Influence of the COVID-19 Pandemic on the Vignette Factors of Smartphone Auctions on the Allegro Auction Platform

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Abstract

Purpose: The influence of the COVID-19 pandemic on e-commerce sales has been perceived from different points of view. This study focuses on changes in the usage of auction vignette factors on one of the most successful sales platforms, Allegro, at three points in time during the pandemic, considered as the pre-pandemic, deep-pandemic, and post-pandemic state.

Design/methodology/approach: The research study uses 3 samples of offers – 320 for the 1st point in time, 259 for the 2nd point in time, and 303 for the 3rd point in time—in the category of Samsung S10 smartphones to determine the changes among the presentation factors belonging to the offers. 22 factors and 5 indexes were examined.

Findings: The results show substantial changes in the usage of factors such as shipping cost, the increased importance of "Buy Now" auctions, platform currency, and the decreased importance of "Bid" auctions. The indexes were also proposed in order to adopt a synthetic view of the factor groupings. The shipping index was pointed out as one factor that may be affected by the pandemic.

Research limitations/implications: The sampling technique limited the study to a preselected category of smartphones. The category was biased by the use of a non-category brand. Non-category items were removed from the data used. Other limitations include ambiguities involved in the assignment of the factors.

Originality/value: The contribution of this study is its examination of a frequently omitted area of factors that buyers use as a first choice when selecting an offer. The uniqueness of the study is covered by the point in time used in the study, i.e. deep-pandemic. Other points in time were based on the announcements of the government of Poland.

Keywords: e-commerce auction, sales platform, auction presentation factors, COVID-19 pandemic, auction vignette.

JEL: D44, D80, M30

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Wpływ pandemii COVID-19 na prezentacje aukcji smartfonów na platformie aukcyjnej Allegro

Streszczenie

Cel: wpływ pandemii COVID-19 na sprzedaż w ramach e-commerce jest postrzegany z różnych punktów widzenia. Przedłożony artykuł koncentruje się na zmianach użycia czynników prezentacji aukcji na liście aukcji na odnoszącej sukcesy platformie sprzedażowej Allegro. Badanie wykonane zostało w trzech punktach pandemii przyjętych jako początek, centrum oraz okres po ustaniu pandemii.

Konstrukcja/metodyka: badanie obejmuje trzy grupy ofert liczących 320, 259 i 303 obserwacji w kolejnych punktach pandemii w kategorii smartfonów Samsung S10. Zanalizowano 22 czynniki i 5 wskaźników.

Wyniki: otrzymane rezultaty wskazują na istotne zmiany w użyciu czynników, takich jak koszty dostawy, wzrost znaczenia aukcji „Kup Teraz", waluty Allegro oraz spadek znaczenia aukcji z licytacją. Zaproponowano wykorzystanie syntetycznych wskaźników obejmujących grupy czynników. Zaobserwowano, iż wskaźnik kosztów dostawy może ulegać wpływowi pandemii.

Ograniczenia/implikacje badawcze: próba badawcza została ograniczona do kategorii smartfonów. W kategorii zanotowano istnienie towarów z innych kategorii. Dane zostały oczyszczone. Jako inne ograniczenie występuje niejednoznaczność przypisania czynników do wskaźników.

Oryginalność/wartość: często omijany obszar badań związanych z czynnikami prezentacji aukcji jako podstawą wyboru potencjalnego klienta stanowi wartość dodaną poniższego badania. Unikalność badania jest reprezentowana przez punkt badawczy określony jako centrum pandemii. Pozostałe punkty badawcze określono na podstawie rozporządzeń polskiego rządu.

Słowa kluczowe: aukcja elektroniczna, platforma sprzedażowa, czynniki prezentacji aukcji, pandemia COVID-19, prezentacja aukcji na liście aukcji.

1. Introduction

The development of internet technologies brought changes to every aspect of mankind's economic activity. One of the most successful fields where internet technologies thrive is e-commerce. E-commerce influenced the market at its deepest nature, bringing new key factors and methods for developing successful strategies to reach potential customers.

A widely used definition of e-commerce states that e-commerce "refers to the use of electronic means and technologies to conduct commerce, including within-business, business-to-business, and business-to-consumer interactions" (Whinston, Choi, & Stahl, 1997, p. 13) within local areas or between residents of two or more countries (Chmielarz, 2001). However, internet technologies continuously develop, and along with them the concept of e-commerce. E-commerce is now perceived as trading over computer networks, such as the internet, through the usage of mobile commerce or electronic funds transfer (Shahriari et al., 2015), or specifically the internet as the medium for purchasing goods (Khan, 2016).

Among international markets, the Polish market is also affected by changes in global e-commerce. The value of the Polish e-commerce market is estimated at over USD 13.545 billion in 2021 compared to 11.900 billion in 2020 (Statista, 2021). The growth rate of 13% is predicted even taking

into account the negative impact of the global pandemic on the economy in 2020.

The enterprises involved in the competition for e-sales rise are online stores, sales platforms, and auction platforms. Auction platforms can also act as sales platforms. They sell goods of a physical and digital nature through an auction mechanism, which also involves a "buy now" option. Potential buyers encounter dynamically prepared websites where offers may come from multiple sellers, thus causing competition for the customer's attention. The only way to get the attention of the buyer is through the attractive preparation of an offer. However, platforms reserve the factors to which buyers may be exposed. These factors differentiate offers among all others when the selection takes place.

The impacts of the global pandemic in 2020 were unprecedently wide. First, the declaration of a pandemic came from the WHO on March 11, 2020 (WHO, 2020). The responses from various governments differed. However, the first use of a travel ban could be perceived as a starting point of the pandemic. Different reactions would come later in the sequential reboots of closed economy branches. That did not come to e-commerce directly, but affected it indirectly through shortages of supplies or the fast adoption of tools for larger amounts of website traffic.

While the pandemic was underway, the analysis of auctions was mainly focused on the individual factors found in auctions. Attention has been paid to price analysis in connection with the type of auctions (Liu et al., 2019), negotiations (Jindal & Newberry, 2018), "premium" value (Snir, 2006), or their dispersion (Bounie et al., 2012). There has been also a review of marketing elements, which take into account offers based on their distinguishing elements (Stępnicka, 2013), or the analysis of phrases included in the title and content of the auction (Makowska, 2013).

The models focus on individual elements, while the sales platforms developed many elements that distinguish the auctions on the auction list. Research focused on one of the elements of auctions showed a noticeable deficiency in the analysis of omitting factors. The next issue came with the COVID-19 outbreak, where a lack of the inclusion of the pandemic in the research of auction offer lists created a research gap that needs to be addressed. Therefore, the aim of the current paper is to investigate how different stages of the pandemic affected the usage of auction presentation factors and their groupings.

The following research questions were specified:

Q1. Do different points in time of the pandemic differentiate the usage of the factors provided by the sales platform?

Q2. Do different points in time of the pandemic distinguish the composed groupings of factors (indexes)?

2. Research Methodology

2.1. Sales Platform and Auction Vignette

Sales platforms and auction platforms remain the aggregators of electronic sales. Sales platforms link different sellers as well as their own sales. Though there are many different sales platforms like Allegro, Empik.com, or Morele.net, Allegro is the largest one and is the most recognized among Polish internet users. In the PBI ranking of September 2020 (PBI, 2020), the Allegro platform took 6th place. Among auction platforms, Allegro has remained the major one in the e-commerce market in Poland. Competitors like Sprzedajemy.pl or OLX remain specifically oriented towards private individuals, or they do not provide a bid-auction mechanism. The world's largest sales and auction platform eBay, a competitor portal (for Polish users there is domain eBay.pl), offers sales opportunities for Polish online stores, but there is no in-country branch available in Poland.

Allegro is not only the largest e-commerce platform in Poland, but also one of the largest players in the world. In January 2020, it was among the top ten e-commerce sites in the monthly visits category, reaching almost 194 million visits (Ecommerce News, 2020). This places Allegro in competition with companies like Amazon or eBay and it is the only e-commerce platform from Europe to be included.

On sales platforms, auctions are organized into groups of interests. Groups are created based on product types. The platforms call them categories, and they are divided further until they reach indivisible, atomic subcategories. To issue an auction, a seller, among other things, needs to specify the atomic category. Then, the product is listed on the list of auctions containing vignettes of the product, i.e. a preselected set of auction factors. Based on examining the factors, a potential buyer could decide to proceed to the auction page or move on to the next product vignette. The vignette of a single offer usually includes several elements, such as name, photo, price, or product parameters. Since each auction could be issued with different factors, the same variant of product could be displayed many times with different sets of factors. Thus the competition takes place between offers. Finding the most optimized set of factors, especially in the case of long auction lists, may be the only way to attract the attention of a potential buyer.

2.2. Auction Factors in Studies

Studies related to the factors of the auction vignette are not consistent. Among the research, studies related to price dispersion analyses have gained in popularity. Price dispersion is intended to answer the question of whether the prices remain at the same level throughout the life of the auction. The

studies indicate that only a small group of sellers change the auction price (Bounie et al., 2012). The dispersion is also explained by factors such as a seller's recognition (Ba et al., 2012), where high price achievement is positively corelated with the seller's recognition. While this is significant, other factors like shipping costs are omitted. Another way of analyzing prices is to link them with reputation to achieve "premium" prices (Snir, 2006). Investigations of relationships between a sale and a price confirm the current market practices. However, the authors focused on studying the value of prices, while there were other factors on the sales platforms that change the perception of a price value, like discounts. This research gap means that the price should be perceived from a broader point of view.

Among the available factors, the ones which are connected with the marketing perspective are also depicted in a study made by Stępnicka (Stępnicka, 2013). This study concludes that some factors allow the visibility of offers to be increased. The research emphasizes the role of a standard list of offers which could lead to an increase in sales. The role of factors such as highlights, bolds, and features in the same context is emphasized. The study is a review of the possibilities, but does not include any quantitative analysis. Another aspect of these studies is the analysis of the values and evaluations of phrases contained in the descriptions of auctions, as well as in the listing of offers (Makowska, 2013). In her study, Makowska concentrated on the values found in auction phrases and listed them. However, the sample size was small and was aimed at the most popular auctions. The values conveyed in the description of an auction could be classified as advertising messages. The independence of the title as an element attracting the attention of a potential buyer was not emphasized directly, and it was the title of the auction that was the first visible element for the potential buyer. Studies of offer descriptions on the offers list should also fill this research gap.

Finally, the pandemic f has an influence on the market. Studies related to this are new, but conclusions are also drawn on selected factors only. Hillen observed the influence of the pandemic on price indexes and the prices of selected goods, but there is a lack of observation of other factors which are also associated with goods being presented in an online list of products (Hillen, 2021).

The presented studies do not fill the research gaps. The provided study will contribute to the research by closing some gaps regarding auction vignettes on auction lists.

3. Hypotheses and Study Design

The study design included the identification of factors and indexes, formulating hypotheses, setting points in time, selecting category, gathering data, and data analysis.

3.1. Platform Factors and Indexes

The following dichotomous factors were identified on the sales platform:
1. Bold – bolding meant the option to write the offer title in bold.
2. Highlight – the offer itself was listed against a blue background.
3. Featured – the offer was shown above all other offers without this option.
4. Free shipping – the offer consisted of the seller's assurance that the subject of the auction would be delivered to the buyer at no additional cost.5.   Shipping cost – the seller specified the shipping cost for the auction.
6. Participation in the "SMART" program – the Allegro "SMART" program allowed buyers who purchased access to this program to receive their goods at a pickup point at no additional shipping cost.
7. Participation in the "SMART with courier" program – the Allegro "SMART" program allowed buyers who purchased access to this program to receive their goods directly via a door-to-door system at no additional shipping cost.
8. "Bid" auction – the seller issued the auction in the form of a buyer-bid auction.
9. "Buy Now" auction – the seller issued the auction in the form of a buy-now auction.
10. "Allegro Coins" – the seller provided the currency "Allegro Coins" in the auction, which could be used in further purchases to lower the purchase cost.
11. "Installments Zero" – the seller shared the Allegro "Installments Zero" program, which indicated that the item could be bought through installments with no additional cost.
12. Discount – the seller specified information that the price of the item being sold was discounted.
13. Seller's logotype – the seller bought the option to show its unique logotype in the vignette of the auction on the list of auctions.
14. "Super Seller" – information that the seller was participating in the Allegro "Super Seller" program. The "Super Seller" program is dedicated to the best sellers on Allegro if they meet certain requirements. These requirements, among others, consist of the fulfillment of orders, number of served customers, or listing new items within a specific period.
15. Company – an informational sign that the user appeared as a company.
16. Manufacturer authorization – information that the seller functioned under the manufacturer's authorization.
17. Variants – information on the existence of product variants inside the offer.

In total, seventeen factors were qualified for use. Appropriate hypotheses were formulated for each of them:

H01: The pandemic will not affect the use of bolding.

H02: The pandemic will not affect the use of highlighting.

H03: The pandemic will not affect the use of featured.

H04: The pandemic will not affect the use of free shipping.

H05: The pandemic will not affect the use of shipping costs.

H06: The pandemic will not affect the use of participation in the "SMART" program.

H07: The pandemic will not affect the use of participation in the "SMART with courier" program.

H08: The pandemic will not affect the use of a "Bid" auction.

H09: The pandemic will not affect the use of a "Buy Now" auction.

H10: The pandemic will not affect the use of "Allegro Coins."

H11: The pandemic will not affect the use of "Installments Zero."

H12: The pandemic will not affect the use of a discount.

H13: The pandemic will not affect the use of the seller's logotype.

H14: The pandemic will not affect the use of the "Super Seller" program.

H15: The pandemic will not affect the use of the company symbol.

H16: The pandemic will not affect the use of the manufacturer's authorization.

H17: The pandemic will not affect the use of variants.

The following interval factors were identified on the item vignette on the auction list: product parameter numbers, title length, and number of words. For the specified factors, appropriate hypotheses were formulated:

H18: The pandemic will not affect the product parameters number.

H19: The pandemic will not affect the title length.

H20: The pandemic will not affect the number of words.

In the literature and on the platform information site, the factors are perceived with a more synthetic approach. The combination of factors also reflects the direction of the research undertaken in the literature, which focuses on groups of issues such as the description of the auction or transaction cost (Jeon et al., 2008), and such as product or price orientation (Ganesh et al., 2010). Chmielarz and Parys in their research (Chmielarz & Parys, 2017) pointed out that the prices of products are perceived similarly as prices with shipping costs. The combined factors could also provide a synthetic explanation in particular fields of study. On that basis, the factors were combined into indexes. The indexes were based on the literature, however there are also ambiguities in the assignment of the factors, e.g. price perception as a promotional element instead of price factor (Hillen, 2021). Hence, the indexes of the offer were prepared:

1. INDPromo – included options related to auction promotion: bold, highlight, feature. The indicator was created by summarizing the

dichotomous variables. The classification of the promotional factors was made in accordance with the sales platform (Allegro, 2020b).

2. INDShipping – included options related to the shipping of goods: free shipping option, specification of shipping costs, participation in the "SMART" program, participation in the "SMART with courier" program. The indicator was created by summarizing the dichotomous variables. An indication for the classification of factors was based on a study of the importance factors for buyers by UOKiK (UOKiK, 2012).

3. INDPrice – included options related to the price of the product: indication of a "Buy Now" auction, indication of a "Bid" auction, usage of the sales platform currency "Allegro Coins," participation in the "Installments Zero" program, information about the price discount. The indicator was created by summarizing the dichotomous variables. The direction for the creation of the price indicator was provided by the UOKiK study (UOKiK, 2012), in which the respondents described the key role of price in making of a purchase decision.

4. INDSeller – included the use of the seller's logo, participation in the "Super Seller" program, company status, official or authorized shop. The indicator was created by summarizing the dichotomous variables. The direction was provided by Grabara's study (Grabara, 2010) and from Allegro itself (Allegro, 2021). Allegro made a program available which distinguishes sellers based on their high-quality customer service, while Grabara stated that company sellers are differentiated from individuals.

5. INDProduct – included product parameterization, i.e.: counting the product parameters specified in the offer and adding a value of 1 in the case of product variants. Product variants were treated as one of the product parameters. The indicator was created by summarizing the values of the variables. The indicator was created in connection with the concept of productization (Allegro, 2020a). Allegro introduced a productization program across its entire platform for the correct creation of offers. An important element of productization is the correct input of product parameters.

The creation of indexes was also followed by formulating the hypotheses:

H21: The pandemic will not affect INDPromo.

H22: The pandemic will not affect INDShipping.

H23: The pandemic will not affect INDPrice.

H24: The pandemic will not affect INDSeller.

H25: The pandemic will not affect INDProduct.

3.2. Sales Item Category

The rapid expansion of users with mobile internet access is considered a fundamental base for e-commerce. Mobile users are defined as persons using smartphones and tablets to connect to the internet. In September 2020,

22.4 million people were using the internet through personal computers at home and at work, and 24.4 million people were using mobile devices in Poland (PBI, 2020). The development of sales is additionally motivated by the development of mobile technologies (Einav et al., 2014). This is confirmed by the activities of both Polish (Morele.net, 2019) and foreign companies (New Media Age, 2011), which develop and optimize their mobile internet strategies. The trend is also seen on Allegro as a media owner. In January 2021, the real users of personal computers and laptops of the Grupa Allegro company numbered over 13 million, while for mobile devices the real users were over 18 million (PBI, 2021).From this point of view, the category featuring the well-known Samsung brand and their flagship S10 phone, introduced in 2019, was chosen. The choice of category was also motivated by the suggestion that online buying behavior tends to be goal-oriented (Wolfinbarger & Gilly, 2000).

3.3. Pandemic Points in Time

Pandemic points in time were taken at three points based on the beginning of the pandemic, when there was a surprise travel ban inside the country, the middle of the pandemic, where there was no indication of a change in the pandemic, and the time when the Polish government allowed a restart for all businesses closed during the pandemic.

The points in time were as follows:
1. March 15, 2020 – In this regard, the national quarantine started on March 15, 2020 (Prezes Rady Ministrów, 2020b). The amendment to the travel ban that followed could constitute a disorder related to the purchasing habits of individual customers. Moreover, the quarantine could be perceived by sellers as a situation that would affect their online offers provided on the online auction platform. The sample taken at that time made it possible to ignore the pandemic type of the phenomenon.
2. April 19, 2020 – a key pandemic point in time. This point was chosen at one month after the initial national quarantine with the introduction of a travel ban. The 30-day period was shifted to match the same day of the week (Sunday) as the first point in time of the current survey.
3. June 21, 2020 – on May 29, 2020, the Polish government publicized information that starting from June 6, 2020, the last of the closed businesses could reopen, i.e.: the hairdressing, beauty and fitness industries (Prezes Rady Ministrów, 2020a). In this regard, the restarting point was set at 2 weeks after the restart of all industries, that being June 21, 2020. The other indication for the containment of the pandemic was the announcement of the election of the President of the Republic of Poland on June 28, 2020, when all Polish citizens could freely move throughout the country (National Electoral Commission, 2020).

3.4. Sample Selection

The samples were recorded from the category page of S10 smartphones. The 1st point in time comprised 320 offers, the 2nd 259, and the 3rd 303. Only offers for Samsung phones and the sellers that the sales platform allowed to sell as business entities were considered. Gathering data proved to be different for the 3rd point in time. While in previous points there were no inconsistent category observations (i.e., there were no items other than Samsung items), at the last point items from different categories were observed. In the category of Samsung S10, devices of a different brand were recorded. Due to this occurrence, data cleaning was applied (Table 1).

Group	Analyzed observations	Initial observations	Removed observations	% of removed observations
1	320	320	0	0.0%
2	259	259	0	0.0%
3	303	599	296	49.4%
Total	**882**	**1178**	**296**	25.1%

Tab. 1. Initial and analyzed observations. Source: The author's research.

In total, for the 3rd point in time over 49% of observations were removed to retain the correct category perception of Samsung phones.

Registration took place once in a 24-hour period for each point in time.

3.5. Data Analysis

For data analysis, Microsoft Excel 2019 and R-CRAN version 4.0.3 software were used. R-CRAN software provides flexibility for cooperating with databases and includes packages that extend its capabilities. It also allows the design of research procedures by introducing them in the form of scripts.

Differences between the points in time were computed using the Kruskal-Wallis (K-W) tests for indexes and non-normally distributed data and chi-square independence tests (multiple proportions) for the dichotomous variables. Proportion and Dunn's all-pairs post-hoc tests were used for multiple comparisons. For the normality of the distribution, the Shapiro-Wilk test was applied. Following the remarks of Armstrong (Armstrong, 2014) to counteract the problems of group risk in multiple comparisons for unplanned hypotheses, the Benjamini-Hochberg procedure was performed (Benjamini & Hochberg, 1995). The p-value was set at 0.05.

The following abbreviations were used: p-value for probability of making type I error, SD for standard deviation, ME for median, IQR for interquartile range, SKE for skewness, df for degrees of freedom.

4. Results

Proportion tests were applied for the dichotomous factors. The results are provided in Table 2.

Hypothesis	Factor	Chi-squared statistics	df	Proportion timepoint			p-value
				1	2	3	
H1	Bold	0.706	2	0.056	0.054	0.069	0.702
H2	Highlight	0.706	2	0.056	0.054	0.069	0.702
H3	Featured	1.189	2	0.194	0.170	0.162	0.552
H4	Free shipping	0.873	2	0.375	0.413	0.393	0.646
H5	Shipping cost	10.85	2	0.803	0.838	0.898	0.004
H6	"SMART" program	4.738	2	0.381	0.405	0.465	0.094
H7	"SMART with courier" program	2.991	2	0.231	0.286	0.284	0.224
H8	"Bid" auction	11.451	2	0.200	0.162	0.102	0.003
H9	"Buy Now" auction	6.936	2	0.894	0.911	0.950	0.031
H10	"Allegro Coins"	6.351	2	0.109	0.131	0.178	0.042
H11	"Installments Zero"	0.908	2	0.181	0.158	0.155	0.635
H12	Discount	0.463	2	0.041	0.031	0.033	0.793
H13	Seller's logotype	3.693	2	0.166	0.220	0.165	0.158
H14	"Super Seller"	5.862	2	0.259	0.197	0.185	0.053
H15	Company	11.357	2	0.778	0.799	0.878	0.003
H16	Manufacturer authorization	0.555	2	0.009	0.015	0.010	0.758
H17	Variants	0.252	2	0.222	0.224	0.238	0.882

Statistically significant tests were greyed out

Tab. 2. 3-sample test for equality of proportions without continuity correction for dichotomous factors. Source: The author's research.

The results (Table 2) showed that the pandemic mostly did not change the style of factor usage. Hypotheses H01, H02, H03, H04, H06, H07, H11, H12, H13, H14, H16, and H17 were confirmed, while H05, H08, H09, H10, and H15 were rejected.

For significant test results, multiple comparison proportion tests were conducted (Table 3).

Factor	Compared timepoints	Proportion test statistic	df	Proportion		p-val	adj. p-val[1]
				1	2		
Shipping cost	1–2	1.162	1	0.803	0.838	0.281	0.281
	1–3	10.863	1	0.803	0.898	0.001	0.003
	2–3	4.426	1	0.838	0.898	0.035	0.071
"Bid" auction	1–2	1.37	1	0.200	0.162	0.242	0.242
	1–3	11.493	1	0.200	0.102	0.001	0.002
	2–3	4.426	1	0.162	0.102	0.035	0.071
"Buy Now" auction	1–2	0.491	1	0.894	0.911	0.484	0.484
	1–3	6.916	1	0.894	0.950	0.009	0.017
	2–3	52.827	1	0.738	0.950	<0.001	<0.001
"Allegro Coins"	1–2	0.654	1	0.109	0.131	0.419	0.419
	1–3	6.024	1	0.109	0.178	0.014	0.042
	2–3	2.33	1	0.131	0.178	0.127	0.254
Company	1–2	0.381	1	0.778	0.799	0.537	0.537
	1–3	10.809	1	0.778	0.878	0.001	0.003
	2–3	6.482	1	0.799	0.878	0.011	0.022

[1] p adjustment – Benjamini-Hochberg method *, Statistically significant tests were greyed out

Tab. 3. 2-sample test for equality of proportions without continuity correction for difference between 1st, 2nd, and 3rd pandemic timepoints in selected factors. Source: The author's research.

Factor	Compared timepoints	Proportion test statistic	df	Proportion		p-val	adj. p-val[1]
				1	2		
Shipping cost	1–2	1.162	1	0.803	0.838	0.281	0.281
	1–3	10.863	1	0.803	0.898	0.001	0.003*
	2–3	4.426	1	0.838	0.898	0.035	0.071
"Bid" auction	1–2	1.37	1	0.200	0.162	0.242	0.242
	1–3	11.493	1	0.200	0.102	0.001	0.002*
	2–3	4.426	1	0.162	0.102	0.035	0.071
"Buy Now" auction	1–2	0.491	1	0.894	0.911	0.484	0.484
	1–3	6.916	1	0.894	0.950	0.009	0.017*
	2–3	52.827	1	0.738	0.950	<5E-04	<5E-04*
"Allegro Coins"	1–2	0.654	1	0.109	0.131	0.419	0.419
	1–3	6.024	1	0.109	0.178	0.014	0.042
	2–3	2.33	1	0.131	0.178	0.127	0.254
Company	1–2	0.381	1	0.778	0.799	0.537	0.537
	1–3	10.809	1	0.778	0.878	0.001	0.003*
	2–3	6.482	1	0.799	0.878	0.011	0.022*

[1] p-adjustment – Benjamini-Hochberg method, * test is considered as significant

Tab. 4. 2-sample test for equality of proportions without continuity correction for difference between 1st, 2nd, and 3rd pandemic timepoints for significant test results of dichotomous factors. Source: The author's research.

In each of the tested factors, at least one test was found to be significant, thus supporting all significant results obtained from the proportion tests (Table 2).

The descriptive statistics of title length, number of words, and product parameters are provided (Table 5).

Factor	Mean	SD	ME	IQR	SKE
Title length	45.175	5,312	47	6	–2.110
	45.336	5.241	47	6	–2.262
	44.789	5.270	47	8	–1.877
Number of words	6.222	1.329	6	1	–0.833
	6.189	1.323	6	2	–0.739
	6.063	1.242	6	2	–0.366
Product parameters	4.000	0.000	4	0	–
	4.000	0.000	4	0	–
	4.000	0.000	4	0	–

Tab. 5. Descriptive statistics of title length, number of words, and product parameters factors. Source: The author's research.

The numbers of characters at all pandemic points in time were characterized by the same median (Me = 47) as well as the left skewed distribution. The same type of distribution was found in the number of words factor with a median value of 6 (Me = 6). The product parameters factor was not analyzed further after obtaining the same scalar value (4) for each point of time of the pandemic.

For the analysis of the title length and number of words, the Kruskal-Wallis test was applied due to the non-normal distribution of the data (Table 6).

Factor	W statistics	p-value
Title length	0.811	< 2.2E-16*
Number of words	0.923	< 2.2E-16*

* test is considered as significant

Tab. 6. Shapiro-Wilk's test results of title length and number of words factors. Source: The author's research.

The results of K-W tests for the title length and number of words are provided in Table 7.

Factor	Kruskal-Wallis chi-squared statistics	df	p-value
Title length	2.480	2	0.289
Number of words	5.450	2	0.066

Tab. 7. Kruskal-Wallis rank sum test results of title length and number of words factors. Source: The author's research.

Although the number of words should be carefully examined due the p-values being not as high (p = 0.066) as the title length (p = 0.289), both results supported hypotheses H19 and H20 that the pandemic did not change the way the titles were constructed.

Analysis of indexes

The descriptive statistics for indexes are provided in Table 8.

Index	Mean	SD	Me	IQR	SKE
INDPromo	0.306	0.743	0	0	2.739
	0.278	0.726	0	0	2.916
	0.300	0.792	0	0	2.758
INDShipping	1.803	1.248	2	2	0.075
	1.950	1.243	2	2	−0.050
	2.043	1.180	2	2	−0.095
INDPrice	1.425	0.598	1	1	1.165
	1.394	0.535	1	1	0.882
	1.419	0.640	1	1	1.246
INDSeller	1.213	0.905	1	1	0.405
	1.232	0.902	1	1	0.477
	1.238	0.787	1	1	0.818
INDProduct	4.222	0.416	4	0	1.332
	4.224	0.418	4	0	1.317
	4.238	0.426	4	0	1.227

Tab. 8. Descriptive statistics of indexes. Source: The author's research.

The median and interquartile range (IQR) values showed that the pandemic did not change the location of indexes. However, the indexes were tested with the Kruskal-Wallis test to support this assumption (Table 9).

Factor	Kruskal-Wallis chi-squared statistics	df	p-value
INDPromo	0.931	2	0.628
INDShipping	5.984	2	0.050
INDPrice	0.315	2	0.854
INDSeller	0.222	2	0.895
INDProduct	0.252	2	0.882

Tab. 9. Kruskal-Wallis rank sum test results of indexes. Source: The author's research.

The tests of the indexes were also in favor of hypotheses H21, H22, H23, H24, and H25. However, the p-value for INDShipping was inconclusive ($p = 0.05$). In this case, the post-hoc tests for different points in time are provided (Table 10).

Comparison timepoint	Dunn's statistic	p-value	Adj. p-value[1]
1–2	1.416	0.157	0.235
1–3	2.425	0.015	0.046*
2–3	0.898	0.369	0.369

[1] p-adjustment – Benjamini-Hochberg method, * test is considered as significant

Tab. 10. Dunn's all-pairs test for INDShipping. Source: The author's research.

Dunn's test results for INDShipping showed that the index could not be easily accepted in support of hypothesis H22.

5. Discussion

The aim of this study was to investigate how different stages of the pandemic affected the usage of auction presentation factors and their groupings.

The results supported the hypotheses claiming that the pandemic did not affect their usage. Factors regarding the usage of bold, highlight, and feature and their synthetic indicator INDPromo did not differ during the pre-, deep-, and post-pandemic points in time. What is more, the values for both bold and highlight factors remained the same. This is not an error and is supported by the sales platform strategy which allows sellers to buy promo factors for significant discounts if the factors are bought together. There is a change in their proportions at the 1st point of the pandemic at a level of 0.06, the level at the 2nd point decreases to 0.05, and the level rises to 0.07 at the 3rd point; however, the proportion tests do not confirm

statistical significance (p = 0.55). The synthetic INDPromo did not reveal substantial changes between the points in time (K-W = 0.93, p = 0.63); even the value of the index at the 2nd point decreases to 0.28 in opposition to 0.31 at the 1st and 0.30 at 3rd points. However, the feature factor showed a persistent decrease in value from the 1st point to the 3rd point (0.19 to 0.16). If the situation persisted, it could cause the loss of revenue for the sales platform and the use of cost optimization strategy by sellers. The feature factor is highly recommended by the sales platform and is more expensive for the buyer than the highlight and bold options.

One of the elements which did not support the hypothesis of the pandemic influence was shipping cost. A significant proportion of usage change was registered between the 1st and 3rd points (p<0.01), implying the slow growth of the visibility of shipping cost on the offer presentation vignette. This is particularly interesting in comparison to shipping factors unchanged by the pandemic, like the free shipping factor, "SMART" program, and "SMART with courier" program. One of possible explanations is that providing the shipping cost for buyers clearly reduces the uncertainty of the offer's shipping cost. The overall uncertainty of the pandemic could be discounted by reducing the unknown, i.e. by providing more information to the buyer. The associated index in this case, INDShipping, should also be carefully examined, while the K-W test showed inconclusive results (p = 0.05), whereas Dunn's all pairs tests showed a significant change between the 1st and 3rd points, implying the constant growth of the index.

In the case of product variety, the situation was the same for all offers. All the parameters available for the products were properly filled. The case of variants of product availability for a given offer was unaffected by the pandemic. To conclude, the associated index INDProduct finally supports hypotheses H17, H18, and H25. The explanation for this could be provided by the Allegro "productization" program (Allegro, 2020a).

The following price factors partially support the hypotheses of the pandemic not affecting them: "Installment Zero" (H11), Discount (H12), and indicator INDPrice (H23). In direct opposition to them, hypotheses H08, H09, and H010 were not supported, representing the usage of the "Bid" auction, "Buy Now" Auction, and "Allegro Coins" factors. Differences were found between the proportion of their usage. For the "Bid" auction, the comparison between the 1st and 3rd points was significant (1–3), implying that the change did not occur instantly, but continuously. The registered proportion decreased from 0.20 to 0.10. Periods 1–2 and 2–3 did not reveal significant changes. The same type of changes arose for the "Allegro Coins" factor. The usage of the factor increased from 0.11 to 0.18, however the influence of the pandemic was continuously seen. There were differences between the 1st and 3rd points in time, while none were registered for periods 1–2 and 2–3. The changes for the "Buy Now" auction were only

seen from the 2nd point, i.e.: periods 2–3 and 1–3. The growth of the usage of factor proportion was found to first be 0.89, then 0.91, and ending at 0.95. This kind of behavior implies that the changes began at the deep pandemic level and proceeded further. The evolution of the usage of the "Buy Now" option factor has a more rapid character and could end with almost all goods being sold with the "Buy Now" option.

Hypothesis H12 regarding the discount factor was supported by the proportion test. While there was no statistical significance between the proportions, the proportions declined from 0.04 at the 1st point to 0.03 at the 2nd and 3rd points, implying the loss of seller interest in this factor. These findings stand in opposition to other studies of online buying behavior during the pandemic, where discounts are the main motivating factor for online shopping (Gabriel & Loredana, 2020).

The current study revealed that INDPrice resisted the influence of the pandemic and remained at the same level for all three observed points of the pandemic. The price concept is perceived as a motivator for online buying (Jeon et al., 2008) and should have already reached a mature stage of development. During the pandemic, the change of the price index is not perceived as a significant increase for online shops. While some prices increased and some did not, the overall index did not change (Hillen, 2021). This is no different in the current study. The creation of the index for offer price elements reflects changes in the price indexes of other studies.

A majority of seller information factors offered through a presentation vignette supported the following hypotheses: seller logotype (H13), "Super Seller" program (H14), manufacturer authorization (H16) factors, and index INDSeller (H24). In the study of price dispersions (Ba et al., 2012), seller recognition is stated as one of the factors affecting high price achievement. While taking a closer look at the seller's logotype factor, even if there is no statistical significance between the points in time, in the deep pandemic stage there was an increase in its usage. At the 2nd point, the usage grew to 0.22 compared to 0.17 at the 1st and 3rd points, which could support the importance of the seller's logotype as an effective tool for auction promotion especially in the case of market phenomena. Nevertheless, the company factor did not support its hypothesis (H15, $p<0.01$), and further examination of multiple comparison proportion test results revealed that starting from the 2nd point (i.e. 1–3 and 2–3), the company factor usage increased from 0.78 (1st point), to 0.80 (2nd point) and 0.88 at the 3rd point. The increase in this factor can be explained by the existence of different types of Allegro sellers. Not all sellers need to be registered with a company account to act as a company. However, as the results show, the explanation for the rise in company importance could be the pandemic forcing sellers to use the proper type of formal account.

The final examined factors were associated with the title. However, the factors for title length as well as number of words did not show any changes

encouraged due to the pandemic. Title length, with the same median of 47 characters throughout all points of the pandemic, acted in the same manner as the number of words with a median of 6 words. A slight change was seen in the 3rd point in time for IQR, increasing from 6 characters to 8 for title length and from 1 to 2 words in the number of words, however it was not enough to reject hypotheses H19 and H20.

In conclusion, there is no significant influence of the pandemic on synthetic indexes (research question Q2), while the answer to Q1 is inconclusive. There are hypotheses which support the lack of pandemic influence: H01, H02, H03, H04, H06, H07, H11, H12, H13, H14, H16, H17, H18, H19 and H20; but there are also hypotheses which should be rejected, indicating that the pandemic was the source of changes: H05, H08, H09, H10, H15.

6. Limitations of the Study

The large number of sellers on Allegro, with over 100,000 registered companies and millions of goods offered each day, limited the possibility of drawing correct samples. In this perspective, the sampling technique was limited to the preselected category of smartphones. For the present study, one of the well-known brands on the Polish market was chosen. At the time of the survey, the Samsung flagship S10 phone was already superseded by the new generation of the S20. However, the S10 has been well-established on the market and did not suffer from a scarcity of supplies, which could be problematic in the case of the newest S20. In this case, it should also be addressed in future research involving a comparison of usage factors between different types of categories.

The second limitation of the study was the sample bias introduced by the non-category brand in the 3rd point in time. Incorrect data was observed and the sample was cleaned, however problems like this could be difficult to discover if the samples were too large for thorough inspection.

Another limitation involves finding correct points in time for the study. While government regulations are the most basic and formal options, in the case of the deep stage of the pandemic the choice is not as clear. In this case, the point is arbitrarily chosen with a few ideas in mind, like the basic period of offer presentation proposed by the platform and the same weekday as the first survey.

A final limitation includes ambiguities for the assignment of the factors which arise from the literature.

7. Conclusion

The influence of the pandemic is perceived as a source of growth for the e-commerce industry. However, the growth is not only applicable to

revenue. The pandemic affects e-commerce in many ways, one of them being the change in the presentation factors of offers.

The study results found interesting behavior for the "Buy Now" option factor, which could lead to great changes in the perception of auction platforms. The rapid growth from the deep-pandemic state implies that instead of being auction platforms, there is a developing perception of these sites as sales platforms. This kind of change is also supported by the platform itself scaling its development only for commercial sales and moving private sales to the separate local auction platform. Other findings are that some of the promo options always occur together, regardless of the pandemic and offer changes. This final point is noteworthy and should be further examined for different categories.

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