

Digitization and Automation in the Time of COVID-19 Pandemic and Their Impact on Sales of IT Sector Companies

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Abstract: *COVID-19 pandemic has affected sales in many sectors of industry in the Slovak Republic, as well as worldwide. Switch to online environment, movement and meeting restrictions have led to increase of using information technologies, Internet, using cloud storages for archiving documents that has immediately affected the increasing demand for goods and services of IT companies. The paper focuses on the analysis of the impact of increasing demand for information technologies in time of COVID-19 outbreak on changes in sales of IT companies. As the results showed, the increasing demand, did not affect the sales of IT companies in such a great scale as we expected.*

Keywords: *sales, COVID-19 outbreak, information technologies, automation, digitization*
JEL codes: M41, O12

1 Introduction

Information technologies have played a significant role in all spheres of human's lives since the first computer had been introduced. The Fourth Industrial Revolution known as the Digital Revolution is characterized by use of information technologies, creation of industrial networks, the global introduction of smart technologies, the building of so-called intelligent industry. Industry 4.0 has been automatically transformed into Industry 5.0, which enables smart-IoT (Internet of Things), then facilities and enables complete automation (Javaid et al., 2020). This revolution is to improve the efficiency of production and eliminate the human need. According to Özdemir and Hekim (2018), Industry 5.0 is poised to harness extreme automation and Big Data with safety, innovative technology policy, and responsible implementation science.

The demand for information technologies, automation and digitization increased especially in the time of COVID-19 pandemic. The switch of work and education into an online environment, as well as movement and meeting restrictions (Blahušíaková, Mokošová, and Šoltés, 2021; Donthu and Gustafsson, 2020; Berger et al., 2020; Leite, Hodgkinson, and Gruber, 2020; Kordošová, 2022; Kadlečíková, 2022) forced people and companies to find new ways of education, communication, new ways of exchanging and storing documents. The shift of business into the online environment due to restrictions related to COVID-19 pandemic has the technology industry growing faster more than ever. Skulmowski and Rey (2020) state that the COVID-19 crises can be a time of major reform that will accelerate the process of digitalization in an unprecedented way. The increase in use of information and smart technologies in education, medicine, business, even in common activities, the increase of automation and digitization of business processes have led to growing demand for information facilities. This increased demand has been automatically reflected in an increase in sales of companies producing information technologies, or providing services connected with information technologies. Despite the negative impact of COVID-19 pandemic on financial position of many companies, especially those from tourism and gastro sector (Fraccascia and Alvarado, 2020; Sharma et al, 2021; Rastegar, 2021; Gomes, 2021; Hornická, 2022), the sector of information technologies (hereafter referred to as "IT sector") is one of the sectors that is supposed to have increased its sales even in time of COVID-19 outbreak.

2 Methodology and Data

The aim of the paper is to analyze the changes in sales in companies operating in the IT sector in the accounting periods before the COVID-19 crises (2018, 2019) and during two years of COVID-19 crises (2020 and 2021) and to prove that IT sector belongs to sectors with increase in sales despite the crisis related to COVID-19 pandemic.

The data for the analysis were extracted from the financial statements of accounting entities operating in IT industry from the website www.finstat.sk. Out of the total number of accounting entities we have excluded those accounting entities that entered into liquidation in 2020 or in 2021, and those accounting entities that had presented negative sales in their financial statements in analyzed accounting periods.

We have divided accounting entities into three groups that were analyzed separately. The first group were accounting entities from IT sector (Table 1), the second group were accounting entities from IT retail sale (Table 2), and the third group were accounting entities from IT wholesale trade (table 3).

Table 1 Accounting Entities from IT sector

Division	Class	Number of accounting entities
58 Publishing activities		17
	58290 Other software publishing	17
62 Computer programming, consultancy and related activities		3 285
	62010 Computer programming activities	1 306
	62020 Computer consultancy activities	431
	62030 Computer facilities management activities	71
	62090 Other information technology and computer service activities	1 477
63 Information service activities		693
	63110 Data processing, hosting and related activities	452
	63120 Web portals	114
	63990 Other information service activities n. e. c.	127
95 Repair of computers and personal and household goods		42
	95110 Repair of computers and peripheral equipment	42
Sum		4 037

Source: Own research based on financial statements

Table 2 Accounting Entities from IT Retail Sale

Division	Class	Number of accounting entities
47 Retail trade, except of motor vehicles and motorcycles		260
	47410 Retail sale of computers, peripheral units and software in specialized stores	192
	47420 Retail sale of telecommunications equipment in specialized stores	48
	47430 Retail sale of audio and video equipment in specialized stores	20
Sum		260

Source: Own research based on financial statements

Table 3 Accounting Entities from IT Wholesale Trade

Division	Class	Number of accounting entities
46 Wholesale trade, except of motor vehicles and motorcycles		282
	46510 Wholesale of computers, computer peripheral equipment and software	133
	46520 Wholesale of electronic and telecommunications equipment and parts	149
Sum		282

Source: Own research based on financial statements

In these accounting entities we have performed the comparative analysis of changes in sales in selected accounting periods.

3 Results and Discussion

3.1 Changes in Sales in Companies from IT sector

The basic analysis proved that sales in IT sector companies in 2019 compared to sales in 2018 have increased by 16.68%, but sales in 2020 compared to sales in 2019 have decreased by 8.70%. Despite the decrease, sales in 2020 were 6.53% higher than sales in 2018. In 2021, there was again an increase in sales by 4.16% compared to 2020 (Table 4).

Table 4 Sales in IT Sector Companies

Year	Sales
2018	1 833 045 744
2019	2 138 845 977
2020	1 952 694 285
2021	2 033 844 547

Source: Own research based on financial statements

In 2019, up to 1 556 accounting entities (38.55%) reported a decrease in sales, while 2 451 accounting entities (60.71%) reported increase in sales. In 2020, up to 2 038 accounting entities (50.48%) reported decrease in sales, while up to 1 966 accounting entities (48.70%) reported increase in sales. In 2021, up to 1 708 accounting entities (42.31%) reported decrease in sales, and 2 294 accounting entities (56.82%) reported increase in sales. The research proved that COVID-19 pandemic has an impact on sales of companies from IT sectors because the number of accounting entities with decrease in sales in 2020 was the highest.

Table 5 Companies from IT Sector according to Changes in Sales and SK NACE

Changes in sales SK NACE	2021 vs 2020			2020 vs 2019			2019 vs 2018			Sum
	Without changes	Increase	Decrease	Without changes	Increase	Decrease	Without changes	Increase	Decrease	
58290	1	8	8		6	11	1	9	7	17
62010	10	756	540	10	648	648	10	820	476	1 306
62020	5	258	168	3	217	211	1	286	144	431
62030	1	43	27		31	40	1	41	29	71
62090	12	820	645	16	709	752	13	873	591	1477
63110	4	261	187	1	223	228		275	177	452
63120	2	65	47	2	52	60	3	65	46	114
63990		64	63	1	62	64	1	62	64	127
95110		19	23		18	24		20	22	42
Sum	35	2 294	1 708	33	1 966	2 038	30	2 451	1 556	4 037

Source: Own research based on financial statements

Based on the analysis of the changes in sales in analyzed accounting periods depending on the main activity of accounting entities (Table 5), we can state that the largest share of accounting entities that reported a decrease in sales in 2019 compared to 2018 was in the class *Repair of computers and peripheral equipment* (SK NACE 95110), where up to 52.38% of accounting entities reported decrease in sales; in 2020 the largest share was in the class *Other software publishing* (SK 58290), where up to 64.71% of accounting entities reported decrease in sales; and in 2021 the largest share was again in the class *Repair of computers and peripheral equipment* (SK NACE 95110), where up to 54.76% of accounting entities from this class reported decrease in sales. The largest share of accounting entities with decrease in sales in 2019 was in the Nitra Region, where up to 42.56% of accounting entities reported decrease in sales, in 2020 in Trenčín Region (55.87%) and in 2021 in Nitra and Trenčín Region (44.94% each).

3.2 Changes in Sales in Companies from IT Retail Sale

The basic analysis proved that sales in IT Retail Sale companies in 2019 compared to sales in 2018 have increased by 86,69%, and sales in 2020 compared to 2019 have increased by 8.41%. Sales in 2020 were 102,39% higher than sales in 2018. In 2021, there was a decrease in sales by 12.16% compared to 2020. Sales in 2021 were 4.77% lower than sales in 2019 and 77.78% higher than sales in 2018 (Table 6).

Table 6 Sales in IT Retail Sale Companies

Year	Sales
2018	109 526 002
2019	204 475 376
2020	221 674 145
2021	194 712 823

Source: Own research based on financial statements

In 2019, up to 110 accounting entities (42.31%) reported a decrease in sales, while 149 accounting entities (57.31%) reported increase in sales. In 2020, up to 142 accounting entities (54.62%) reported decrease in sales, while up to 116 accounting entities (44.62%) reported increase in sales. In 2021, up to 126 accounting entities (48.46%) reported decrease in sales, and 131 accounting entities (50.38%) reported increase in sales. The research proved that COVID-19 pandemic has also an impact on sales of companies from IT retail sale because the number of accounting entities with decrease in sales in 2020 was the highest.

Table 7 Companies from IT Retail Sale according to Changes in Sales and SK NACE

Changes in sales	2021 vs 2020			2020 vs 2019			2019 vs 2018			Sum
	Without changes	Increase	Decrease	Without changes	Increase	Decrease	Without changes	Increase	Decrease	
SK NACE										
47410	1	98	93	2	96	94		109	83	192
47420	2	24	22		11	37	1	30	17	48
47430		9	11		9	11		10	10	20
Sum	3	131	126	2	116	142	1	149	110	260

Source: Own research based on financial statements

Based on the analysis of the changes in sales in analyzed accounting periods depending on the main activity of accounting entities (Table 7), we can state that the largest share of accounting entities that reported a decrease in sales in 2019 compared to 2018 was in the class *Retail sale of audio and video equipment in specialized stores* (SK NACE 47430), where up to 50.00% of accounting entities from this class reported decrease in sales; in 2020 the largest share was in the class *Retail sale of telecommunications equipment in specialized stores* (SK NACE 47420), where up to 77.08% of accounting entities reported decrease in sales; and in 2021 the largest share was again in the class *Retail sale of audio and video equipment in specialized stores* (SK NACE 47430), where up to 55.00% of accounting entities reported decrease in sales. The largest share of accounting entities with decrease in sales in 2019 was in the Trnava Region, where up to 60.00% of accounting entities reported decrease in sales, in 2020 in Presov Region (63.16%) and in 2021 also in Presov Region (63.16%).

3.3 Changes in Sales in Companies from IT Wholesale Trade

The basic analysis proved that sales in IT Wholesale Trade companies in 2019 compared to sales in 2018 have increased by 5.55%, and in 2020 compared to 2019 sales have increased only by 1.29%. Sales in 2020 were 6.92% higher than sales in 2018. In 2021, there was again an increase in sales by 8.24% compared to 2020. The sales in 2021 were 9.64% higher than sales in 2019 and 15.73% higher than sales in 2018 (Table 8).

Table 8 Sales in IT Wholesale Trade Companies

Year	Sales
2018	1 078 979 809
2019	1 138 907 339
2020	1 153 601 668
2021	1 248 715 824

Source: Own research based on financial statements

In 2019, up to 128 accounting entities (45.39%) reported a decrease in sales, while 153 accounting entities (54.26%) reported increase in sales. In 2020, up to 180 accounting entities (63.83%) reported decrease in sales, while up to 100 accounting entities (55.56%) reported increase in sales. In 2021, up to 109 accounting entities (38.65%) reported decrease in sales, and 168 accounting entities (59.57%) reported increase in sales. The research proved that COVID-19 pandemic has also an impact on sales of companies from IT wholesale trade because the number of accounting entities with decrease in sales in 2020 was the highest.

Table 9 Companies from IT Wholesale Trade according to Changes in Sales and SK NACE

Changes in sales SK NACE	2021 vs 2020			2020 vs 2019			2019 vs 2018			Sum
	Without changes	Increase	Decrease	Without changes	Increase	Decrease	Without changes	Increase	Decrease	
46510	2	77	54	1	52	80		73	60	133
46520	3	91	55	1	48	100	1	80	68	149
Sum	5	168	109	2	100	180	1	153	128	282

Source: Own research based on financial statements

Based on the analysis of the changes in sales in analyzed accounting periods depending on the main activity of accounting entities (Table 9), we can state that the largest share of accounting entities that reported a decrease in sales in 2019 compared to 2018 was in the class *Wholesale of electronic and telecommunications equipment and parts* (SK NACE 46520), where up to 45.64% of accounting entities reported decrease in sales; in 2020 the largest share was also in the class *Wholesale of electronic and telecommunications equipment and parts* (SK 46520), where up to 67.11% of accounting entities reported decrease in sales; and in 2021 the largest share was in the class *Wholesale of computers, computer peripheral equipment and software* (SK NACE 46510), where up to 40.60% of accounting entities reported decrease in sales. The largest share of accounting entities with decrease in sales in 2019 was in the Banska Bystrica Region, where up to 70.83% of accounting entities reported decrease in sales, in 2020 in Nitra Region (80.95%) and in 2021 in Trencin Region (46.43%).

Conclusions

The results of our research proved that COVID-19 pandemic had partially negative impact on sales of IT companies. In all analyzed groups of IT companies, we can see the highest number of companies with decrease in sales in 2020. In all groups, the share of these companies was more than 50.00 %. Despite this fact, the sales in analyzed companies were lower in 2020 compared to sales in 2019 only in IT sector companies, where there the sales have decreased by 8.70%. Companies from IT retail sale and companies from IT wholesale trade reported increase in sales in 2020 despite the crises related to COVID-19 pandemic which has generally negative impact on many sectors of industry.

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