Analysis of Digital Customer Communities in terms of their interactions during the first wave of the COVID-19 pandemic

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Abstract. *The COVID-19 pandemic has redefined procedures in every business sector. In the first half of 2020, companies had to face an unexpected and unpredictable situation that resulted in both threats and opportunities in real time. Almost overnight, brick-and-mortar establishments of most stores closed, and the dominant part of transactions and activities moved from offline to the online environment. The main goal of the paper is to identify changes in the interactions of digital customer communities of selected e-business representatives in the Czech market. Within a sample of almost one and a half million Facebook users, during the first spring COVID-19 lockdown (March to May 2020), the interactions of the five largest Czech e-shops and their customers were recorded on a daily basis. The data were then subjected to a thorough statistical analysis in order to identify the specifics that resulted from the highly non-standard market situation. The results suggest that during the pandemic, there was a major reallocation of interactions in terms of their timing. Most interactions take place during the working week. From a day-to-day perspective, most of the interactions occur at around noon. In view of the findings, it can be stated that in order to maintain the competitiveness resulting from efficient management of corporate resources, it will be necessary to modify the usual procedures of e-marketing communication, as well as human resources management procedures in terms of the optimization of work of employees working from home.*

Introduction

The COVID-19 pandemic has redefined procedures in almost every business sector. In the first half of 2020, companies of all sizes had to face an unexpected and unpredictable situation that resulted in both threats and opportunities at the same time (Han & Qian, 2020; Garel & Petit-Romec, 2020; Rababah et al., 2020; Korzeb & Niedziółka, 2020; Yetgin, 2020; Bur & Trench, 2020; Pardal, et al., 2020). Almost overnight, brick-and-mortar establishments of most stores closed, and a dominant part of transactions and activities moved to the online environment.

Although retail stores (with a few exceptions) had to remain closed, e-shops could operate without any restrictions. As a part of stricter hygiene measures, carriers temporarily abolished cash payment, and a large number of e-shops followed this approach by canceling cash on delivery and preferring card payments through the payment gateway (Hambalíková, 2020).

While until recently, the traditional business model of companies has been slowly and gradually modified towards e-commerce, the closure of markets has given the modifications a revolutionary character (Ruokonen, 2020; Žufan et al., 2020). The sudden change in the usual stereotypes of consumer behavior caused by both the closure of the economy and the need for social distancing brought about extensive improvisation for all stakeholders, especially during the first weeks of the pandemic (Sheth, 2020). Wang et al. (2020) state that in the event of an emergency, consumer behavior is different, it changes. Some of these changes are predictable, others not so well. Uncertainty on the customer side was transmitted on suppliers in the form of enormous burdens and pressure.

Consumers have also begun to prefer shopping from the safety of their home, even for products that have only recently represented a marginal part of the market (Bertan, 2020). From the point of view of customer demand, there has been a shift in the trend of buying daily consumption products as well as oversized goods online. Pavla Hobíková (In Zaňková, 2020), PR manager and press spokesperson of the Mall Group stated that an approximately 20% increase in long-lasting food compared to the previous period. There has been an extreme increase in interest in face masks, respirators, disinfectants, and protective equipment in general, which are among the 10 most searched items on their website. In addition, sales of the entire range of gym equipment also increased by 2,000 %, probably due to the fact that because of government regulations, gymnasiums closed their facilities for the public. Zaňková (2020) adds that consumers probably expected they would spend most of their time in the safety of their home. Based on the data from the largest supplier of e-shop solutions in the Czech Republic, Shoptet, which includes 19,000 e-shops, almost half of them recorded a shortage of assortment imported from abroad. Miroslav Uďan (In Hambalíková, 2020), CEO of the Shoptet, states that e-shops that sell goods directly from China, accounted for about 25 %. . Seventy percent of them experienced supply difficulties. Hambalíková (2020) adds that the problem has most affected e-shops with fashion, which are dependent on the import of goods from China or other Asian countries.

On the one hand, we therefore encounter the forced closure of most brick-and-mortar stores; on the other hand, enormous pressure on e-commerce and distribution, complemented by a supply shock in various segments of goods (Dima & Maassen, 2018; Vega Barrios, Cerón Islas & Figueroa Velázquez, 2021). A huge number of variables creates a situation on the market that is unprecedented in modern history.

Although in the medium term, it may only be a kind of black swan, it is highly likely that many of the changes that have recently occurred in the market under the pressure of unpredictable and non-standard conditions will persist in the post-covid period (Khan, et al., 2020; Bagchi, Chatterjee, Ghosh & Dandapat, 2020; Kuc-Czarnecka, 2020; Ibn-Mohammed et al., 2021). This assumption is based on the concept of our research.

It was also assumed that the highly non-standard situation in the market will result in both threats and opportunities (Morosan-Danila & Bordeianu, 2020; Donthu & Gustafsson, 2020). In terms of science, we saw an opportunity in the form of examining an almost model situation in real time. In terms of practice, we saw an opportunity in the form of identifying selected contexts, the interpretation of which could contribute to increasing the competitiveness of companies as such.

Due to the fact that at a time of social distancing, most interactions within customer communities are moving from offline to online environment (Ahmed et al., 2020; Wang, 2020; Ferencakova et al., 2020) we focused our attention to the market leader, the social network Facebook. In identifying the object of the research, we focused on the most important representatives of the domestic industry, namely five largest e-shops operating in the Czech market. From the perspective of interactions, we monitored the B2C communication of our selected subjects and their customer communities on a daily basis throughout the first spring COVID-19 lockdown.

Given the circumstances, the research was predominantly qualitative in nature, with the main goal being the identification of research topics for further quantitative research. We presented the partial results of the research to the academic community (Pollák, Konečný, 2021), where we intended to specify the topic for further processing through active feedback. Subsequently, we presented the first results of the research for assessment to the international professional public (Pollák, Markovič, Váchal, Vavrek, 2021) and, based on the feedback, proceeded to the finalization of the study being presented.

From the point of view of the structure of the paper, literary review is presented, in which the authors describe the starting points of the topic and the current state of knowledge in the issue. Subsequently, the methodological part of the study is presented, followed by a chapter presenting selected findings. The last chapter of the study presents a discussion of the findings and formulation of the most important recommendations for science and practice.

Literature review
Pandemic and consumer behavior
The beginnings of the pandemic caused by COVID-19 date back to the turn of 2019 and 2020. Extensive measures taken at various stages of the initial spread of the disease in China were observed by the Western world with a considerable surprise. Words such as economic lockdown and social distancing have entered the vocabulary of managerial practice. Very few analysts at the time could imagine that similar measures would be applied in the broader context of open western markets (Amankwah-Amoah et. al., 2021; Friedson et al., 2021)

In the first step of the literature review, we will focus on the research that documented the beginning of the global pandemic at the site of its outbreak. Li and Hallsworth (2020) focused on the beginnings of the COVID-19 pandemic in China, where most pandemic-stricken people decided to follow the Chinese government's nationwide self-quarantine campaign. In addition to the efforts to prevent the spread of the new coronavirus, these

measures resulted in the disruption of one of the most common market processes in retail, namely food retailing. Researchers adopted a theory of planned behavior and provided a set of timely empirical insights into the changes in consumer behavior associated with food purchases at the beginning of a pandemic. Wang et al. (2020) argue that in the event of an emergency, consumer behavior is different, it changes. Understanding consumer behavior in terms of food storage by consumers during the COVID-19 pandemic can provide important information in the context of adjusting inventory management strategies for policy makers and governments to be able to respond to it in the event of a similar situation in the future. The priority goal of any crisis situation is to ensure the basic needs for survival; therefore, the initial research analyzed consumer behavior from the point of view of securing basic consumer goods.

Wang et al. (2020) analyzed consumer behavior in the case of stockpiling by consumers, including changes in the extent of their food reserves and their willingness to pay for fresh food reserves. Based on the findings, they state that consumer behavior related to food supply is driven by a subjective perception of risk and a set of multiple motivations. In most cases, larger food supplies were reserved by high-income consumers, university-educated people (especially women), but consumers' willingness to pay for fresh food supplies was determined by their income.

Gao et al. (2020) examined the impact of COVID-19 on food purchases by e-consumers on the basis of an online survey that was combined with city-level data. They examined their behavior from a short-term perspective. To address potential endogeneity issues, they chose the method of instrumental variable, using the distance from the city under review to Wuhan as an instrumental variable. This method is considered effective by researchers in terms of minimizing potential bias. Based on the findings, they found that the proportion of confirmed cases of COVID-19 infection increases the willingness of customers to buy food online. However, this option is more likely for young people living in large cities and with a lower perceived risk of online shopping.

Kirk and Rifkin (2020) document some of the many unusual patterns of behavior that predominated in the early days of the COVID-19 pandemic. In the light of the environmental constraints imposed on consumers, they examined consumer behavior during each of the following three phases:

- response phases, including activities such as accumulation and rejection,
- management phases, such as maintaining social connectivity, "handyman" behavior or changing the way we look at brands,
- adaptation phases, including potential transformational changes in consumption and changes in social and individual identity.

The consumer goes through all the phases slowly, their behavior and preferences undergo the changes that result from the need to adapt to the situation.

In Europe, the pandemic broke out to the full in the first half of March 2020, when the number of new cases exceeded the number of cases in China (Kufel, 2020). The measures that were subsequently taken largely copied the measures taken in China in early January. The behavior of European customers also largely followed the aforementioned trends.

Barska and Wojciechowska-Solis (2020) analysed the behavior of Polish consumers buying local food products online and also identified the barriers to purchasing. Based on the new legislation currently in force in Poland, the findings were used in relation to local foods to identify development opportunities for a given form of trade. On the basis of the findings

on the research concenrning consumer behavior in the local food market conducted on a sample of 1,067 respondents, Polish e-commerce consumers of local products are usually aged 30 - 40, with university education and in a good financial position. The authors of the research further state that, despite the fact that Polish e-commerce is still relatively underdeveloped, the fastest growing category of internet sales was online food sales. Experts say that by 2026, almost 40 % of all products will be sold online worldwide.

In terms of the changes in the e-shopping behavior of Czechs forced by the restrictions imposed by the pandemic, Hambalíková (2020) refers to research by GoPay, which compares the volume of payments in e-shops at the time of the declaration of the state of emergency. She identified the categories showing an undesired decline in payments and also the categories which showed an increase in sales. Products in the travel category showed a significant decrease, while food supplements, which experienced a huge increase in sales of up to 600 %. However, drug sales did not rise significantly. Another item that increased significantly was various forms of meal replacements., which showed a 300% increase. Another analysed category was food of all kinds. Within this category, the increase in the given monitored week reached up to several hundred percent and this category is expected to grow due to the limited mobility of persons. Within the category of medical device products, there was an increase in payments for goods such as back correctors, various positioning aids for healthy sitting, tapes and the like. This increased interest was recorded within the monitored week, which was probably due to the fact that people had begun to prepare for home office and the associated all-day sitting in front of the computer. In the case of the drugstore and cosmetics category, increases of up to a thousand percent were recorded in the monitored week. It can thus be stated that customer behavior of the Czechs completely copied world trends.

Sheth (2020) states that since consumers could not go to the stores, the stores came to their home.

Digital customer communities

Singh et al. (2017) argue that online shopping is becoming the first option for more and more consumers, as it allows them to choose products on the basis of product reviews. A huge amount of constantly generated data can be considered a big challenge for both consumers and businesses (Singh, Irani, Rana 2017; Paetsch, et al, 2017; Jibril et al. 2019). Wang and Herrando (2019) and Miron et al. (2009) state that social trade, or s-commerce, has a growing impact on e-commerce and brings about potential economic benefits. In the context of growing concerns about consumer privacy on the Internet, Wang and Herrando further explain how consumer behavior (in the context of social interaction and purchasing decisions) is affected by concerns about consumer privacy. Researchers have found that institutional security has a positive effect on consumer confidence in institutions. This affects consumers' online social interactions and consequently increases the likelihood of buying products by consumers. Van Dat (2020) examined the relationship between risk, perceived satisfaction, and purchasing intent. A conceptual model showing the individual relationships was compiled on the basis of the results of factor analysis and modeling of structural equations. Survey included 306 consumers. Based on the findings, it could be stated that managers need to take perceived risks into account when designing e-marketing channels.

Building customer communities is an extremely complex activity (Ardielli, 2020). Any breach of trust can have a significant impact on the effectiveness of overall marketing activity

(Matijová et al., 2019). Ayaburi and Trek (2020) argue that transparent communication between companies increases the trust of their customer communities. Buhalis et al. (2020) analyzed the impact of internal and external variables on the e-loyalty of young consumers in a generational context. Based on a large sample and using structural equations (PLS), they created a new model containing two internal variables (trust and satisfaction) and two external variables (web design and eWoM /electronic Word-of-Mouth/). Buhalis et al. added the very intention of consumers to shop online. According to the results, it could be stated that internal variables have a greater impact on consumers than external variables.
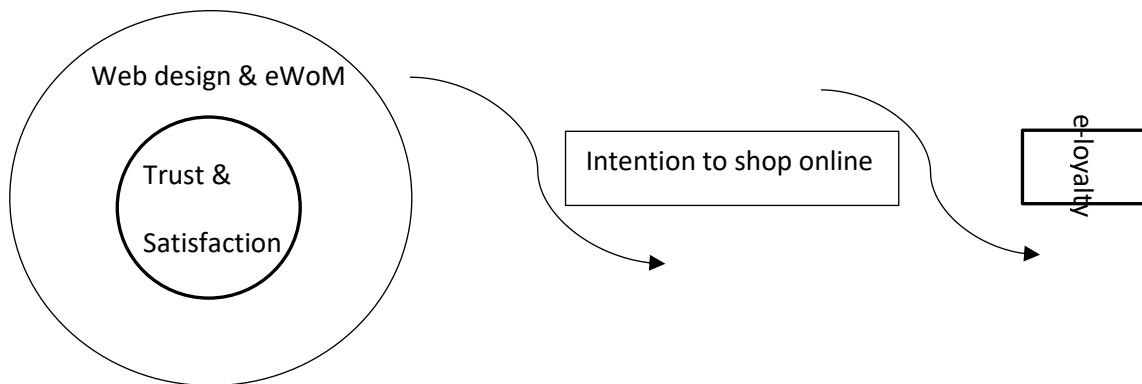

Figure 1. The impact of variables on the e-loyalty
Source: Authors' elaboration based on Buhalis et al. (2020).

Karampela et al. (2020) conducted research on B2B companies, primarily aimed at identifying the factors that influence the acceptance of business presentations on social media, as well as the acceptance of their marketing communications in the form of the benefits of participating in the digital community. The strength of the relationship is expressed by four indicators, namely commitment, intimacy, satisfaction, and quality in the form of the overall perception of the organization as a partner. The research was conducted on a sample of 200 customers of British B2B companies. Research shows that a company should be present on a social network, as such a presence directly indicates a commitment to cooperation. Researchers say organizations should focus on:
- Intensifying their presence on social media, thus reinforcing the strength of relations,
- Active communication through social networks, thus increasing the transparency and strengthening their perceived quality.

Shao et al. (2019) based their research on theories of promoting trust and innovation. In their study, they developed a model examining trust-building mechanisms on third-party mobile payment platforms. In particular, they examined whether there were significant gender differences in various confidence-building mechanisms associated with mobile payments. The research was conducted on a sample of 740 payment users of Alipay and Wechat in China. Based on research, Shao et al. state that the relative impact of confidence-building mechanisms is gender dependent. Male customers are more strongly influenced by the mobility and reputation of the platform in building trust. The security and adaptation of the platform have a greater impact on the trust of female customers. Aladwani and Dwivedi (2018) state that the expected quality of communication through social media influences

trust, which affects the extent of adaptation of communication and the communicated message as such.

In connection with the pandemic, it is possible to agree with Lv et al. (2020), who state that e-commerce has become the first option for shoppers in the context of the global economic downturn caused by COVID-19. Many marketers (Goel & Gupta, 2020; Mason, Narcom, Mason, 2021; Chebrolu et al., 2021; Marzouki, Aldossari. & Veltri, 2021), or even individuals have decided to launch promotional activities through some social media platforms (Sándor, 2020). Sales amounts within social e-commerce can dramatically increase price discounts, thanks to the subsequent interaction of online consumers. In order for traders to be able to formulate appropriate discount strategies and thus achieve sustainable business (Miron et al., 2010), it is essential that they learn the rules of disseminating information on discounts on social media in the field of e-commerce. This was the starting point for formulating our research goals.

Evaluation of knowledge and theoretical assumptions
By examining the initial context in the previous subchapters, it was possible to identify key topics for subsequent empirical research. Based on the fundamentals of examining the effects of a pandemic on customer behavior, we found that regardless of geographical location, consumers exhibited the same patterns of behavior at the beginning of the pandemic. These were characterized by:

- a step change in preferences, where customers focused primarily on the satisfaction of basic needs in the form of food and products of daily usage,
- accumulation of goods, where customers tend to stockpile in case of supply chain collapse,
- switching to an electronic form of purchasing, where customers tried to apply the methods of social distancing.

The dominant rate of interactions thus shifted from the offline to the online environment, so we proceeded to examine the characteristics of digital communities. By describing the basic benefits of e-commerce, we have moved on to the issue of trust and perceived risk. It is these two determinants that most significantly influence the acceptance rate of e-commerce. A suitable approach to increase the acceptance of the company in the online environment is:

- increasing the presence on social networks,
- transparency in performance and communication (Onuferová & Čabinová , 2018).

In order to remain competitive in a difficult period, it is necessary to make changes in the usual approaches used by companies to implement their marketing communications. The dominant part of interactions within B2B or B2C communication is shifting to the social media environment.

Sheth (2020) states that it is possible to anticipate a lasting change in selected characteristics of consumer behavior. He argues that while consumers are slowly returning to old habits, it is likely that these old habits will be adapted by new practices and regulations in the way consumers buy services and products. New habits will emerge in the context of technological progress, as a result of demographic change and also thanks to the innovative ways in which consumers have learned to cope with blurring borders, whether for work, education or leisure. This fact is only illustrated by the data from the autumn of 2020, where after the end of the first and the onset of the second wave of the closure of the economy, Czech

consumers are gradually switching to new forms of communication. Working from home, which until recently was considered an occasional benefit, is becoming the new norm. Sales of webcams increased by 6600 % in the autumn of 2020, there was also a demand for laptops, for which their availability sharply deteriorated (Hobíková, In Zaňková, 2020). Air purifiers and ozone generators were also sold twice as much/ The sales of air purifiers and ozone generators doubled. We are talking about the assortment that was relatively unknown to most consumers a year ago.

Methodology

As noted above, the dominant rate of interactions has shifted from the offline to the online environment. In our previous studies (Dorčák, Štrach & Pollák, 2015; Pollák, Dorčák, 2016; Pollák, Konečný, 2021; Pollák, Markovič, Váchal & Vavrek, 2021), we observe an increased presence of subjects from both side of the market on social networks. It is also possible to state on the basis of our research, that in last decade the e-commerce is increasingly becoming the customer's first choice when buying or selling goods and services. In view of the above, the following research question of the presented research is identified:

How has the possibility of working from home affected the efficiency of time management?

The main goal by which this research question should be answered is to identify changes in the interactions of digital customer communities of selected representatives of electronic business on the Czech market during the first wave of the COVID 19 pandemic.

The monitored period is from 12. March 2020 to 17. May 2020, while the research was carried out by monitoring the Facebook activity on the official profiles/ fan pages of the 5 largest Czech e-shops, ranked on the basis of the order published by the journal e-commerce bridge (2020), specifically profiles of Alza, Mall, CZC, Aukro and Lidl Czech Republic. The research sample therefore represents more than 1.5 mil. users in the following structure:

Table 1. Structure of the research sample

Facebook profile	users/fans*
Alza.cz	264,865
Mall.cz	207,747
CZC.cz	232,694
Aukro.cz	110,021
Lidl Czech Republic	778,673
Total	1,594,000

Source: Authors' calculations.
Legend: * Number of users / fans as of May 2020

Data collection was carried out by the interested researchers who for four months on a daily basis recorded the number, type and nature of user interactions, as well as the number and nature of contributions- posts published on the profiles of selected e-commerce entities.

The interactions of customer groups (for the purposes of the analysis) represent the interaction of the individuals to the e-marketing communication /posts/, which the subject / profile manager of the e-commerce subject published during the observed period on the

official profile of the monitored company. The reactions /in our case user entitled like user interactions/ took the following forms: comment, like, post and sharing.

The time and date of the published post were recorded. Scales from the point of view of the week were pre-created for subsequent data processing, in this case the scales were in the form of seven days a week. Scales were also pre-created from the point of view of the day, where the day was divided into five time intervals as follows:
- 00:00-08:00,
- 08:00-12:00,
- 12:00-16:00,
- 16:00-20:00,
- 20:00-24:00.

Records were made in predefined time frames with the time necessary to generate the final number of customer groups interactions. Due to the available resources, it was not technically possible to record the exact time of each individual interaction, we extrapolated the values based on the exact times of publication of each individual contribution, to which the users responded with their interactions. We assumed that most interactions occur immediately after the content is published.

The analysis is processed in three stages, resp. parts, using the following apparatus of mathematical-statistical methods including:
- Shapiro-Wilk text

$$W = \frac{\left(\sum_{i=1}^{n} a_i x_{(i)}\right)^2}{\sum_{i=1}^{n} (x_i - \bar{x})^2},$$

H_0: data are normally distributed,
H_1: data are not normally distributed,

where (with parentheses enclosing the subscript index i; not to be confused with x_i) is the i-th order statistic, i.e., the i-th smallest number in the sample, $\bar{x}$ - the sample mean.

- Mann-Whitney test

$$U' = n_y n_x \frac{n_y(n_y+1)}{2} - R_y, \quad U = n_y n_x - U',$$

H_0: two samples come from the same population (i.e. have the same median),
H_1: two samples come not from the same population (i.e. have different median),

where n_x is the number of observations or the range of the x-th file, n_y is the number of observations with respect to the of the y-th file, R_y - the sum of the ranks of the y-th file, and U, U′ are test statistics.

- Kolmogorov-Smirnov test

$$KS = sup\left|F_{1,n_1}(x) - F_{2,n_2}(x)\right|,$$
$$-\infty < x < \infty$$

H_0: two samples are from the same continuous distribution,
H_1: two samples are from different continuous distribution,

where $F_{1,n_1}(x)$ is an empirical distribution function of the first selection, $F_{2,n_2}(x)$ is an empirical distribution function of the second selection.

- Kruskal-Wallis test

$$Q = \frac{12}{n(n-1)} \sum_{i=1}^{I} \frac{T_i^2}{n_i} - 3(n+1),$$

H_0: k samples come from the same population (i.e. have the same median),
H_1: k samples come not from the same population (i.e. have different median),

where n is the total number of observations, n_i is the number of observations in the i-th group, T_i^2 is the total sum of ranks in the i-th group, k is the number of sample groups.

- Levene test

$$LE = \frac{(N-k)}{(k-1)} \frac{\sum_{i=1}^{k} N_i (Z_i - Z_{..})^2}{\sum_{i=1}^{k} \sum_{j=1}^{N_i} (Z_{ij} - Z_{i.})^2},$$

H_0: samples variances are equal across all samples,
H_1: sample variances are not equal for at least one pair,

where k is the number of values in the monitored variable category, N is the total number of observations, N_i is the number of observations in the i-th group, Y_{ij} is the measured value of the j-th unit of the i-th group, $\overline{Y_i}$ is the average value of the i-th group, $\tilde{Y}_i$ is the median of the i-th group, $Z_{..}$ is the average of the groups (Z_{ij}), and $Z_{i.}$ is the average of Z_{ij} for the i-th group.

The analysis is processed in the MS Excel environment and statistical programs Statgraphics XVIII and Stastistica 13.4.

Empirical results and discussion

The results of the presented research can be divided into three parts. In the first of them, we focus on the differences in the monitored e-commerce parameters during the weekend and during the working week. Subsequently, we focus on the analysis during the working week, which are evaluated in terms of individual days as well as time intervals.

The number of comments is slightly higher during the working week, but this is not statistically significant. During the working week, however, we follow significantly more published posts, more likes, and people also more share individual posts. The activity is therefore higher during the working week, which at first glance says against the home office. The interest of the monitored group of users in e-commerce is therefore declining over the weekend.
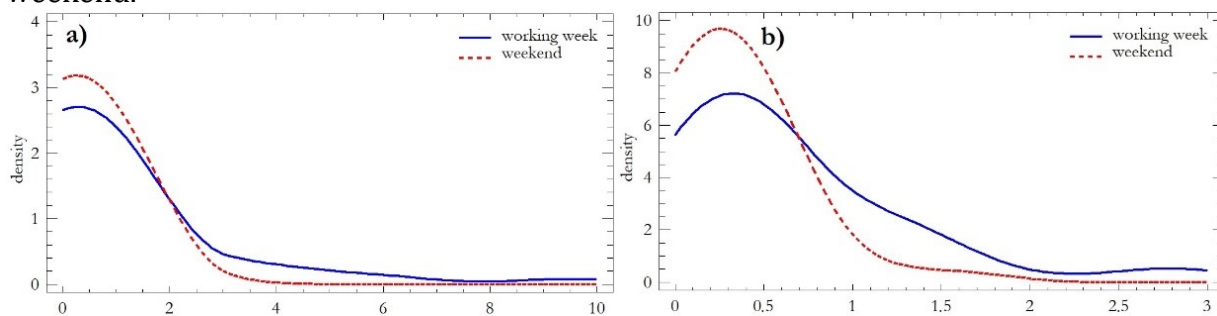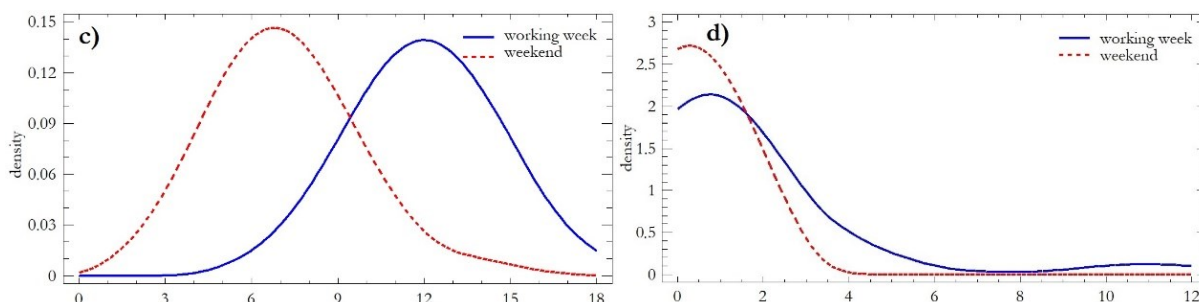
Figure 2. Comparison of the distribution function of selected e-commerce parameters during and outside the weekend

Legend: a) comment analysis, b) like analysis, c) post analysis, d) share analysis

From the point of view of individual monitored parameters (a.o.t. also moment characteristics), these differences are statistically significant in the majority of cases. The null hypotheses of the Mann-Whitney test and the Kolmogorov-Smirnov test are rejected for a degree of significance of 0.05 (except comments). The smallest differences, as Figure 2 suggests, are observed in the number of comments during the weekend and the working week. The numbers of likes and shares can be described as diametrically different (see Table 2).

Table 2. Statistical comparison of selected moment characteristics (working week vs. weekend)

	comments	likes	posts	shares
median comparison	U=438	U=348**	U=53***	U=291.5***
distribution function comparison	KS=0.76	KS=1.37**	KS=3.43***	KS=1.55**

Shapiro-Wilk test does not confirm the normality of individual groups of data.

Legend: * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

From the point of view of each of the monitored parameters, the "most interactive" day in the working week is Wednesday, when we monitor the most comments, likes and shares. In the number of posts, the stability/ resp. composure was confirmed again. As the most passive day we can mark the beginning, respectively. end of working week. On the one hand, we can attribute this to the end of the weekend experience, as well as to the dedication to leisure activities outside the digital world.
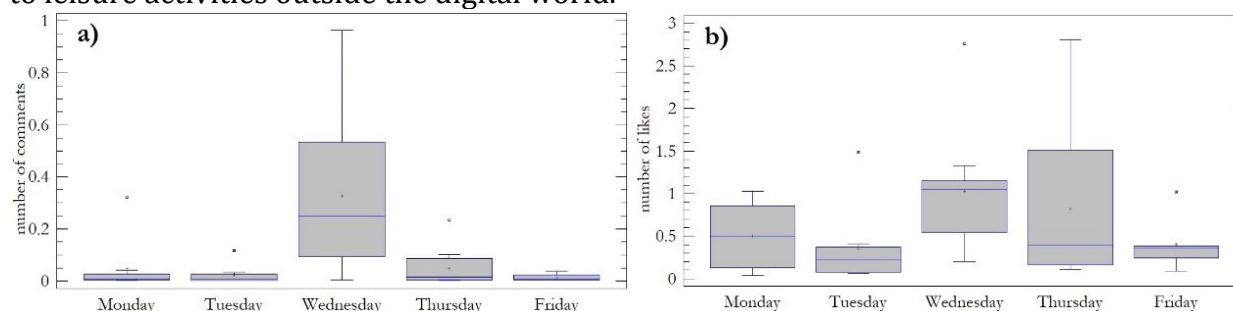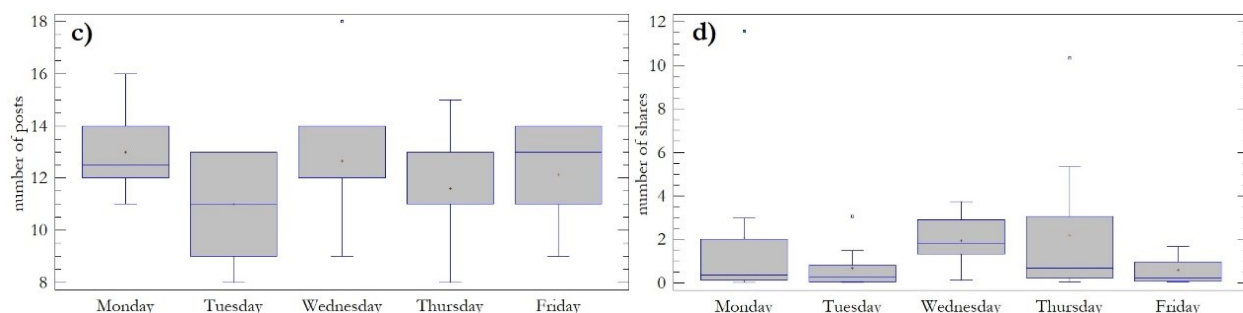
Figure 3. Comparison of selected e-commerce parameters during working weekdays

Source: Authors' calculations.

Legend: a) comment analysis, b) like analysis, c) post analysis, d) share analysis

Statistically significant differences at the level of individual working days can be observed mainly in the number of comments. The null hypotheses of the Kruskal-Wallis test and the Levene test are rejected for a degree of significance of 0.1 (except posts). Apart from the number of posts, the differences were also confirmed in the other two monitored indicators, which, however, we attribute to an even distribution of the activities of individual e-shops on social network (see Table 3).

Table 3. Statistical comparison of selected moment characteristics (working weekdays)

	comments	**likes**	**posts**	**shares**
median comparison	Q=13.03**	Q=8.80*	Q=4.23	Q=7.80*
variance comparison	LE=8.28***	LE=2.67**	LE=0.29	LE=3.07**

Shapiro-Wilk test does not confirm the normality of individual groups of data.

Source: Authors' calculations.

Legend: * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

Based on the fact that most employees tend to have 8 working hours during the workday, and those are set from 8 am to 4 pm, then based on an interval comparison (even if it is graphically distorted by outliers), we can conclude:
- There is a minimal interest about e-commerce activities before working hours.
- As one of the first think after arriving at work, respectively after connecting to the web (home office), employees will start interacting with the profile of their preferred e-shop.
- Gradually during the day, the number of likes and shares decreases, but the number of comments increases.

Paradoxically, the maxima in terms of the number of posts (in other words quantity of e-marketing communication activities of e-commerce entities) are recorded with the end, respectively after working hours.
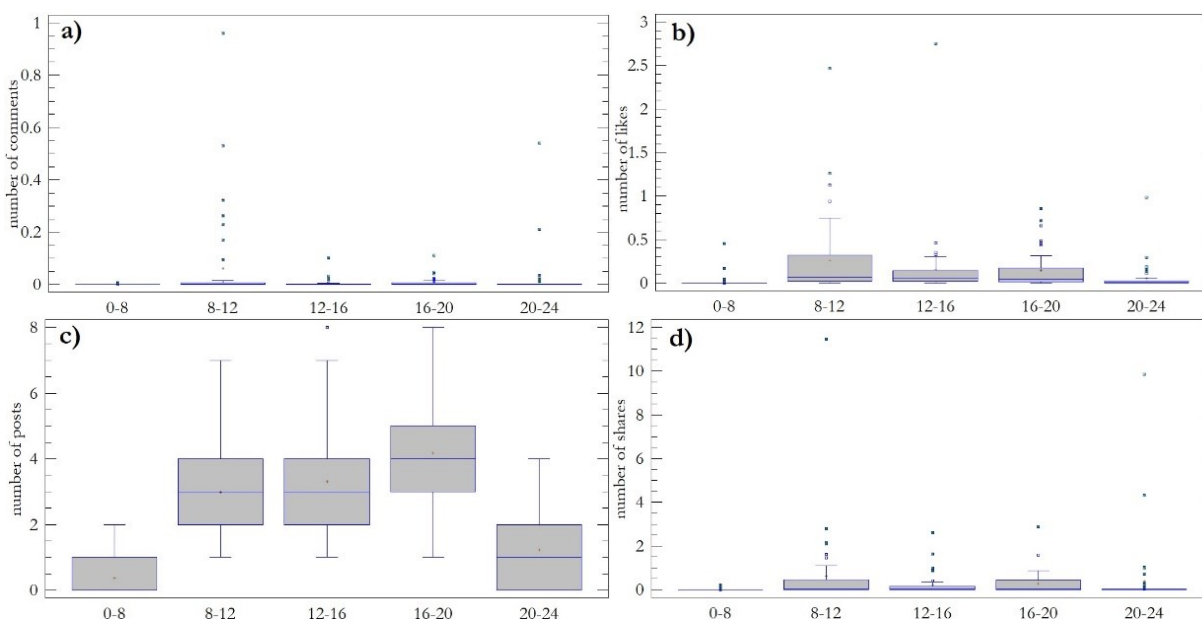
Figure 3. Comparison of selected e-commerce parameters (e-marketing activities of e-shops as well as individual interactions of their customer groups) during individual time intervals within the days of the working week

Source: Authors' calculations.
Legend: a) comment analysis, b) like analysis, c) post analysis, d) share analysis

The null hypotheses of the Kruskal-Wallis test and the Levene test are rejected for a degree of significance of 0.01. Confirmed statistically significant differences are attributed mainly to the first and the last time interval, which are significantly undersized in terms of individual indicators (see Table 4).

Table 4. Statistical comparison of selected moment characteristics (time intervals in days of working week)

	comments	likes	posts	shares
median comparison	Q=12.71***	Q=7.44***	Q=130.12***	Q=78.23***
variance comparison	LE=76.35***	LE=84.8***	LE=6.83***	LE=4.70***

Shapiro-Wilk test does not confirm the normality of individual groups of data.
Source: Authors' calculations.
Legend: * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level.

From the point of view of the discussion of the findings, it can be stated that based on studies of Baur & Trench (2020), as well as Buhalis, Parra Lopez & Martinez-Gonzalez (2020) we indicated baselines in the context of changed trends on both sides of the market. Thus, we conclude that the Central European market will also show changed characteristics. Within the studies Pollák & Konečný (2021) as well as Pollák, Markovič, Váchal & Vavrek (2021), we created a reference knowledge base preceding the statistical processing of the dataset. Based on that studies we were able to identify the basic trend lines, which are confirmed in the presented results. From the point of view of general findings that resulted from the realized empirical study, it is possible to state that the effectiveness of time management is

statistically verified from several angles. Whether it's verification through a distribution function or scattering. Based on the characteristics of the processed data, a group of nonparametric tests was used, including the Kolmogorov-Smirnov test, the Levene test or the Mann-Whitney test. From the point of view of specific findings, the differences between the weekend and the working week in the number of interactions, both likes, posts and shares were statistically significant (three out of four monitored variables). Among other findings, we can call Friday the most "e-passive" working day, during which we record the most significant decline of number of user interactions. From the point of view of time frames analyzed in the study, it can also be stated that the number of posts on the profiles of monitored e-commerce entities grows almost smoothly over the working day, while in other parameters we observe a slight variance in the form of user activity, especially at the beginning of the working day.

Conclusion

During the pandemic, there was a major reallocation of digital customer interactions in terms of their timing. From the point of view of hard data, most interactions take place during the working week, culminating in the middle of the working week and declining significantly at the end of the working week. From a day-to-day perspective, most of the interactions occur at around noon. In view of the findings, it can be stated that in order to maintain the competitiveness resulting from efficient management of corporate resources, it will be necessary to modify the usual procedures of e-marketing communication. A significant part of the posts, i.e., e-marketing communication of business entities, was realized in the monitored period to the afternoon and early evening. Under the influence of shifts in daily stereotypes, customers reflected these activities to a lesser extent than in the past. This reduced the efficiency of spending corporate resources on promotion. It is also possible to assume a decline in the competitiveness of entities that were not prepared to reflect on changes in data in real time, compared to their more flexible competitors. There is also a presumption of the need to modify the usual procedures for human resources management in terms of the optimization of workflow of employees working from home.

From the point of view of the soft data, we have identified a number of specificities that only complete the complex and uncertain period in which all market players were present during the first wave of the COVID-19 pandemic. One of the key factors that could be identified is a certain degree of humility on the part of the consumer, where under the pressure of circumstances, consumers were willing to tolerate facts such as delays or cancellations of the ordered goods. Similar facts in the pre-crisis period created a relatively large space for negative user reactions and thus the reputational risk of business entities. However, this fact was not reflected in the long-term trend, from the ongoing research of the second lockdown (autumn 2020), it is clear that all parties in the market have adapted to partially changed conditions. Both customers and businesses have accepted the changed market conditions as a new standard. Again, quality is not only expected but also required. These connections are ultimately pointed out by recently published studies by the author, who deal with the issue in a similar way (Dvorak, Komarkova, Stehlik, 2021; Islam, 2021).

We are of the opinion that the competitiveness of companies will continue to be exposed to market turbulence, so it is necessary to constantly monitor, analyse and evaluate data. Real-time analysis is necessary in certain (if not in all) market segments.

Limitations and further direction of research

The biggest limitation of presented research is its qualitative nature. Regardless of the relatively large sample used in the implementation of the research as such, the generalization of findings is mainly determined by its geographical location. Another limitation may be the possible seasonality of the data. It is assumed that data change their values over time during the year. The authors' research efforts for the future are aimed at eliminating these limitations. Data collection is currently underway that reflects the winter season, including the autumn lockdown, which continues to this day. We plan to follow up this data collection, with which we will be able to map the shift in interactions from the point of view of an interval of one year. The research effort will result in the creation of a knowledge base for the preparation of the project (and the formation of a consortium) focused on the analysis of the long-term effects of the COVID-19 pandemic on the economy.

Acknowledgement

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