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Impact of the COVID-19 pandemic on the production and sales of cars in the world

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Annotation. Problem. *The global automotive industry has already had an experience of recovery from the global financial crisis of 2008, but the pandemic crisis of 2020 is quite different in nature and pattern of progress: in recent history it has had no analogues and it will be premature to state its completion. Therefore, it is important to determine the impact of the pandemic on the production and sale of cars in order to overcome the negative consequences. To address this issue, the article identifies the sensitivity of this subsector of mechanical engineering to destructive changes in the environment; an analysis of changes in the volume of production and sales of cars by countries of the world over the past period has been made.* ***Goal.*** *The aim of the work is to determine the destructive consequences and trends of the COVID-19 pandemic impact on the global automotive industry, namely the production and sale of cars.* ***Methodology.*** *To determine the impact of the COVID-19 pandemic, a vertical and horizontal analysis of car production and sales in the world has been conducted.* ***Results.*** *The results of the analysis allowed the authors to group the countries of the world by the destructive effects of the pandemic crisis of 2020 for the automotive industry.* ***Originality.*** *The carried out classification of countries by the destructive effects of the COVID-19 pandemic provided an opportunity to gain insight into its impact on the automotive industry, in particular on the production and sale of cars.* ***Practical value.*** *The obtained results can be recommended to identify further ways to overcome the negative effects of the COVID-19 pandemic in the automotive industry.*

Key words: *automotive industry, socio–economic development, car production, car sales, COVID–19 pandemic.*

Introduction

A strategically important part of the national economy, industry and machine–building complex is the automotive industry – a powerful generator of an added value and a flagship of the innovation activity. It is believed that the progress of the national economy and its place on the world economic arena is largely determined by the presence in its structure of space industry, aircraft and automotive industry, because these industries provide a powerful impetus to the development of science and technology, and building a network of enterprises in related industries. For example, the creation of 1 job in the automotive industry leads to the creation of at least 6 jobs in related industries. Such synergy promotes the development of specialization and cooperation, the implementation of cluster initiatives at the meso–level on the basis of public–private partnership.

But not only car production characterizes the socio–economic development of the country: an important indicator is the sales of new cars, which indicate the material security of the population in terms of its paying capacity in the long term period.

Since December 2020, all sectors of the world's national economies have faced a huge challenge and come under the influence of the World Coronavirus Epidemic, called COVID-19. The pandemic has already affected the paying capacity of the population and, consequently, its buying capacity.

The global automotive industry has already had an experience of recovery from the global financial crisis of 2008, but the pandemic crisis of 2020 is quite different in nature and pattern of progress: in recent history it has had no analogues and it will be premature to state its completion.

Therefore, it is important to determine the impact of the pandemic on the production and sale of cars in order to overcome the negative consequences.

Analysis of publications

The impact of the COVID-19 pandemic is being hotly debated not only in the scientific community but in society as a whole. The tough economic conditions of the World Epidemic have prompted the scientists to study trends in its impact, implications for national economies, and ways out of the crisis.

In the study [1] the author has analyzed the state and trends of the impact of COVID-19 on the economic situation in the world, in particular, the definition of socio–economic losses. The scientist has conducted a study of the results of Rosamund Hutt's analysis for the WEF, where he has found a decline in all indicators of economic growth in the world. The study shows the expected reduction in employment in terms of sectors of the national economy, due to the introduction of quarantine in Ukraine. The scenarios of the global crisis proposed by the world experts and politicians deserve attention and further research.

The author [2] has considered the main trends in the global automotive industry on the example of three main markets for this sector, namely the European region, the United States and China. The study has identified the characteristic aspects of the dynamics of automotive production during the pandemic of coronavirus pneumonia COVID-19. The author has analyzed the indicators of car sales by geographical area in the frame of epidemic spread and relevant regulatory measures.

In Ukraine, the research [3] was presented in 2020. It was prepared by the NGO "Center for Applied Research" with the support of the Konrad Adenauer Foundation Representation in Ukraine. The authors of the study "The impact of COVID-19 and quarantine restrictions on the economy of Ukraine" have analyzed the internal and external factors of the crisis in the economy. The study has analyzed the impact of quarantine measures on certain sectors of Ukraine's economy, including transport. But this study did not take into account the analysis of the demand for the cars.

Foreign scientists also pay enough attention to the impact of the World Pandemic on the indicators of economic growth of world's national economies [4–12].

In the studies [6–8] the authors have identified the impact of the pandemic crisis on all sectors of the national economy, and also they have proposed the measures to stabilize the situation.

The authors [5] on the example of Saudi Arabia have conducted a study on the impact of COVID-19 on entrepreneurship and consumer behavior.

Much attention has also been paid to the study of the impact of the pandemic on the automotive industry by foreign scientists. So, for example, the works [4. 9–13] are aimed at highlighting the current consequences of the pandemic and measures to overcome them in the automotive industry of different countries.

Purpose and Tasks

The aim of the study is to determine the destructive consequences and trends of the COVID–19 pandemic impact on the global automotive industry, namely the production and sale of cars.

In accordance with the desired goal it is necessary to determine the sensitivity of this sub–branch of machine–building to destructive changes in the external environment; to conduct a vertical and horizontal analysis of changes in the volume of production and sales of cars in the world in recent years.

Despite the undeniable advantages of the development of the automotive industry in the country, it is fair to note the increased sensitivity of this subsector of mechanical engineering to destructive changes in the external environment. The last twenty years have been marked by two global crises – the financial crisis of 2008 and the pandemic crisis of 2020. The global automotive industry has naturally responded to the crisis by reducing the scale of activity (Fig. 1, made by the authors according to [14–15]).

According to preliminary estimates, the pandemic crisis of 2020 will have more destructive consequences for the global automotive industry than the global financial crisis of 2008: for example, in the crisis year of 2008 the decline in car production was 3.46% (including a reduction in passenger car production – 0, 68%, a reduction in the production of commercial vehicles – 10.85%), while in the pandemic year of 2020, the volume of car production decreased by 15.43% (including the volume of passenger car production – by 16.85%, the volume of commercial vehicles production – by 11.57%).

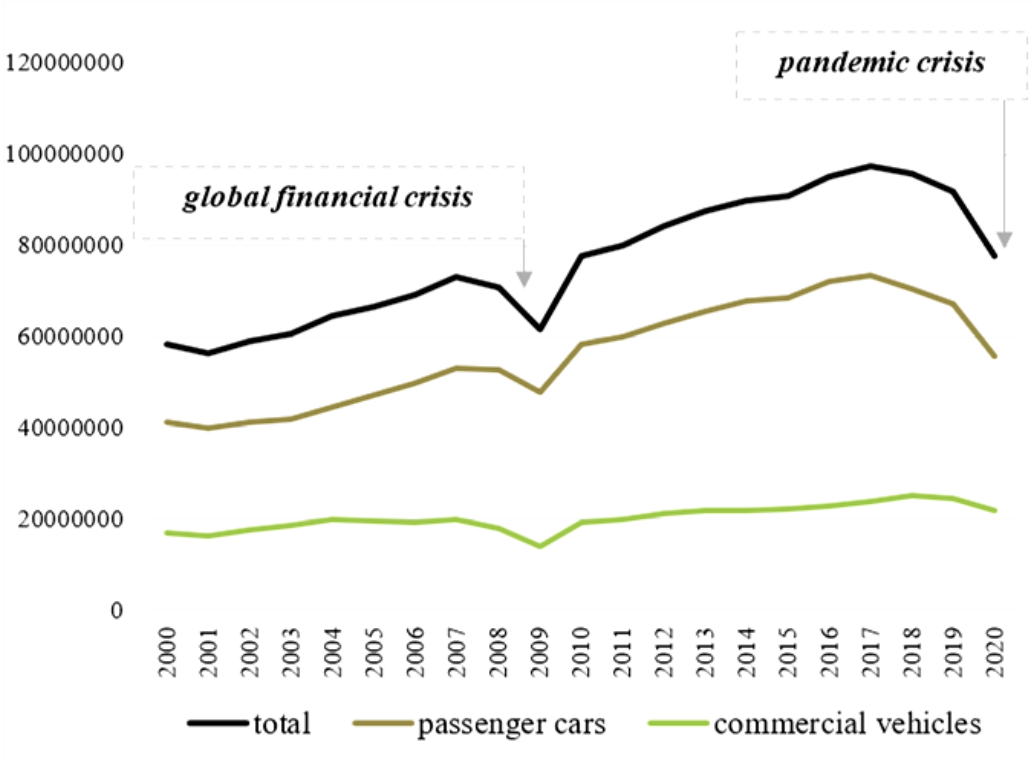

Fig. 1. Production of cars (including cars and commercial vehicles) in the world in 2000–2020

For the analysis we will choose the period of 2019–2020 and perform a vertical and horizontal analysis of changes in production and sales of cars around the world (Table 1–2, [calculated by the authors according to: [14]).

The results of the vertical analysis of the volumes of car production in the world give us opportunity to state that the flagships of the global automotive industry are China, USA, Japan, Germany, India, Mexico, South Korea, Brazil, Spain, France. These countries have produced 77.75% of all cars (including 77.22% of cars and 79.21% of commercial vehicles) in 2019 and 79.27% of all cars (including 78.38% of cars and 81.55% of commercial vehicles) in 2020. The results of the vertical analysis of car sales in the world have shown the leadership of such countries as China, USA, Japan, Germany, India, Brazil, France, which together account for more than 65% of all sold cars.

Based on the results of the horizontal analysis of car production and sales in the world, we will classify the countries of the world by the destructive effects of the pandemic crisis of 2020 for the automotive industry by criterion of reducing car production and sales (Table 3), where the reduction: by a percentage not exceeding 5%, can be identified as minor destructive effects; by a percentage in the range of 5–15 % – as quite significant destructive consequences; by a percentage in the range of 15–25 % – as significant destructive consequences; by a percentage exceeding 25 % – as very significant destructive consequences.

According to table 3 we can see that the most destructive effects of the pandemic crisis of 2020 have affected the automotive industries of Canada, Thailand, France, South Africa, Indonesia, Austria, Brazil, Poland, the United Kingdom, Morocco, Serbia, Slovenia, Mexico, Portugal. India, and Malaysia. In the context of the analysis of car sales, the most striking signs of destruction are observed in countries such as Croatia, Spain, Portugal, Mexico, Chile, Peru, Indonesia, Philippines, South Africa, Bulgaria, Greece, Italy, United Kingdom, Brazil, Colombia, Ecuador, Pakistan, UAE, Slovakia, France, Canada, USA, Kuwait, Thailand, Romania, Slovenia, Sweden, and India.

It is fair to note the fact that in the pandemic year of 2020, still, there were isolated cases of growth in production and sales of cars in some countries. In 2020, car production increased in Egypt (by 28.4 %), Iran (by 7.3 %) and Uzbekistan (by 3.3 %), including: car production increased in Egypt by 28.4 %, Iran – by 7.3 %, Uzbekistan – by 3.3 %. Production of commercial vehicles increased in Germany (by 100 %), China (by 19.97 %), Taiwan (by 4.68 %) and Iran (by 7.3 %).

Table 1. Vertical and horizontal analysis of car production (including cars and commercial vehicles) in the world in 2019–2020

Country	Automobiles						including											
							cars						commercial vehicles					
	2019 [14]	%*	2020 [14]	%*	Δ*	Δ, %*	2019 [14]	%*	2020 [14]	%*	Δ*	Δ, %*	2019 [14]	%*	2020 [14]	%*	Δ*	Δ, %*
USA	10880019	11.85	8822399	11.37	–2057620	–18.91	2512780	3.74	1926795	3.45	–585985	–23.32	8367239	33.96	6895604	31.65	–1471635	–17.59
China	25720665	28.02	25225242	32.50	–495423	–1.93	21360193	31.81	19994081	35.81	–1366112	–6.40	4360472	17.70	5231161	24.01	870689	19.97
Mexico	3986794	4.34	3176600	4.09	–810194	–20.32	1382714	2.06	967479	1.73	–415235	–30.03	2604080	10.57	2209121	10.14	–394959	–15.17
Canada	1916585	2.09	1376623	1.77	–539962	–28.17	461370	0.69	327681	0.59	–133689	–28.98	1455215	5.91	1048942	4.81	–406273	–27.92
Japan	9684298	10.55	8067557	10.39	–1616741	–16.69	8328756	12.40	6960025	12.47	–1368731	–16.43	1355542	5.50	1107532	5.08	–248010	–18.30
Thailand	2013710	2.19	1427074	1.84	–586636	–29.13	795254	1.18	537633	0.96	–257621	–32.39	1218456	4.95	889441	4.08	–329015	–27.00
India	4516017	4.92	3394446	4.37	–1121571	–24.84	3623335	5.40	2851268	5.11	–772067	–21.31	892682	3.62	543178	2.49	–349504	–39.15
Spain	2822355	3.07	2268185	2.92	–554170	–19.64	2248019	3.35	1800664	3.22	–447355	–19.90	574336	2.33	467521	2.15	–106815	–18.60
France	2202460	2.40	1316371	1.70	–886089	–40.23	1675198	2.49	927718	1.66	–747480	–44.62	527262	2.14	388653	1.78	–138609	–26.29
Brazil	2944988	3.21	2014055	2.59	–930933	–31.61	2448490	3.65	1608870	2.88	–839620	–34.29	496498	2.02	405185	1.86	–91313	–18.39
Turkey	1461244	1.59	1297878	1.67	–163366	–11.18	982642	1.46	855043	1.53	–127599	–12.99	478602	1.94	442835	2.03	–35767	–7.47
Italy	915305	1.00	777165	1.00	–138140	–15.09	542007	0.81	451826	0.81	–90181	–16.64	373298	1.52	325339	1.49	–47959	–12.85
South Korea	3950617	4.30	3506774	4.52	–443843	–11.23	3612587	5.38	3211706	5.75	–400881	–11.10	338030	1.37	295068	1.35	–42962	–12.71
South Africa	631983	0.69	447218	0.58	–184765	–29.24	348665	0.52	238216	0.43	–110449	–31.68	283318	1.15	209002	0.96	–74316	–26.23
Indonesia	1286848	1.40	691286	0.89	–595562	–46.28	1045666	1.56	551400	0.99	–494266	–47.27	241182	0.98	139886	0.64	–101296	–42.00
Poland	649864	0.71	451382	0.58	–198482	–30.54	434700	0.65	278900	0.50	–155800	–35.84	215164	0.87	172482	0.79	–42682	–19.84
Argentina	314787	0.34	257187	0.33	–57600	–18.30	108364	0.16	93001	0.17	–15363	–14.18	206423	0.84	164186	0.75	–42237	–20.46
Russia	1719784	1.87	1435335	1.85	–284449	–16.54	1523594	2.27	1260517	2.26	–263077	–17.27	196190	0.80	174818	0.80	–21372	–10.89
UK	1381405	1.50	987044	1.27	–394361	–28.55	1303135	1.94	920928	1.65	–382207	–29.33	78270	0.32	66116	0.30	–12154	–15.53
Portugal	345704	0.38	264236	0.34	–81468	–23.57	282142	0.42	211281	0.38	–70861	–25.12	63562	0.26	52955	0.24	–10607	–16.69
Taiwan	251304	0.27	245615	0.32	–5689	–2.26	189549	0.28	180967	0.32	–8582	–4.53	61755	0.25	64648	0.30	2893	4.68
Iran	821060	0.89	880997	1.13	59937	7.30	770000	1.15	826210	1.48	56210	7.30	51060	0.21	54787	0.25	3727	7.30
Belgium	285797	0.31	267460	0.34	–18337	–6.42	247020	0.37	237057	0.42	–9963	–4.03	38777	0.16	30403	0.14	–8374	–21.60
Malaysia	571632	0.62	485186	0.63	–86446	–15.12	534115	0.80	457755	0.82	–76360	–14.30	37517	0.15	27431	0.13	–10086	–26.88
Morocco	394652	0.43	248430	0.32	–146222	–37.05	360110	0.54	221299	0.40	–138811	–38.55	34542	0.14	27131	0.12	–7411	–21.46
Austria	179400	0.20	104544	0.13	–74856	–41.73	158400	0.24	104544	0.19	–53856	–34.00	21000	0.09	0	0.00	–21000	–100.00
Czech Republic	1433963	1.56	1159151	1.49	–274812	–19.16	1427563	2.13	1152901	2.06	–274662	–19.24	6400	0.03	6250	0.03	–150	–2.34
Serbia	35115	0.04	23375	0.03	–11740	–33.43	34985	0.05	23272	0.04	–11713	–33.48	130	0.00	103	0.00	–27	–20.77
Slovakia	1100000	1.20	985000	1.27	–115000	–10.45	1100000	1.64	985000	1.76	–115000	–10.45	0	0.00	0	0.00	0	0.00
Finland	114785	0.13	86270	0.11	–28515	–24.84	114785	0.17	86270	0.15	–28515	–24.84	0	0.00	0	0.00	0	0.00
Egypt	18500	0.02	23754	0.03	5254	28.40	18500	0.03	23754	0.04	5254	28.40	0	0.00	0	0.00	0	0.00
Slovenia	199102	0.22	141714	0.18	–57388	–28.82	199102	0.30	141714	0.25	–57388	–28.82	0	0.00	0	0.00	0	0.00
Uzbekistan	271113	0.30	280080	0.36	8967	3.31	271113	0.40	280080	0.50	8967	3.31	0	0.00	0	0.00	0	0.00
Germany	4661328	5.08	3742454	4.82	–918874	–19.71	4661328	6.94	3515372	6.30	–1145956	–24.58	0	0.00	227082	1.04	227082	100.00
Romania	490412	0.53	438107	0.56	–52305	–10.67	490412	0.73	438107	0.78	–52305	–10.67	0	0.00	0	0.00	0	0.00
Hungary	498158	0.54	406497	0.52	–91661	–18.40	498158	0.74	406497	0.73	–91661	–18.40	0	0.00	0	0.00	0	0.00
Others	1115108	1.21	898891	1.16	–216217	–19.39	1054445	1.57	778625	1.39	–275820	–26.16	60663	0.25	120266	0.55	59603	98.25

Table 2. Vertical and horizontal analysis of car sales (including cars and commercial vehicles) in the world in 2019–2020

Country	Automobiles					including											
						cars						commercial vehicles					
	2019 [15]	%*	2020 [15]	%*	Δ*	Δ, %*	2019 [15]	%*	2020 [15]	%*	Δ*	Δ, %*	2019 [15]	%*	2020 [15]	%*	Δ*	Δ, %*
Austria	371934	0.41	301723	0.39	–70211	–18.88	320381	0.50	257721	0.48	–62660	–19.56	51553	0.19	44002	0.18	–7551	–14.65
Belgium	644074	0.71	504110	0.65	–139964	–21.73	550008	0.86	424492	0.79	–125516	–22.82	94066	0.35	79618	0.33	–14448	–15.36
Czech Republic	281423	0.31	228834	0.29	–52589	–18.69	249915	0.39	202971	0.38	–46944	–18.78	31508	0.12	25863	0.11	–5645	–17.92
Denmark	264244	0.29	233248	0.30	–30996	–11.73	225581	0.35	198130	0.37	–27451	–12.17	38663	0.14	35118	0.14	–3545	–9.17
Finland	133519	0.15	112947	0.14	–20572	–15.41	114202	0.18	96392	0.18	–17810	–15.60	19317	0.07	16555	0.07	–2762	–14.30
France	2755728	3.05	2100058	2.69	–655670	–23.79	2214280	3.47	1650126	3.08	–564154	–25.48	541448	2.03	449932	1.85	–91516	–16.90
Germany	4017059	4.44	3268222	4.19	–748837	–18.64	3607258	5.66	2917678	5.44	–689580	–19.12	409801	1.54	350544	1.44	–59257	–14.46
Greece	122873	0.14	88710	0.11	–34163	–27.80	114109	0.18	80977	0.15	–33132	–29.04	8764	0.03	7733	0.03	–1031	–11.76
Hungary	190084	0.21	153968	0.20	–36116	–19.00	157900	0.25	128021	0.24	–29879	–18.92	32184	0.12	25947	0.11	–6237	–19.38
Ireland	145104	0.16	112122	0.14	–32982	–22.73	117109	0.18	88324	0.16	–28785	–24.58	27995	0.10	23798	0.10	–4197	–14.99
Italy	2132630	2.36	1564670	2.01	–567960	–26.63	1916949	3.01	1381496	2.58	–535453	–27.93	215681	0.81	183174	0.75	–32507	–15.07
Netherlands	538739	0.60	430211	0.55	–108528	–20.14	446057	0.70	357996	0.67	–88061	–19.74	92682	0.35	72215	0.30	–20467	–22.08
Norway	178830	0.20	160563	0.21	–18267	–10.21	133964	0.21	124424	0.23	–9540	–7.12	44866	0.17	36139	0.15	–8727	–19.45
Poland	656258	0.73	510153	0.65	–146105	–22.26	555598	0.87	428347	0.80	–127251	–22.90	100660	0.38	81806	0.34	–18854	–18.73
Portugal	267827	0.30	176992	0.23	–90835	–33.92	223799	0.35	145417	0.27	–78382	–35.02	44028	0.16	31575	0.13	–12453	–28.28
Romania	186933	0.21	145012	0.19	–41921	–22.43	161562	0.25	126351	0.24	–35211	–21.79	25371	0.10	18661	0.08	–6710	–26.45
Slovakia	113863	0.13	84909	0.11	–28954	–25.43	101568	0.16	76305	0.14	–25263	–24.87	12295	0.05	8604	0.04	–3691	–30.02
Spain	1501103	1.66	1030470	1.32	–470633	–31.35	1258249	1.97	851213	1.59	–407036	–32.35	242854	0.91	179257	0.74	–63597	–26.19
Sweden	418478	0.46	330215	0.42	–88263	–21.09	356036	0.56	292024	0.54	–64012	–17.98	62442	0.23	38191	0.16	–24251	–38.84
Switzerland	356038	0.39	275366	0.35	–80672	–22.66	311466	0.49	236828	0.44	–74638	–23.96	44572	0.17	38538	0.16	–6034	–13.54
UK	2736918	3.03	1964772	2.52	–772146	–28.21	2311140	3.63	1631064	3.04	–680076	–29.43	425778	1.60	333708	1.37	–92070	–21.62
Russia	1778901	1.97	1631163	2.09	–147738	–8.31	1567809	2.46	1433956	2.68	–133853	–8.54	211092	0.79	197207	0.81	–13885	–6.58
Turkey	491947	0.54	796200	1.02	304253	61.85	387256	0.61	610109	1.14	222853	57.55	104691	0.39	186091	0.76	81400	77.75
Ukraine	102542	0.11	98986	0.13	–3556	–3.47	88437	0.14	85450	0.16	–2987	–3.38	14105	0.05	13536	0.06	–569	–4.03
Canada	1937218	2.14	1527580	1.96	–409638	–21.15	496846	0.78	318750	0.59	–178096	–35.85	1440372	5.40	1208830	4.96	–231542	–16.08
Mexico	1359884	1.50	976373	1.25	–383511	–28.20	764175	1.20	532097	0.99	–232078	–30.37	595709	2.23	444276	1.82	–151433	–25.42
USA	17037088	18.84	14452892	18.54	–2584196	–15.17	4719710	7.41	3401838	6.35	–1317872	–27.92	12317378	46.14	11051054	45.34	–1266324	–10.28
Brazil	2787850	3.08	2058437	2.64	–729413	–26.16	2262069	3.55	1615942	3.01	–646127	–28.56	525781	1.97	442495	1.82	–83286	–15.84
Australia	1062867	1.18	916968	1.18	–145899	–13.73	799 263	1.25	676804	1.26	–122459	–15.32	263604	0.99	240164	0.99	–23440	–8.89
China	25796931	28.53	25311069	32.46	–485862	–1.88	21472092	33.69	20177731	37.65	–1294361	–6.03	4324839	16.20	5133338	21.06	808499	18.69
India	3816858	4.22	2938653	3.77	–878205	–23.01	2962115	4.65	2433464	4.54	–528651	–17.85	854743	3.20	505189	2.07	–349554	–40.90
Indonesia	1030486	1.14	532077	0.68	–498409	–48.37	785539	1.23	388925	0.73	–396614	–50.49	244947	0.92	143152	0.59	–101795	–41.56
Japan	5195216	5.75	4598611	5.90	–596605	–11.48	4301091	6.75	3809977	7.11	–491114	–11.42	894125	3.35	788634	3.24	–105491	–11.80
Kuwait	112633	0.12	85287	0.11	–27346	–24.28	98454	0.15	72648	0.14	–25806	–26.21	14179	0.05	12639	0.05	–1540	–10.86
Malaysia	604287	0.67	529434	0.68	–74853	–12.39	550182	0.86	480965	0.90	–69217	–12.58	54105	0.20	48469	0.20	–5636	–10.42
Philippines	410406	0.45	244178	0.31	–166228	–40.50	258555	0.41	153833	0.29	–104722	–40.50	151851	0.57	90345	0.37	–61506	–40.50
Saudi Arabia	533904	0.59	452544	0.58	–81360	–15.24	460373	0.72	387709	0.72	–72664	–15.78	73531	0.28	64835	0.27	–8696	–11.83
South Korea	1795134	1.99	1905972	2.44	110838	6.17	1497035	2.35	1618333	3.02	121298	8.10	298099	1.12	287639	1.18	–10460	–3.51
Thailand	1007552	1.11	792146	1.02	–215406	–21.38	468638	0.74	343494	0.64	–125144	–26.70	538914	2.02	448652	1.84	–90262	–16.75
UAE	232305	0.26	158711	0.20	–73594	–31.68	198520	0.31	129901	0.24	–68619	–34.57	33785	0.13	28810	0.12	–4975	–14.73
South Africa	536611	0.59	377932	0.48	–158679	–29.57	355378	0.56	247571	0.46	–107807	–30.34	181233	0.68	130361	0.53	–50872	–28.07
Others	4 734 431	5.31	3 808 746	4.89	–925685	–19.55	3789719	5.95	2983052	5.57	–806667	–21.29	989689	3.70	825694	2.27	–163995	–16.57

Table 3. Classification of the countries of the world by the destructive effects of the pandemic crisis of 2020 for the automotive industry

Criterion	Countries around the world due to the destructive effects of the pandemic crisis of 2020 for the automotive industry			
	minor destructive consequences	quite significant destructive consequences	significant destructive consequences	very significant destructive consequences
Automobiles				
Production	China, Taiwan	Turkey, South Korea, Belgium, Slovakia, Romania	USA, Mexico, Japan, India, Spain, Italy, Argentina, Russia, Portugal, Malaysia, Czech Republic, Finland, Germany, Hungary	Canada, Thailand, France, Brazil, South Africa, Indonesia, Poland, UK, Morocco, Austria, Serbia, Slovenia
Sales	Ukraine, China, Uzbekistan	Denmark, Norway, Russia, Australia, Japan, Malaysia, Taiwan, Vietnam	Austria, Belgium, Czech Republic, Finland, France, Germany, Hungary, Ireland, Netherlands, Poland, Romania, Sweden, Switzerland, Canada, USA, Argentina, India, Israel, Kuwait, New Zealand, Saudi Arabia, Thailand, Morocco	Bulgaria, Croatia, Greece, Italy, Portugal, Slovakia, Spain, UK, Mexico, Brazil, Chile, Colombia, Ecuador, Peru, Indonesia, Pakistan, Philippines, UAE, South Africa
Passenger cars				
Production	Taiwan, Belgium	China, Turkey, South Korea, Argentina, Malaysia, Slovakia, Romania	USA, Japan, India, Spain, Italy, Russia, Czech Republic, Finland, Germany, Hungary	Mexico, Canada, Thailand, France, Brazil, South Africa, Indonesia, Poland, UK, Portugal, Morocco, Austria, Serbia, Slovenia
Sales	Ukraine, Uzbekistan	Denmark, Norway, Russia, China, Japan, Malaysia, Vietnam	Austria, Belgium, Czech Republic, Finland, Germany, Hungary, Ireland, Netherlands, Poland, Romania, Slovakia, Sweden, Switzerland, Argentina, Australia, India, Israel, New Zealand, Saudi Arabia, Morocco	Bulgaria, Croatia, France, Greece, Italy, Portugal, Spain, UK, Canada, Mexico, USA, Brazil, Chile, Colombia, Ecuador, Peru, Indonesia, Kuwait, Pakistan, Philippines, Thailand, UAE, South Africa
Commercial vehicles				
Production	Czech Republic	Turkey, Italy, South Korea, Russia	USA, Mexico, Japan, Spain, Brazil, Poland, Argentina, UK, Portugal, Belgium, Morocco, Serbia	Canada, Thailand, India, France, South Africa, Indonesia, Malaysia, Austria
Sales	Ukraine, South Korea, Uzbekistan, Vietnam	Austria, Denmark, Finland, Germany, Greece, Ireland, Switzerland, Russia, USA, Argentina, Australia, Japan, Kuwait, Malaysia, Saudi Arabia, UAE, Morocco	Belgium, Bulgaria, Czech Republic, France, Hungary, Italy, Netherlands, Norway, Poland, UK, Canada, Brazil, Colombia, Ecuador, Israel, New Zealand, Pakistan, Taiwan, Thailand	Croatia, Portugal, Romania, Slovakia, Spain, Sweden, Mexico, Chile, Peru, India, Indonesia, Philippines, South Africa

In 2020, there were some growing trends in car sales, in particular, in Turkey (by 61.85 %, including cars – by 57.55 %, commercial vehicles – by 77.75 %), Kazakhstan (by 30.02 %, including cars – by 30.1 %, commercial vehicles – by 23.04 %), Egypt (by 28.82 %, including cars – by 31,66 %, commercial vehicles – by 20.44 %), South Korea (by 6.17 %, including cars – by 8.1 %), Puerto Rico (by 1.53 %, including cars – by 1.73 %, commercial vehicles – by 0.68 %). Also in Taiwan, sales of passenger cars increased by 19.97 %, and in China – sales of commercial vehicles increased by 18.69 %.

Conclusion

Based on the conducted vertical and horizontal analysis of car production and sales in the world, the impact of the COVID-19 pandemic on the automotive industry has been determined. The results of the vertical analysis of car production in the world give us the opportunity to state that the flagships of the global automotive industry are China, USA, Japan, Germany, India, Mexico, South Korea, Brazil, Spain, and France. Based on the results of the horizontal analysis of car production and sales in the world, we will classify the countries of the world by the destructive effects of the pandemic crisis of 2020 for the automotive industry by criterion of reducing car production and sales (Table 3), where the reduction: by a percentage not exceeding 5 %, can be identified as minor destructive effects; by a percentage in the range of 5–15 % – as quite significant destructive consequences; by a percentage in the range of 15–25 % – as significant destructive consequences; by a percentage exceeding 25 % – as very significant destructive consequences.

The obtained results can be recommended in identifying further ways to overcome the negative effects of the COVID-19 pandemic in the automotive industry.

Conflict of interests

The authors state that there is no conflict of interest regarding the publication of this article.

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Вплив пандемії COVID–19 на виробництво та продажі автомобілів у світі

Анотація. Проблема. *Світова автомобільна індустрія вже має досвід відновлення після глобальної фінансової кризи 2008 року, проте пандемічна криза 2020 року є зовсім іншою за природою та характером перебігу: в новітній історії вона ще не мала аналогів і поки що передчасною буде констатація її завершення. Тому важливим питанням є визначення впливу пандемії на виробництво та продаж автомобілів для подолання негативних наслідків. Для вирішення цього питання у статті визначено чутливість цієї підгалузі машинобудування до деструктивних змін у зовнішньому середовищ; проведено аналіз зміни обсягів виробництва та продажу автомобілів за країнами світу за останній період.* ***Мета.*** *Метою роботи є визначення деструктивних наслідків та тенденцій впливу пандемії COVID–19 на світову автомобільну індустрію, а саме виробництво та продаж автомобілів.* ***Методологія****. В роботі для визначення впливу пандемії COVID–19 проведено вертикальний і горизонтальний аналіз виробництва та продажі автомобілів у світі.* ***Результати.*** *Отримані результати аналізу дозволили авторам провести групування країн світу за силою деструктивних наслідків пандемічної кризи 2020 року для автомобільної індустрії.* ***Оригінальність.*** *Проведене групування країн за силою деструктивних наслідків пандемії COVID–19 надали можливість отримати уявлення про його вплив на автомобільну галузь, зокрема виробництво та продаж автомобілів.* ***Практичне значення****. Отримані результати можуть бути рекомендовані при для визначенні подальших шляхів подолання негативних наслідків пандемії COVID–19 у автомобільній індустрії.*

Ключові слова: *автомобільна індустрія, соціально–економічний розвиток, виробництво автомобілів, продаж автомобілів, пандемія COVID–19.*

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