the Covid-19 pandemic. Fear about the infection can be a reason for such a behavioural shift. Therefore, the conclusions of this pilot study can be helpful for business managers, marketers, mobile shopping app developers to understand how the respondents online buying behaviour by using their mobile phones during the Covid-19 pandemic time.

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