Changes in the retail market structure through the prism of consumer behaviour

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Abstract

The development of e-commerce (e-tail, electronic retailing) has become the reason for many changes in the entire retail industry, including brick-and-mortar retailing during the past years. The changes do not affect only the companies but also consumer behaviour. From the gradual growth of sales in e-commerce and its share on the total retail sales, it can be demonstrated that a part of consumer demand transfers to the online environment. However, this transfer is neither evenly distributed, not absolute. There are many noticeable differences, e.g., according to the assortment or socio-demographic structure of consumers (etc.). Simultaneously, based on selected statistic indicators, it can be observed that the structure of retail has been changing. This paper aims to assess the relationship between the growth in online sales and changes in the retail market structure.

Introduction

Although newspapers mark e-commerce retailers (sometimes also so-called e-tailers or electronic retailers) to be the "winners" of the current corona crisis (Horáček, 2021; Bidrmanová, 2021; Klánová, 2021), some studies (Buck et al., 2020; Prouza, 2020) present in their papers facts proving that significant portion of consumers returned to their former consumer behaviour, represented mainly by shopping in brick-and-mortar stores immediately as it was possible. Only a small part of consumers have changed their behaviour permanently to the benefit of e-commerce. Even if these are limited ad hoc surveys, and the actual consequences of the pandemic on retail will still have to be explored in detail, they indicate a sense in studying the development of e-commerce in the pre-covid time.

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Hence, we will have to wait for a definite answer whether the corona pandemic is a catalyst of e-commerce development. Unequivocally, e-commerce prosperity is closely linked to the evolvement of technologies. However, this condition is necessary, but not sufficient. The critical element is the change in consumers' behaviour, and therefore this should be investigated as the first one. This paper aims to realise how the development of e-commerce influences the changes in the structure of Czech retail by the prism of changes in consumer behaviour.

1   Literature review

The retail structure can be investigated from various points of view, e.g., according to the subjects' legal form, by the share of foreign investment, etc. However, the standard structuring follows official statistics, especially NACE. Therefore, the structure according to the prevalent assortment is mainly watched.

More apparent changes in market structure have begun to manifest, first, linked to the new buying trends (e.g., interest in specialty stores), and second, with the development of e-commerce. The latter lead to a new item in the NACE statistics "CZ-NACE 4791 – retail sale via mail order houses or via Internet" (European Union, 2006). Despite that, the development has been only gradual, only by some per cent, which was primarily caused by prolonged changes in consumer behaviour, which usually has a certain inertia. Even if the share of European consumers that purchased at least once online was between 22 per cent (Ukraine) and 88 per cent (Switzerland) in 2018, with the average value around 61 per cent and although the e-commerce turnover has been rising (Statista, 2021), the change in consumer behaviour is not as vigorous to be able to claim that the deviation to e-commerce will change the structure of the retail market significantly.

The changes in consumer behaviour resulting from digitalisation can be observed for a longer time. The main factor that has enabled these changes is the households' access to the Internet (see e. g. Eurostat, 2021a). Examining the changes in consumer behaviour in scientific papers has a wide range of forms.

For instance, Hagberg et al. (2017) rate the influence of retail digitalisation as the issue of the impact on brick-and-mortar stores. This implication is understood in three shapes: "implication as effect, implication as integration, implication as value" (Hagberg et al., 2017, p. 265).

As an example of the fact that "implication as effect refers to how physical stores may be affected by digitalisation" (Hagberg et al., 2017, p. 265) can serve the conclusions of Luo et al. (2020, p. 974), whose "study reveals that omnichannel retailers should be cautious when targeting distal customers, due to potential cannibalisation effects that might reduce the total sales revenues." Jocevski (2020, p. 114) can also be a good example of this, saying that "retailers need to adopt a customer-centric approach, matching contemporary customers' needs and values with the help of analytics of data collected from both physical and digital retail spaces."

The second implication of Hagberg et al. (2017) is "implication as integration," stating that "the integration, interweaving and entanglement of the digital into retailing

takes many forms." (p. 206). This can be demonstrated by Johnson and Ramirez's (2020, p. 97) findings that "online retailers should encourage showrooming in both online and in-store retail channels, through tactics such as in-store signage, online messaging and marketing campaigns." This implication can also be found in the paper of Kim et al. (2020, p. 11) that claim that "retailers should understand why consumers do not choose Buy-Online-Pick-Up-In-Store services, and strive to recover these choice barriers and cope with the reasons against behavioural factors."

Third, "implication as value directs attention to the meanings and significance of the physical stores in an increasingly digitalised retailing landscape" (Hagberg et al., 2017, p. 266). This corresponds to the outcomings of Dekimpe et al. (2019, p. 25), stating that "brick-and-mortar stores can continue to play a pivotal role in consumers' shopper journey." On the other hand, Reinartz et al. (2019, p. 362) claim that "in this new environment, many retailers recognize that they will not be able to compete efficiently, on the price or the assortment dimension with pure online retailers or with platforms."

Grewal et al. (2017) distinguish five key areas that influence the future of retailing. And digitalisation is not necessarily accentuated in all these areas, which are: "(1) technology and tools to facilitate decision making, (2) visual display and merchandise offer decisions, (3) consumption and engagement, (4) big data collection and usage, and (5) analytics and profitability." (Grewal et al., 2017, p. 1). Chen et al. (2020) give an example of the first area searching, even in the time of dynamic retail digitalisation, the ways to optimize the profit of the brick-and-mortar stores. With the help of advanced mathematical methods, they aim to solve the issue that "retail shelf space is an essential resource for retailers to meet customer demands and influence customer purchase decisions." (Chen et al., 2020, p. 14). The second area is supported by the conclusions of Lick et al. (2020), that investigated the usage of a verbo-visual window in brick-and-mortar stores. They came to the findings that "that the interaction between complexity and perceived attractiveness of store windows affects store entry propensity." (Lick et al., 2020, p. 511). The example of the third area of "consumption and engagement" is to be found in Marmol et al. (2020) that studies the efficiency of the choice of the offered assortment with the help of algorithmisation methods. He concluded that "increasing levels of competitiveness among brands, as well as among channels of the same brand, make it difficult for retailers in brick-and-mortar stores to engage customers while in the shop." (Marmol et al., 2020, p. 19). The fourth area is supported by Johnson et al. (2019). Their research investigated the use of big data in marketing. Apart from others, they realized that it is the "overreliance on external partners for big data analytics learning, that can slow marketing big data analytics progress." (Johnson et al., 2019, p. 175). This is also one of the challenges for retail. Sarkar et al. (2019) deal with the fifth area in their paper, with the topic of discount mechanisms by the perishable goods. They came to the opinion "that the joint decision-making policy is beneficial from the whole supply chain viewpoint" (Sarkar, et al., 2019, p. 21), and therefore, that the profitability should be handled at the level of the whole supplier chain.

Apart from the examples named earlier of consumer behaviour changes, aggregate data about e-commerce can also be found in official statistics (e g. Statista, 2020; Eurostat, 2021b).

As it is clear from the above mentioned, retailing and its changes caused by digitalisation are topics of a whole range of scientific papers. (Which does not mean that

retail would be in the centre of scientific research only linked to digitalisation). Concerning the structure of retail market, it can be claimed that methodically, it is internationally stable. The statistical classification of economic activities NACE is used to describe the structure (European Union, 2006), which is an integral part of the international system of economic classifications. After careful analysis of the literature through Web of Science, we concluded that the influence of e-commerce on the retail market's organizational structure is an area omitted in this context up till now.

2   Methodology

The data from the Czech Statistical Office (CSO) forms the basis for the investigation. It is clear that, formerly, e-commerce retail was understood as a relatively minor issue, which is reflected in the low amount of data observed. However, it can be acknowledged that almost from the beginning of the more substantial development of e-commerce, the Office pays its attention to this area. In the case of the data about shopping on the Internet, the result is that some timelines are, on the one hand, relatively short and, on the other hand, from the point of the data definition, non-consistent. This is also a certain limitation for deeper analysis of the data. The data was calculated or, in another way, edited, where possible, to ensure their relevancy. This was not possible in all cases, and therefore the observations have various time lengths, whereas the aim was to use a maximum of valid data. The data concerning retailers was investigated from 2010 when a consistent row can be downloaded till 2018. Later data is not verified, and they were therefore not included in the paper. The CSO does not register e-commerce retail separately, but it collects data for "retail sale via mail order houses or via Internet" within CZ-NACE 47.91. As recently, the classical delivery services through a catalogue (eventually teleshopping) have almost disappeared, respectively transformed to the online environment; this section NACE can be considered as the e-commerce company data. The obtained data was then processed by standard mathematic-statistical methods. The investigation is focused consistently on Czech retail; international comparison could be a further direction of scientific research.
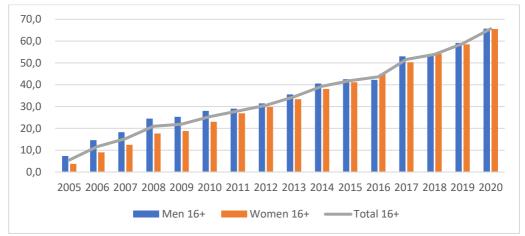
3   Results and Discussion

Regarding the logical sequence, we will investigate the changes in consumer behaviour related to the e-commerce environment first. Then the changes in retail, respectively e-commerce retail, will be tackled.

3.1 Consumer behaviour in e-commerce retail

The number of persons buying on the Internet has been continuously growing in recent years with the pace at which those generations (growing up with the Internet and familiar with this environment) have engaged in active life. The following graph

shows the proportion of persons older than 16 years that have bought something via the Internet at least once during the last twelve months. The graph also shows that at the beginning of the observed period, men were more active in their e-shopping, this share has gradually become equal. Recently, almost two-thirds of the inhabitants older than 16 years have an experience with Internet shopping within the last 12 months. There are built-in styles for a paper title, author, abstract, key words, introduction, section heading, sub-section heading, paper text, tables, graphs, figures, bullets, conclusion and list of references in this template.

Graph 1 The share of persons that have shopped on the Internet in the given category at least once during the last 12 months

Source: Processed based on (ČSÚ, 2010; ČSÚ, 2011; ČSÚ, 2012; ČSÚ, 2013; ČSÚ, 2013; ČSÚ, 2014; ČSÚ, 2015; ČSÚ, 2016; ČSÚ, 2017; ČSÚ, 2018; ČSÚ, 2019; ČSÚ, 2020).

The development of the Internet buyers' share is not steady; the increments in particular years are counted in the following table. The higher increase in 2020 is understandable in the light of the partial lockdown, and closing of brick-and-mortar stores due to the pandemic.

Tab. 1 The increments of the Internet buyers in the timeline (per centage from the given category, compared to the previous year)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 16+	6.2	3.6	5.7	0.9	3.4	2.6	2.6	3.8	4.8	2.6	1.8	8.0	2.3	4.9	6.9
Men 16+	7.3	3.7	6.2	0.8	2.7	1.1	2.5	4.1	5.0	2.0	-0.3	10.7	0.6	5.6	6.5
Women 16+	5.2	3.5	5.2	1.1	4.2	3.9	2.9	3.6	4.7	3.1	3.8	5.4	3.9	4.3	7.1

Source: Processed based on (ČSÚ, 2010; ČSÚ, 2011; ČSÚ, 2012; ČSÚ, 2013; ČSÚ, 2013; ČSÚ, 2014; ČSÚ, 2015; ČSÚ, 2016; ČSÚ, 2017; ČSÚ, 2018; ČSÚ, 2019; ČSÚ, 2020)

Comparing the persons buying on the Internet according to the age, education and economic activity is very interesting, as the following table shows.

Tab. 2 The share of persons that have shopped on the Internet at least once during the last 12 months according to demographic groups

Age	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
16–24 years	6.7	18.2	22.9	35.0	31.7	38.8	40.5	46.3	53.9	62.2	60.6	58.7	69.8	71.0	81.4	85.5
25–34 years	9.7	18.9	25.1	35.6	37.9	44.5	48.0	54.3	58.3	63.2	66.9	72.0	79.1	81.3	86.5	91.2
35–44 years	9.7	17.6	21.5	26.0	30.1	34.7	39.3	43.1	46.9	52.6	59.2	59.4	70.9	71.4	76.9	86.1
45–54 years	4.0	9.6	13.7	18.7	18.4	22.1	25.3	27.9	32.4	40.1	41.2	46.6	56.2	63.8	69.8	77.7
55–64 years	1.8	4.7	6.9	9.6	11.3	10.5	13.1	15.7	19.8	21.7	25.7	28.3	38.6	41.2	45.4	57.0
65+	.	0.8	1.4	1.4	2.3	3.0	3.7	3.9	4.5	7.6	8.0	9.7	12.7	13.5	16.4	21.2
Education																
Basic	.	.	.	.	2.1	7.1	5.4	6	5.4	6.3	12.6	13.9	21.8	32.0	33.4	43.1
Secondary without A-levels	2.2	5.1	6.4	12.4	12.5	17.1	16.4	18.7	21.3	23.5	35.4	39.5	46.0	50.5	54.6	68.0
Secondary with A-levels+ higher schools	8.7	17.2	22.5	25.2	28.5	38.2	32.9	38.5	41.4	45.9	58.7	65.2	69.3	73.9	79.8	85.7
University	16.6	31.9	32.6	40.3	41.5	49.8	51.3	50.7	53.8	61.4	71.3	69.8	84.6	84.0	88.9	92.1
Economic activity																
Employed	8.2	15.9	20.2	27.2	28.2	33.0	35.9	40	45.0	50.3	53.8	56.0	66.5	68.4	74.4	82.2
Unemployed	3.0	5.5	8.8	11.5	18.2	21.3	25.7	23	27.3	33.8	33.8	31.5	36.7	38.5	40.5	60.1
Students	6.8	22.1	25.9	36.8	34.1	40.4	40.9	47.7	54.5	62.5	61.4	58.3	68.5	69.5	81.9	86.9
Pensioner	.	0.8	1.3	1.8	2.8	3.7	4.4	4.7	6.4	8.4	9.9	11.4	14.5	15.5	17.2	22.1

Source: Processed based on (ČSÚ, 2010; ČSÚ, 2011; ČSÚ, 2012; ČSÚ, 2013; ČSÚ, 2013; ČSÚ, 2014; ČSÚ, 2015; ČSÚ, 2016; ČSÚ, 2017; ČSÚ, 2018; ČSÚ, 2019; ČSÚ, 2020)

In all categories, gradual growth in the number of persons buying on the Internet can be observed, even if this growth is again not the same in all the categories and years (and in some years, there is even a decline in the number of the Internet buyers). If only the year-to-year increments were observed, the highest of them is found in the first three age categories. However, if we track the multiplication of the share in 2020 compared to the share in the first year observed, the last two age groups have grown most of all. In category 55-64, the per centage of persons buying on the Internet has risen almost 32 times during the last 15 years.

The increase in the age groups can be divided into two parts. The first is linked to an actual transfer of consumers' interest into the e-commerce sphere; the second is a mere effect of the active persons' gradual movement into the higher age groups. For instance, 44.5 per cent of the group 24-34 years in 2010 were e-buyers, whereas it was 86.1 per cent in 35-44 years in 2020 (the same year of birth). Therefore, in the group of people born between 1976 and 1985, the share has risen by 41.6 per centage points during the last ten years. Comparing the decades (e.g., the year 2005 versus 2015) in the table above, there is always a rise in the share of people buying via the Internet in the groups of people with the same year of birth.

As far as education is concerned, a positive correlation between the share of the Internet-buying persons and education level can be observed. However, significant growth occurs in all categories. Students are the most active buyers on the Internet, followed by the group of the employed. The lower share in the group of pensioners also relates to the per centage in the age group.

The number of persons that shop on the Internet grows. Moreover, the consumer behaviour of these people also changes. We have to admit that the following data is not entirely consistent. Respectively they have not been observed all the years, and there-fore even shorter timelines are cited. Despite this, the changes in the behaviour of the buyers can be well demonstrated by them.

Tab. 3 The frequency of buying on the Internet within three months (persons 16+, a per centage in the given category)

	2015	2016	2017	2018	2019	2020
1-2 online purchases	14.8	13.9	15.0	15.3	15.1	16.0
3-5 online purchases	7.4	9.4	11.2	13.1	17.2	21.5
6 and more online pur-chases	1.8	3.3	4.9	5.9	6.7	16.3

Source: Processed based on (ČSÚ, 2015; ČSÚ, 2016; ČSÚ, 2017; ČSÚ, 2018; ČSÚ, 2019; ČSÚ, 2020)

The purchasing frequency has been increasing, and the persons shopping online during the last three months make most often 3-5 purchases. The increased number of purchases in 2020 is derived from this year's specific conditions, and it is not clear whether this frequency will also continue after the lockdown. Mainly the group of six plus purchases per quarter is doubtful. It can be assumed that not to such an extent.

The age group of 25-34 years shops the most often via the Internet (32.7 per cent have done their shopping on the Internet more than six times during the last three months in 2020), and the group of 35-44 years (23.8 per cent). From the point of view of education, the most active group is university graduates. A third (32.1 per cent) shops via the Internet with the buying frequency of 3-5 purchases per quarter and another third (35 per cent) even more than six times during this period. An interesting comparison of buying frequency from the point of view of the economic status of the respondents is shown in the following table:

Tab. 4 Frequency of purchases on the Internet within the last three months (persons older than 16 years, a per centage in the given category)

		2015	2016	2017	2018	2019	2020
1-2 pur-chases	Employed	18.4	17.7	19.1	18.2	18.7	20.4
	Unemployed	18.2	10.2	5.2	15.5	x	12.6
	Maternity leave	23.5	21.7	28.8	20.4	15.2	9.2
	students	22.4	19.4	18.2	25.7	25.6	20.5
	pensioners	3.4	4.0	4.6	5.2	4.7	6.9
	Disabled pen-sioners	x	7.1	9.2	12.0	6.4	13.1
3-5 pur-chases	Employed	10.0	12.1	14.5	16.7	21.8	26.8
	Unemployed	3.6	6.0	10.5	6.0	x	24.9
	Maternity leave	16.1	20.4	19.8	30.3	29.2	35.3
	students	9.5	12.4	16.6	18.3	28.1	28.8
	pensioners	1.3	1.5	1.6	1.8	3.1	6.1
	Disabled pen-sioners	x	5.2	7.4	6.2	7.4	14.7
more than six pur-chases	Employed	2.3	4.3	6.7	7.5	8.7	20.6
	Unemployed	2.9	0.9	5.5	8.8	x	13.0
	Maternity leave	5.0	8.1	9.5	17.7	19.7	35.0
	students	2.8	5.1	5.5	5.0	5.5	25.0
	pensioners	0.0	0.2	0.5	0.7	1.0	2.3
	Disabled pen-sioners	x	0.6	1.7	1.9	0.8	5.2

Source: Processed based on (ČSÚ 2015; ČSÚ 2016; ČSÚ 2017; ČSÚ 2018; ČSÚ 2019; ČSÚ 2020)

Women on maternity leave are the group buying the most of all on the Internet. Their share in the groups with higher buying frequency has been rising, especially in the last three years. Reasons for this phenomenon could be only speculated. It can be a whole range of motives from the positive ones, as "the Internet saves time for the family", to the negative ones like dependency, while this group belongs to the most endangered. Except for pensioners, other groups have significantly risen their buying frequency in 2020. This could have been assumed as it is a response to the partial closing of brick-and-mortar stores.

From the point of view of expenses on the internet buying, it does not depend only on the frequency but also on the sum of the spending. In this area, only the data for

the last five years are at disposal; the sum of the purchases had been defined in another way formerly.

Tab. 5 Expenses on buying on the Internet for the last three months (persons older than 16 years, a per centage in the given category)

	2016	2017	2018	2019	2020
Up to 2500 CZK	9.8	11.1	11.5	14.9	19.0
2500-10000 CZK	12.4	13.9	16.6	18.0	24.9
More than 10000 CZK	4.1	5.8	6.2	6.2	9.9

Source: Processed based on (ČSÚ, 2016; ČSÚ, 2017; ČSÚ, 2018; ČSÚ, 2019; ČSÚ, 2020)

The pandemic and respective measures again influence a more significant rise in expenses in 2020. In all the age categories, the share of the persons with higher expenses increases. Similarly to the frequency of purchases, the most increased spending is found with university graduates. In both groups with higher spending, the highest share is found among women in the household (and maternity leave): 45.2 per cent when spending 2,500-10,000 CZK and 17.6 per cent when spending more than 10,000 CZK last three months in 2020. However, this group dominates the table regardless of the pandemic.

As far as the country of origin of the retailers is concerned, it is not surprising that the Czech retailers dominate. Nevertheless, it is an interesting fact that in the case of the foreign retailers, the dominancy of those from the EU is not unambiguous. These shares have been changing during the last years, and in 2019, the percentage of retailers from and outside of the EU was almost the same. The group buying the most of all abroad out of the EU is represented mainly by the students. Concerning the EU purchases, the dominancy of particular groups has been changing during the last years.

From the point of view of assortment, it is impossible to investigate longer time-lines, as the definition of categories has been changed several times. Clothing is a typical case. A deeper analysis would be recommended; the data shows an increase in e-commerce buying, mainly the younger age categories are relatively active online. However, the data is concerning the definition of the categories consistent only in very short periods, and therefore not to be compared (i.e., it sometimes includes also sportswear, sometimes fashion accessories, etc.)

It can therefore be claimed that the changes in the consumer behaviour related to buying on the Internet occur, the share of consumers' buying online has been increasing, the frequency of online purchases and the expenses have been rising as well. These factors can then influence the overall environment of the retail, and not only e-tail.

3.2 The development of the retail market

In the text above, we described the changes in the buying consumer behaviour, from which it can be derived, that they would significantly help the development of e-

commerce retailing. The question is whether this development will also influence the overall changes in retail.

In 2018, 4,677 active retailers belonging to e-commerce were registered (CZ-NACE 47.91), representing a rise of almost 40 per cent compared to 2010. The share of these companies on particular indicators is shown in the following table.

Tab. 6 The share of e-commerce on particular indicators in retail (in per cent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Number of active enterprises	2.60	2.35	2.36	2.39	2.51	2.72	3.22	3.43	4.04
Average registered number of employees - FTE	1.84	1.92	2.01	2.19	2.55	3.15	3.50	4.42	5.24
Sales of goods for resale	3.52	4.16	4.14	4.43	5.14	6.40	7.29	7.66	9.16
Trade margin	3.12	3.34	3.36	3.74	4.17	5.07	5.86	6.51	7.95

Source: Processed based on (ČSÚ, 2020b)

There is to be seen the growth in the share of e-commerce companies from all the chosen categories, while the relative rise in sales is disproportional to e-commerce companies' benefit. To compare the increase of sales in absolute numbers with the index of difference (except for 2013), the increment of the e-tailers represents only a part of the increment of the whole retail industry's sales. Therefore, there is also a growth in sales in brick-and-mortar stores.

Tab. 7 Yearly increments of sales (in million CZK)

Indicator	CZ-NACE	2011	2012	2013	2014	2015	2016	2017	2018
Sales of goods and services and sales of goods for resale	47[*]	25 836	9 204	-5 495	21 671	31 682	33 816	73 902	66 714
Sales of goods for resale	47	24 294	5 950	-1 751	19 418	33 496	33 858	70 954	65 451
Sales of goods and services and sales of goods for resale	47.91[**]	6 474	-13	2 914	7 486	14 042	11 606	11 039	22 660
Sales of goods for resale	47.91	6 459	76	2 505	7 276	13 456	10 834	9 054	21 597

Source: Processed based on (ČSÚ, 2020b)

* CZ-NACE 47 is retail trade (except for motor vehicles and motorcycles).

** CZ-NACE 47.91 is a retail sale via the Internet.

From the point of view of the growth rate in particular years, the chain indexes illustrate that e-tailing grows faster in most cases.

Tab. 8 Chain indexes of chosen indicators

Indicator	CZ-NACE	2011	2012	2013	2014	2015	2016	2017	2018
Number of active enterprises	47 without 47.91	1.051	0.976	0.962	0.972	0.975	0.959	0.971	1.013
	47.91	0.950	0.979	0.972	1.023	1.062	1.139	1.038	1.202
Average registered number of employees - FTE	47 without 47.91	0.971	0.992	0.967	0.993	1.001	1.004	0.998	1.022
	47.91	1.014	1.043	1.056	1.159	1.244	1.118	1.275	1.221
Sales of goods for resale	47 without 47.91	1.022	1.007	0.995	1.014	1.023	1.026	1.069	1.046
	47.91	1.215	1.002	1.068	1.186	1.290	1.181	1.128	1.271
Trade margin	47 without 47.91	1.004	0.986	0.980	1.026	1.051	1.091	1.109	1.062
	47.91	1.078	0.992	1.095	1.149	1.291	1.272	1.239	1.318

Source: Processed based on (ČSÚ, 2020b)

Nevertheless, although the growth rate of margin is higher, the trade margin, respectively its share on sales of goods, is lower in e-commerce companies.

Tab. 9 Share of trade margin on sales of goods (in per cent)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	24.0	23.5	23.0	22.7	22.9	23.4	24.9	25.9	26.3
47.91	21.3	18.9	18.7	19.2	18.6	18.6	20.0	22.0	22.8

Source: Processed based on (ČSÚ, 2020b)

To be able to assess the size of e-commerce companies, it was necessary to calculate average values. Regarding the fact that most e-commerce companies belong to small and medium-sized enterprises (SMEs), a comparison was made with this retail company group.

Tab. 10 The average number of employees in the company (number of persons)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	1,83	1.69	1.72	1.74	1.78	1.83	1.91	1.98	2.00
47 without 47.91	1,84	1.70	1.73	1.74	1.78	1.82	1.91	1.96	1.98
47.91	1,29	1.38	1.47	1.60	1.81	2.12	2.08	2.55	2.60
47 - SME*	1,05	0.95	0.94	0.93	0.91	0.92	0.94	0.97	0.95

Source: Processed based on (ČSÚ, 2020b)

* Small and medium enterprises.

From 2014, it can be observed that, from the point of view of the average number of employees, the e-commerce companies are the biggest, even if they belong mainly to the category of micro-companies, like other retail SMEs. However, the question is whether this number is not misrepresented by the number of employees of big e-commerce companies much more than in the other observed categories (because the base is much smaller).

Tab. 11 The average sales of goods per company (in million CZK)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	6.61	6.49	6.69	6.94	7.29	7.74	8.31	9.17	9.56
47 without 47.91	6.55	6.37	6.57	6.80	7.09	7.44	7.96	8.77	9.05
47.91	8.96	11.46	11.73	12.89	14.95	18.17	18.84	20.48	21.66
47 - SME	3.69	3.57	3.59	3.64	3.78	3.86	4.06	4.46	4.49

Source: Processed based on (ČSÚ, 2020b)

From the point of view of average sales per company, the e-commerce companies seem to be the biggest compared to the industry as a whole, after deducting the indicators of e-commerce companies and in comparison with the indicators of SMEs. With regards to the fact that, in this case, there are several international retail chains with high sales in the first row of the table, this indicator can be understood as very meaningful.

The authors also compared the efficiency of the companies. Recalculation to one employee was chosen as a basis to which the indicators correspond. To eliminate the wages' inequality, the recalculation to one CZK of the wage was used.

Tab. 12 Sales of goods per one employer (in million CZK)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	3.62	3.83	3.88	4.00	4.10	4.22	4.35	4.63	4.77
47 without 47.91	3.56	3.74	3.80	3.91	3.99	4.08	4.18	4.47	4.57
47.91	6.93	8.31	7.98	8.07	8.26	8.57	9.06	8.02	8.35
47 - SME	3.50	3.77	3.82	3.93	4.13	4.19	4.30	4.61	4.73

Source: Processed based on (ČSÚ, 2020b)

Comparing the sales, the productivity of employees of e-commerce companies is almost two times higher in each year observed. This discrepancy is partially linked also to a higher margin per employee (see table 13). However, the critical factor is the costs of goods counted as sales minus margin, which is much higher in e-tail. Therefore, the margin can be a pregnant indicator to assess productivity, mainly because the average margin of e-commerce companies is lower than the margin in brick-and-mortar companies (see table 9).

Tab. 13 Margin per one employee (in million CZK)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	0.87	0.90	0.89	0.91	0.94	0.99	1.08	1.20	1.25
47 without 47.91	0.86	0.89	0.88	0.89	0.92	0.97	1.05	1.17	1.22
47.91	1.48	1.57	1.49	1.55	1.53	1.59	1.81	1.76	1.90
47 - SME	0.85	0.89	0.88	0.88	0.94	0.99	1.09	1.19	1.24

Source: Processed based on (ČSÚ, 2020b)

Recalculating the indicator to one CZK of wage eliminates the difference in wages in the observed groups of companies.

Tab. 14 Margin per one CZK of wage (in CZK)

CZ-NACE	2010	2011	2012	2013	2014	2015	2016	2017	2018
47	4.18	4.13	4.04	4.01	4.06	4.08	4.18	4.28	4.14
47 without 47.91	4.15	4.09	4.00	3.96	4.00	4.02	4.11	4.21	4.06
47.91	5.73	5.96	5.61	5.91	5.85	5.72	5.84	5.40	5.36
47 - SME	4.73	4.71	4.70	4.64	4.74	4.77	4.90	4.90	4.85

Source: Processed based on (ČSÚ, 2020b)

The difference between the groups is not as apparent in this table. Despite that, 1 CZK of wage generates a higher margin with e-commerce companies, which, also in the context of the average margin, allows us to conclude that e-commerce companies work more efficiently, respectively have higher productivity.

It would also be very interesting to investigate structure and indicators in particular retail segments according to the assortment. However, there is not enough consistent data for this study from the perspective of changes in consumer behaviour in the online environment. Also, more detailed data of e-commerce companies related to the assortment is missing. As it was described above, increasing e-buying of clothes can be derived from the data. Nevertheless, a decrease in the number of active companies in this sector (e-commerce and brick-and-mortar) can also be observed. However, the data is not sufficient to prove some causality in the fashion industry. In this segment, compared to the number of active companies, the financial indicators are rising. Still, there is again

not enough data to prove that this growth is linked to e-commerce companies' prosperity. Therefore, considering the discrepancy in the increase of shares of online purchases in particular assortment segments, we are convinced that it would be helpful to collect more detailed data that would help explain the changes in the structure of these segments.

Conclusions, limitations, and future research suggestions

To conclude, with regards to the fact that the development of e-tailing needs changes in consumer behaviour, and based on the data above, it can be claimed that such a change already took place, respectively, that this change has still been occurring. Not only the absolute number of consumers buying online has been rising, but also the share of buyers in each age group has been increasing. With a higher frequency of purchases, even the size of spending has been growing. A transfer of sales to the online environment can be observed, whereas the growth rate of e-commerce companies is higher than in the whole retail industry. Nevertheless, it is still a relatively small part of the market. Although the absolute number of active companies has been declining since 2011 in brick-and-mortar retail (except the year 2018, CSU 2020b), it is disputable whether this is caused by the pressure of the emerging e-commerce companies. Other industry indicators have been rising, and e-commerce share on the increase in financial indicators is only partial. Therefore, brick-and-mortar retail also prospers. The influence of the development of e-tailing on the organisational structure of retail is, therefore, up until now relatively small. There are no significant changes in the overall structure. However, with gradual changes in consumer behaviour, it will strengthen.

The investigation of this issue has its limits, especially in the lack of relevant data. Nowadays, the data also considering the impacts of the pandemic is lacking. There are two types of them: first, accelerated growth of e-commerce and transfer of the purchases into the online environment, and second, impacts of the lockdown on brick-and-mortar stores belonging mainly to the category of SMEs.

Current partial studies work with too short timelines to be able to assess possible impacts. It will primarily be necessary to pay attention to whether consumer behaviour changes are permanent, or only temporary. If it were the second case, a part of the demand would go back to brick-and-mortar stores, and the growth rate of e-commerce would slow down.

Another suggestion of future research, consists of assessing the influence of the development of e-commerce according to the assortment, because it is very different in various categories. In this case, the authors came to a problem of inconsistent data, because the assortment categories have been defined differently when observing consumer behaviour online over the years. Therefore, there is no longer timeline to be analysed. Moreover, detailed data focused on e-commerce companies divided according to the assortment, basic statistics, and financial indicators are missing. Therefore, it is difficult to search for the reasons for the retail companies' structure changes, if they should not be only estimations.

To sum up, it can be claimed that the development of e-commerce retail, is a power that will more and more influence retail and its structure in the future. Therefore, it should be studied and investigated in detail.

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