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## Global steel production in the first two decades of the 21st century: a period of economic fluctuations and attempts to control globalisation processes

“The Chinese hold on tight”

(Stanisław Wyspiański, “Wesele” / “The Wedding”)<sup>1</sup>

**Abstract:** Based on World Steel Association statistical data, this study brings together changes in the geographical pattern of global steel production in the first two decades of the 21st century and its fluctuations during economic and social crises. The analysis indicates a strong concentration of production in several countries, and among them, China has become the leader in the last two decades. Since 2017, it has produced more than half of all steel globally, and in 2019 its annual production exceeded one billion tonnes. In 2020 the largest Chinese concern, China Baowu Group, ousted ArcelorMittal from its leading position in the ranking of the world’s largest steel concerns. Such an intense concentration of steel production in one country and the strategies of internal consolidation of Chinese steel producers are a clear signal that China is taking control of the global market for this raw material, essential for many economic sectors.

**Keywords:** geographical pattern; rankings; steel concerns; steel production; strategic consolidation

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<sup>1</sup> Translated by <https://polishnews.co.uk/maciej-wierzynski-for-tvn24-pl-column-the-wedding/>.

## INTRODUCTION

For most of the 20th century, the volume of steel production was considered a measure of a state's military power and economic potential. After World War II, a manifestation of this rivalry was the struggle for primacy in steel production between the United States and the Soviet Union. In 1971, the Soviet Union overtook the United States for the first time, and from 1974 to 1990, it continuously prevailed. The 1990s brought the collapse of the Soviet Union, and there was a temporary decline or 'fluctuation' in steel production: initially, in 1991–1995, Japan had primacy but in 1996 was taken over by the People's Republic of China.

Until the 1970s, steel was one of the essential products of the world economy, although, in the last two decades, it has clearly given way in terms of production volume to cement (and, consequently, also concrete), among others. This resulted from the development of the construction industry in various parts of the world and increased urbanisation (e.g. in China). The production of steel and steel products is, however, the driving force for many economies, especially in rapidly developing countries, and is the basis for the functioning of many sectors such as construction and the machine, shipbuilding, and automotive industries. According to data from the World Steel Association (2021), in 2019, 52% of steel produced was used in construction and infrastructure, another 16% for mechanical equipment (including machines and devices), 12% was used by the automotive industry, 10% for the production of metal products (including cans and tools) and 5% by the water and rail transport industry. The construction sector is currently the largest consumer of steel, and this trend is most likely to continue in the near term due to increasing demand in this industry and changes in urbanisation models.

This study aims to describe changes in the geographical pattern of global steel production in the first two decades of the 21st century and present the role of steel concerns in the context of ongoing globalisation. From a geographical perspective, the intensification of globalisation at the turn of the century (including the establishment of the World Trade Organization – WTO – in 1995) has led to continuous changes in the spatial distribution of steel production and demand concerning both states and world megaregions. Another effect of the globalisation of steel production is the consolidation of steel producers in multinational corporations and within national economies (e.g. in China). Therefore, the first of these issues focuses on shifts in the geographical pattern of production, especially to some Asian countries, and emerging new large economies (also demographically determined). In the second, mergers and acquisitions processes play an important role both on international and national scales.

The primary source of information on steel production was data published on World Steel Association (2021) websites in yearly and current statistical reports. It should be noted that data from this source is not only constantly updated but also revised backwards, and this is visible in the results of our work. The article is a comparative analysis based on available statistics, the result of the research interests of its authors, developed over many years and reflected in previous publications (Matykowski, Tobolska, 2003, 2005, 2006), as well as conference presentations. An important inspiration for the research is the emergence of publications on various aspects of the functioning of the steel industry at the level of certain countries or regions (cf., e.g. Brandt

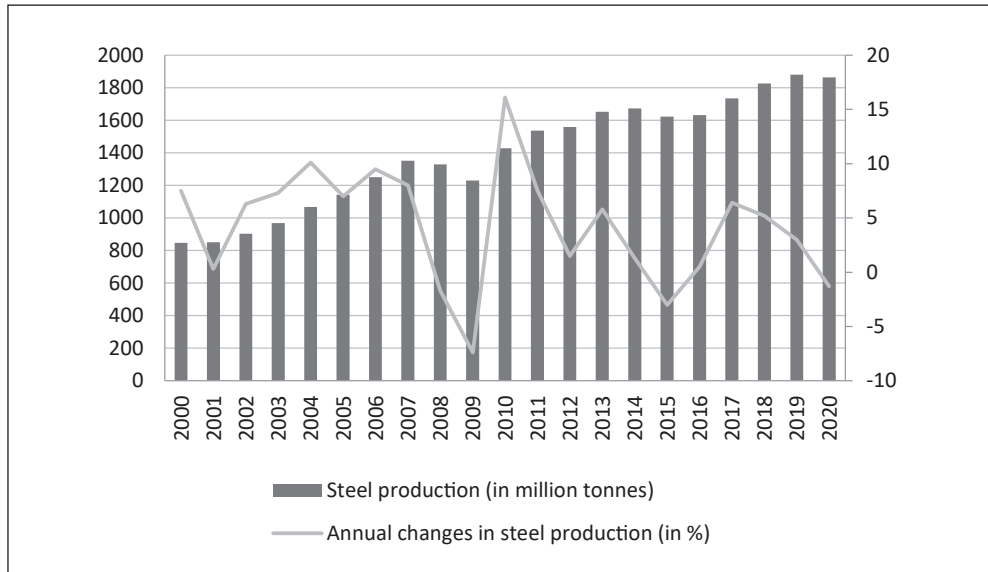
et al., 2020; Hasanbeigi, 2011; Noviello, 2018; Ozga-Blaschke, 2016; Sourisseau, 2018; Wiedermann, 2002; Wilczyński, 2020).

### INCREASE IN GLOBAL STEEL PRODUCTION: THE MAIN TRENDS AND FLUCTUATIONS IN THE ERA OF GLOBALISATION AND SOCIO-ECONOMIC CRISES

In 2020, world steel production amounted to one billion 864 million tonnes, which was slightly less than in 2019, by 16 million tonnes (0.9%), but at the same time, it was over one billion tonnes more than at the beginning of the 21st century in 2000 (see Figure 1 and Table 3). This is a considerable increase, if only due to the fact that one billion tonnes was only exceeded for the first time in 2004. The average annual growth rate of steel production was highest in the first 5-year period of the 21st century at 6.2%.

Such a dynamic growth of steel production is not continuous and is subject to fluctuations. Analysis of statistical data indicates several periods of decline, with the most severe related to the global financial crisis of 2008–2009 (see Figure 1, also Wilczyński, 2020: 179–180). The crisis in the financial markets was caused by the collapse of mortgage loans from banks. Initially, it only concerned the United States but then caused economic disturbance worldwide, including in the steel industry. In 2008, global steel production dropped by 1.7%, and in 2009 by a further 7.4%. A particular decrease occurred in the G-7 group of highly developed countries with a decrease of 4.3% in 2008 and as much as 30.7% in 2009 (calculations according to World Steel Association, 2021). However, it should be emphasised that a decrease in the level of steel production did not occur in two fast-developing economies in Asia, i.e. in China and India, where annual production increased quite significantly during this period, by 23.4% and 12.5%, respectively (World Steel Association, 2021).

Figure 1. Changes in global steel production: 2000–2020 [in million tonnes] showing annual changes [in %]



Source: authors based on World Steel Association (2021: reports and statistics)

Table 1. Changes in steel production in January–August 2020 and September–December 2020 compared to the corresponding periods in 2019

Index January–August 2020	Country		Index September–December 2020	Country		
Above 0.0			Above average	Vietnam	72.5	
		Uzbekistan		44.6	Pakistan	39.5
		Vietnam		11.6	Egypt	31.9
		Iran		11.3	Uzbekistan	27.1
		Chile		5.4	Finland	25.1
		China		4.0	Tukey	16.6
		Egypt		0.8	Thailand	16.6
		Turkey		0.6	Czechia	15.3
		Australia		0.2	Iran	14.5
Above average	Norway	-1.5		Sweden	14.2	
	Belarus	-2.0		Ukraine	12.1	
	Russia	-3.3		China	10.6	
World average	World	-4.4	World average	World	5.9	
Below average	Thailand	-6.4	Below average	Germany	3.9	
	Ukraine	-6.6		Argentina	3.2	
	Taiwan	-7.0		Mexico	2.6	
	United Kingdom	-7.9		India	1.8	
	South Korea	-8.4		Russia	1.5	
	Finland	-8.7		Luxembourg	0.8	
	Czechia	-10.1		Belarus	0.8	
	Hungary	-10.1		Columbia	0.5	
	Brazil	-12.7				
	Netherlands	-12.9				
	Belgium	-14.9				
	Sweden	-16.2				
	Germany	-16.5				
	Poland	-16.6				
	Austria	-16.9				
	Italy	-17.0				
	Mexico	-17.1				
	New Zealand	-17.1				
	Canada	-17.7				
	Luxembourg	-17.7				
	UAE	-17.8				
	Japan	-19.1				
	Saudi Arabia	-19.1				
	USA	-20.5				
	India	-22.0				
	Kazakhstan	-22.0				
	Serbia	-24.1				
	Greece	-24.3				
	Columbia	-26.4				
	France	-28.1				
	Spain	-30.6				
	Argentina	-32.9				
	South Africa	-44.3				
Qatar	-47.1					
Peru	-49.0					
Pakistan	-59.7					
			Below 0.0	South Korea	-0.2	
				Netherlands	-0.3	
				Australia	-0.7	
				France	-1.8	
				New Zealand	-1.9	
				Spain	-2.3	
				Saudi Arabia	-2.4	
				Kazakhstan	-3.8	
				Taiwan	-4.0	
				Italy	-4.6	
				Chile	-6.9	
				Poland	-7.3	
				Japan	-10.1	
				Austria	-11.4	
				Canada	-13.7	
				South Africa	-13.8	
				USA	-14.8	
				UAE	-18.9	
				Belgium	-19.3	
				Hungary	-24.6	
				Serbia	-25.5	
				Peru	-35.8	
				Qatar	-63.7	

Source: authors based on World Steel Association (2021: reports and statistics)

Another slowdown and decline in steel production took place in 2015 (3.0% decrease worldwide), which also affected China (2.3% decrease). It was the so-called commodity crisis, expressed in a drop in prices for iron ore, coal, coke and scrap, and thus also steel. As a result, there was an imbalance in the demand-supply relationship, which resulted in steel production stagnation. However, the fall in prices stopped relatively quickly, and in 2016 increased slightly. Out of the top 20 steel producers globally, only India (1.9%) and Poland (7.0%) recorded an increase in production in 2015. Another crisis occurred in 2020 due to the COVID-19 pandemic, as many countries in the spring of that year decided to limit the mobility and social contacts of their populations, thus limiting economic activity. Although the restrictions affected industrial production to a relatively small extent, some of the effects indirectly spread to the industry. Statistical data from October 2020 indicated a fairly significant drop in steel production (4.4%) globally compared to the corresponding period in 2019 (see Table 1). This downward trend was broken in the last quarter when production increased by 5.9% compared to the corresponding period in 2019. As a result, steel production in 2020 was only 0.9% lower than in the record-breaking 2019 (see Figure 1). However, attention should be paid to the relatively significant variety of responses of individual national economies to the pandemic crisis, including those that did not succumb to the global decline in socio-economic activity and increased steel production during the first three quarters: these included Uzbekistan, Vietnam, Iran, Chile, China, as well as Egypt, Turkey and Australia (see Table 1). The remaining producers, i.e. 39 out of 47 countries analysed, recorded falls in production, although some falls, such as in Norway, Belarus and Russia, were relatively insignificant and above the world average (-1.5% to -3.3%). In contrast, in countries like South Africa, Peru, Qatar and Pakistan, production declines were drastically steeper, ranging from -44.3% (South Africa) to -59.7% (Pakistan). In turn, in the third quarter of 2020, after the first pandemic wave, losses began to be made up. In both analysed periods, the Polish steel industry and 24 of the countries recorded an increase in production compared to the corresponding period in 2019, and record-high increases were recorded in Vietnam (72.5%), Pakistan (39.5%) and Egypt (31.9%).

It should be noted that the countries where there has been an increase in steel production are intensively developing and for which the production, consumption and export of steel is a driving force for the economy (not including China, Brazil, Thailand, Iran) as well as countries with an established position as large producers and exporters of steel (including Ukraine, United Kingdom, Germany, Russia). The Polish steel industry in both analysed periods recorded production falls: in the first stage by 16.6%, and in the second by 7.3%.

## CHANGES IN THE GEOGRAPHICAL PATTERN OF GLOBAL STEEL PRODUCTION IN THE FIRST TWO DECADES OF THE 21ST CENTURY

The geographical pattern of steel production has changed significantly over the past 20 years. Its beginnings could be observed in the second half of the 1990s. By the turn of the new century, in 2000, the role of three Asian countries had significantly increased: the People's Republic of China, South Korea and India (cf. Matykowski, Tobolska, 2005, 2006). Their position strengthened in the following years, so the modern map of global steel production is quite different from that of 20 years ago. According to WSA statistics, in 2019, steel was produced in 91 countries worldwide, and in 2000 it had been

90 (see Steel Statistical Yearbooks 2000, 2020). In 2019 the 36 largest producers provided 97.4% of total global production; in 2000, it was slightly less than 96.4% (see Table 2). The strong concentration is also evidenced by the fact that the five largest producers, i.e. China, India, Japan, the USA and Russia, produced almost three-quarters of global production in 2019 (73.1%). It is also worth noting that the leading 15 steel producers (89.6% of global output in 2019) have not changed significantly over the last 20 years, and only the positions in the ranking have changed. India moved to a higher position (currently 2nd from 9th), Turkey (8th from 14th), Iran (10th from 15th) and Vietnam (14th from 38th), while France has dropped below (from 11th to 16th – see Table 2). Among the remaining members of the 39 largest steel producers, it is mainly Asian countries that have moved to higher positions: Saudi Arabia, Indonesia, Malaysia and Thailand, but also Austria, Egypt and Slovakia. This may indicate an increased demand for steel by the economies of these countries and indirectly also to the development of infrastructure and construction. In the case of Slovakia, it is related to production from a branch of US Steel in Košice. The remaining countries either maintained their positions (e.g. South Korea, Taiwan, Mexico, Poland, the Netherlands) or fell. However, this did not always mean a decline in production but was mainly due to China's enormous increase in steel production during this period (dynamic index<sup>2</sup>  $di = 783.25$ ). Such a situation was also characteristic for Russia ( $di = 121.66$ ), Brazil ( $di = 115.41$ ), Argentina ( $di = 102.22$ ) and the UAE ( $di = 126.92$ ), and positive changes in steel production growth reflect the growing demand generated by the economies of these countries (including BRIC).

However, most countries (i.e. 18 out of 39) are those whose position has fallen in the last two decades and, at the same time, the volume of steel production has also decreased. The most significant drops (greater than 30%) occurred in the United Kingdom ( $di = 47.37$ ), Czechia ( $di = 64.51$ ), Ukraine ( $di = 65.41$ ), Belgium ( $di = 67.24$ ), South Africa ( $di = 67.06$ ) and France ( $di = 68.57$ ). The reasons for such declines are varied, but mostly it is the withdrawal of these countries from the steel industry; in the case of Ukraine, it is undoubtedly due to the destabilisation of the economy as a result of the war in Donbas.

Table 2. The world's largest steel producers in 2000 and 2020

Ranking 2000	Production [mln tonnes] 2000	Ranking 2020 (▲higher position)	Country/economy	Production [mln tonnes] 2020	Changes in production di: 2020/2000
1	127.2	1	China	1053.0	827.8
9	26.9	2▲	India	99.6	370.2
2	106.4	3	Japan	83.2	78.2
4	59.1	4	Russia	73.4	124.2
3	101.8	5	USA	72.7	71.4
6	43.1	6	South Korea	67.1	155.7
17	14.3	7▲	Turkey	35.8	250.4
5	46.4	8	Germany	35.7	76.9

<sup>2</sup> This dynamics index is the quotient of the production value at the final moment and the production value at the initial moment expressed in%, i.e. multiplied by 100 times.

8	27.9	9	Brazil	31.0	111.1
22	6.6	10▲	Iran	29.0	439.4
7	31.8	11	Ukraine	20.6	64.8
12	16.8	12	Taiwan	20.6	122.6
10	26.8	13	Italy	20.2	75.4
45	0.6	14▲	Vietnam	19.5	3000.0
15	15.6	15	Mexico	16.9	108.3
11	21.0	16	France	11.6	55.2
13	16.6	17	Canada	11.1	66.9
14	15.9	18	Spain	10.9	68.6
34	2.8	19▲	Egypt	8.2	292.9
19	10.5	20	Poland	7.9	75.2
33	3.0	21▲	Saudi Arabia	7.8	260.0
35	2.8	22▲	Indonesia	7.6	271.4
16	15.2	24	United Kingdom	7.2	47.4
24	5.7	25	Austria	6.7	117.5
30	4.5	26▲	Malaysia	6.5	144.4
18	11.6	27	Belgium	6.1	52.6
25	5.7	28	Netherlands	6.1	107.0
68	0.02	29	Bangladesh	5.5	22000.0
21	7.1	30	Australia	5.5	77.4
23	6.2	31	Czechia	4.5	64.5
37	2.1	32▲	Thailand	4.4	209.5
26	5.2	33	Sweden	4.4	84.6
42	1.1	34	Algeria	4.0	363.6
20	8.5	35	South Africa	3.9	45.9

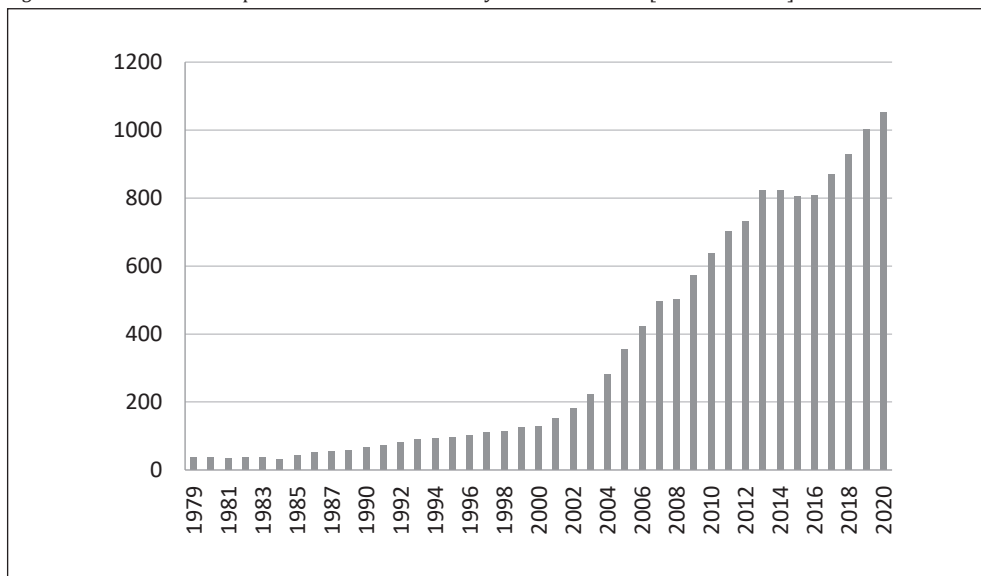
Source: authors based on World Steel Association (2021), Steel Statistical Yearbook (2000, 2021), and the economic press

The development of steel production as supported by the model of economic transformation in China.

In 1996, steel production in the People's Republic of China exceeded the threshold of 100 million tonnes (101.2), and the country became the global leader (see Figure 2). Much earlier, production of over 100 million tonnes of steel was achieved by the world's economic powers: the United States (in the 1950s), the Soviet Union (in the 1970s) and Japan (in the 1980s and maintaining this level into the first decades of the 21st century). However, the volume of steel production and the percentage of China's share increased systematically.

In 1996, China had a 13.4% share of global steel production. By 2000 it had increased slightly to 15.0%, and in 2002 it exceeded one fifth, and soon after, in 2006, it exceeded one third (see Table 3). This increase was probably the result of implementing the Chinese development model of Deng Xiaoping, which was subject to certain

Figure 2. Increase in steel production in China in the years 1979–2020 [million tonnes]



Source: World Steel Association (2021: reports and statistics)

modifications at particular moments. The accession of the People's Republic of China to the World Trade Organization in December 2001, and thus submission to the rules of trade defined by this organisation, also had a significant impact on the development of steel production. The more than 2.5 – fold increase in steel production in China in 2002–2007 was also the result of investment challenges related to the organisation of the 2008 Summer Olympics in Beijing. Another sharp increase was visible in 2009, reaching 46.6% of world production, while in 2009–2012 it ranged from 44 to 47%. In 2013–2016 this share exceeded 49%, and since 2017, China has accounted for more than half of global production (see Table 3).

China's driving influence on world steel production is shown in annual changes of China versus the rest of the world. In only three years (i.e. in 2000, 2010 and 2014), the rate of change was lower than for the rest of the world (see Table 3).

Table 3. Changes in the volume of global steel production and China in 2000–2020

Year	World		People's Republic of China			Rest of the world	
	Steel production (in million tonnes)	Annual production changes (in %)	Steel production (in million tonnes)	Annual production changes (in %)	% share in world steel production	Steel production (in million tonnes)	Annual production changes (in %)
2000	847.6	7.5	127.2	2.6	15.0	720.4	8.4
2001	850.3	0.3	150.9	18.6	17.7	699.4	-2.9
2002	903.6	6.3	182.2	20.7	20.2	721.4	3.1
2003	969.3	7.3	222.4	22.1	22.9	746.9	3.6
2004	1067.0	10.1	280.5	26.1	26.3	786.5	5.3
2005	1141.9	7.0	355.8	26.8	31.2	786.1	-0.1
2006	1250.7	9.5	423.0	18.9	33.8	827.7	5.3



2007	1351.3	8.0	494.9	17.0	36.6	856.4	3.5
2008	1329.0	-1.7	500.3	1.1	37.6	828.7	-3.2
2009	1230.9	-7.4	573.4	14.6	46.6	657.3	-20.7
2010	1429.1	16.1	637.4	11.1	44.6	791.7	20.4
2011	1536.2	7.5	702.0	10.1	45.7	834.2	5.4
2012	1559.2	1.5	731.0	4.1	46.9	828.2	-0.7
2013	1652.3	5.8	822.0	12.4	49.7	830.3	0.2
2014	1674.0	1.3	822.3	0.1	49.1	851.7	2.6
2015	1622.9	-3.0	803.8	-2.3	49.5	819.1	-3.8
2016	1631.3	0.5	807.6	0.5	49.5	823.7	0.6
2017	1734.9	6.4	870.9	7.8	50.8	864.1	4.9
2018	1825.6	5.2	928.3	6.6	50.7	897.3	3.8
2019	1880.1	3.0	1001.3	7.9	53.3	878.8	-2.1
2020	1864.0	-0.9	1053.0	5.2	56.5	811.0	-7.7

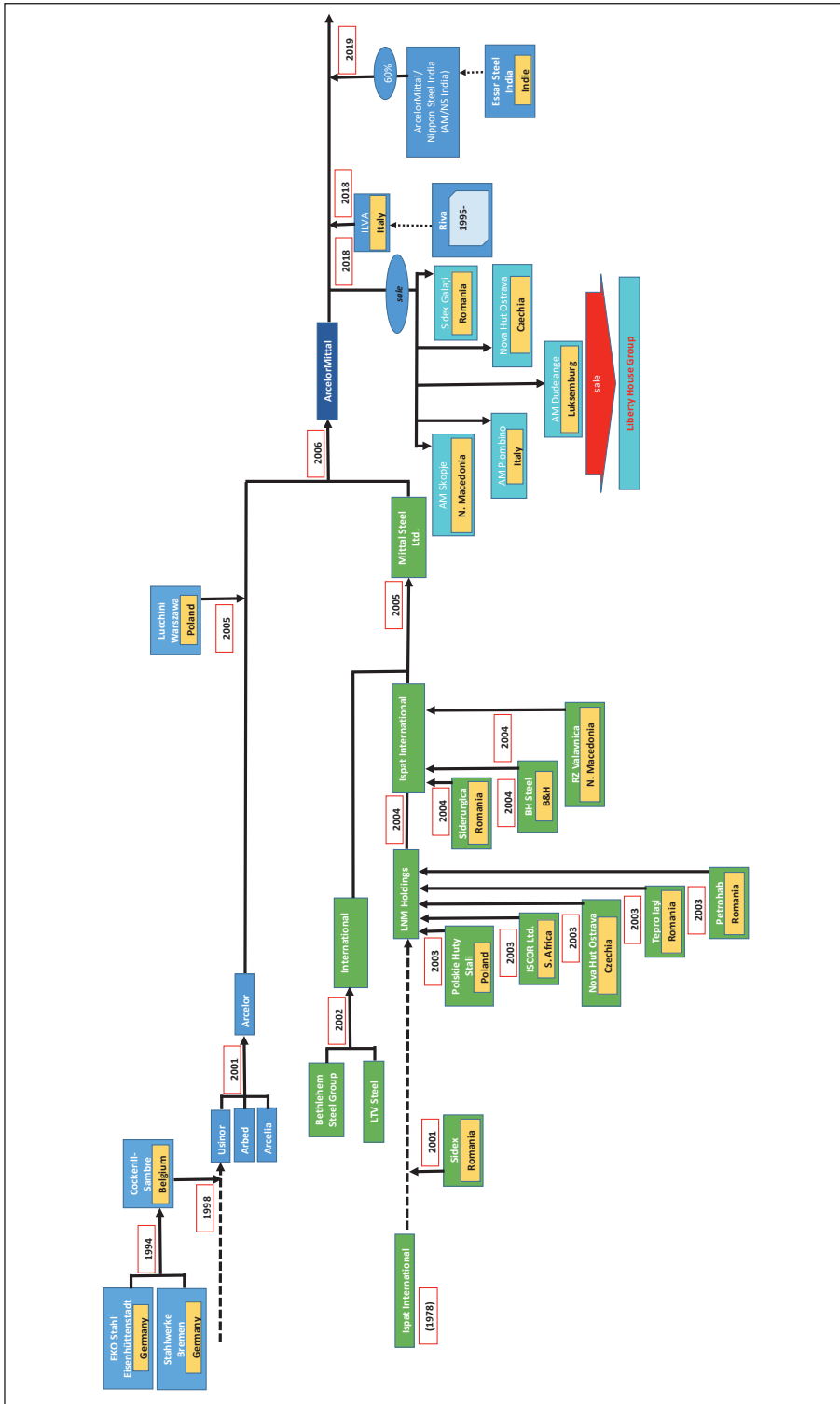
Source: authors based on the Steel Statistical Yearbook, <https://www.worldsteel.org/media-centre/press-releases/2021/Global-crude-steel-output-decreases-by-0.9--in-2020.html> and <https://www.worldsteel.org/en/dam/jcr:e723da20-7c4a-4680-8d2e-501c108d7590/Top%252040%2520steel%2520producing%-2520countries.pdf> (accessed on 16.04.2021)

Moreover, in the last 20 years, changes in steel production in China have been positive almost every year (except for 2015), even in the last year during the great crisis related to the COVID-19 pandemic.

## THE CONCENTRATION OF STEEL PRODUCTION AND GROWTH IN THE STRENGTH OF STEEL CONCERNS IN CHINA

Large concerns dominate in world steel production, competing and dividing markets among themselves. These global mega-enterprises concentrate their capital thanks to the consolidation of many previously independent producers as a result of mergers and acquisitions, but also through the acquisition of controlling blocks of shares, as well as through cooperation agreements and strategic alliances (cf. Tobolska, 2004: 33–44). As a result, enterprises with extensive organisational structures are created, consisting of many subordinated units with different legal statuses. The configurations of the organisational structures of these corporations reflect the great complexity of the competition strategies implemented, as well as the method of coordination and control of internal units. These are to lead to building a sustainable competitive advantage through the use of large and diversified resources, dispersed in various regional markets (see Tobolska, 2017: 116–122, and also, e.g. Dicken, 2015: 262–264; Neumair, Schlesinger, Haas, 2012: 307–309; Rymarczyk, 2012: 262–264). The processes of capital concentration, characteristic of the globalisation era, resulted in the ‘oligopolization’ of the global steel market and the taking control over production and transactions. An example of these processes is the history and origins of one of the largest steel concerns in the world, ArcelorMittal, presented in detail in Figure 3. At the turn of the 21st century, under the influence of globalisation, the steel market in Europe had seen mergers and acquisitions. In 1999, two important steel producers in the then European Union, British Steel and the Dutch Hoogovens, merged to form Corus. However, in 2006, 100% of Corus shares were purchased by another steel tycoon, Tata Steel Limited (based in Mumbai).

Figure 3. ArcelorMittal – its genesis as a result of external consolidation and concentration processes



Source: authors' work authors

Table 4. The largest steel concerns in the world in 2000–2020 (Top 20) and their production [million tonnes]

No	2000	mln t	2005	mln t	2010	mln t	2015	mln t	2020	mln t
1	Nippon Steel	28.4	Mittal	63	ArcelorMittal	98.2	ArcelorMittal	97.1	China Baowu Group	115.3
2	POSCO	27.7	Arcelor	46.7	Baosteel	37.0	Hesteel	47.8	ArcelorMittal	78.5
3	Arbed	24.0	Nippon Steel	32.0	POSCO	35.4	NSSMC (Nippon Steel & Sumitomo Metal)	46.4	HBIS Group	43.8
4	Ispat International	22.4	POSCO	30.5	Nippon Steel	35.0	POSCO	41.9	Shagang Group	41.6
5	Usinor	21.0	JFE	29.9	JFE	31.1	Baosteel Group	34.9	Nippon Steel Corporation	41.6
6	Corus	20.0	Baosteel	22.7	Jiangsu Shagang	23.2	Shagang Group	34.2	POSCO	40.6
7	ThyssenKrupp	17.7	United States Steel	19.3	Tata Steel	23.2	Ansteel Group	32.5	Ansteel Group	38.2
8	Shanghai Baosteel	17.7	Nucor	18.4	United States Steel	22.3	JFE Steel Corporation	29.8	Jianlong Group	36.5
9	NKK	16.0	Corus Group	18.2	Ansteel	22.1	Shougang Group	28.6	Shougang Group	34.0
10	Riva	15.6	Riva	17.5	Gerdau	18.7	Tata Steel Group	26.3	Shandong Steel Group	31.1
11	Kawasaki Steel	13.0	ThyssenKrupp	16.5	Nucor	18.3	Wuhan Steel Group	25.8	Delong Steel Group	28.3
12	Sumitomo Metal	11.6	Tangshan	16.1	Severstal	18.2	Shandong Steel Group	21.7	Tata Steel Group	28.1
13	SAIL (Steel Authority of India Limited)	10.9	EVRAZ	13.9	Wuhan	16.6	Hyundai Steel	20.5	Valin Group	26.8
14	USX (United States Steel)	10.7	Gerdau	13.7	ThyssenKrupp	16.4	Nucor Corporation	19.6	JFE Steel	24.4
15	Magnitogorsk	10.0	Severstal	13.6	EVRAZ	16.3	Maanshan Steel	18.8	Nucor Corporation	22.7
16	Nucor	10.0	Sumitomo Metal	13.5	Shougang	14.9	ThyssenKrupp	17.3	Hyundai Steel	19.8
17	China Steel	10.0	SAIL (Steel Authority of India Limited)	13.4	Riva	14.0	Gerdau	17.0	Fangda Steel	19.6
18	Severstal	10.0	Wuhan	13.0	SAIL (Steel Authority of India Limited)	13.6	Tianjin Bohai Steel	16.3	IMIDRO	18.9
19	Bethlehem Steel	9.6	Anshan	11.9	Sumitomo	13.3	NLMK (Novolipetsk)	16.0	Benxi Steel	17.4
20	Anshan	9.1	Magnitogorsk	11.4	Hyundai	12.9	Jianlong Group	15.1	Liuzhou Steel	16.9

Source: authors based on World Steel Association data (2021)

In 2001, the shares of three steel companies were amalgamated: French – Usinor (56.5% of the total shares), Luxembourg – Arbed (23.4%) and Spanish – Arcelia (20.1%), thus creating Arcelor, the largest steel producer in 2001–2004. In 2006, Arcelor (50.5% of the company’s shareholders) merged with the Mittal concern (43.6%) to form ArcelorMittal (based in Luxembourg), which in 2005 became the world’s largest steel producer. The concern, belonging to the Indian Mittal family (or its previous incarnations: Ispat International and the LNM holding company), took over many steel plants in Central and Eastern Europe (e.g. in Romania, Czechia, Poland, North Macedonia) and Kazakhstan. Among the important activities of the Mittal Steel concern, increasing its importance in steel production, was the acquisition of the South African Iscor Ltd (in 2003) and the North American International Steel Group (in 2005).

Until 2019, ArcelorMittal was the largest steel concern globally and had held this position since the company was founded under this name in 2006 (see Table 4). In 2019, the company produced 97.31 million tonnes of steel, i.e. 5.18% of total world production. However, in 2020, the Chinese concern, China Baowu Group, took its place. Steel production is as strongly concentrated at the concern level as at the country level: the world’s 50 largest steel concerns produced 58.5% of the total world production in 2020 while in 2000 it had been slightly less at 55.8%. However, the composition has changed (see Table 4) – in 2000, the companies on the list came from 19 countries, and the most were from the USA (7), Japan (6), China (6), Russia (5), Ukraine and Brazil (3 each), India, Korea, Germany and Italy (2 each), and one from Luxembourg, France, Spain and the United Kingdom. On the other hand, in 2020, Chinese companies (28) were the most numerous on the Top 50 list, and the rest came from only 11 other countries (including four from Russia, three from the USA, three from India, two from Japan, two from Korea, two from Luxembourg).

The rapid increase in the representation of the Chinese steel industry on the list of the 50 largest steel companies can be observed throughout the analysed period, i.e. from 2000 when there were six, to 2020 when there were 27 (Tables 5 and 6). Their share in total world steel production is now 34.6%, i.e. over one third and in China alone, it is almost two thirds (61.2%).

Table 5. Chinese steel concerns on the Top 50 list in 2000–2020

Year	The number of Chinese concerns in the Top 50	Steel production of Chinese concerns from Top 50 (million tonnes)	The share of steel production in China (in %)	Steel production of concerns on the Top 50 list (million tonnes)	Top 50 share in world steel production (%)
2000	6	52.5	41.3	472.6	55.8
2005	16	158.8	44.6	658.2	57.6
2010	5	113.8	17.9	683.2	47.8
2015	28	467.4	58.1	942.5	58.2
2020	27	644.4	61.2	1090.0	58.5

Source: authors based on World Steel Association data

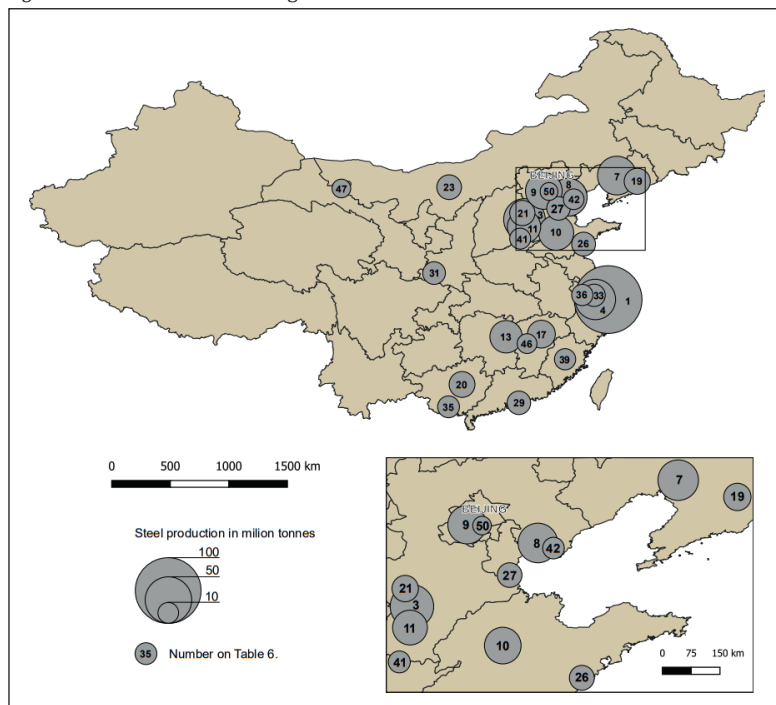
Table 6. Chinese steel companies on the Top 50 list in 2020

Ranking in 2020	Concern name	Headquarters	Production (million tonnes) in 2020
1	China Baowu Group	Shanghai (Shanghai)	115.29
3	HBIS Group	Shijiazhuang (Hebei)	43.76
4	Shagang Group	Zhangjiagang (Jiangsu)	41.59
7	Ansteel Group	Anshan (Liaoning)	38.19
8	Jianlong Group	Tangshan (Hebei)	36.47
9	Shougang Group	Beijing (Beijing)	34.00
10	Shandong Steel Group	Jinan (Shandong)	31.11
11	Delong Steel Group	Xingtai (Hebei)	28.26
13	Valin Steel Group	Changsha (Hunan)	26.78
17	Fangda Steel	Nanchang (Jiangxi)	19.60
19	Benxi Steel	Benxi (Liaoning)	17.36
20	Liuzhou Steel	Liuzhou (Kuangsi Zhuang)	16.91
21	Jingye Steel	Nandian (Hebei)	16.30
23	Baotou Iron & Steel Group	Baotou (Inner Mongolia)	15.61
26	Rizhao Steel	Rizhao (Shandong)	14.40
27	Sinogiant Group	Cangzhou (Hebei)	14.18
29	CITIC Pacific	Hong Kong (special region)	14.09
31	Shaanxi Steel	Hanzhong (Shaanxi)	13.18
33	Zenith Steel	Changzhou (Jiangsu)	12.76
35	Shenlong Metallurgical	Fangchenggang (Guanxi Zhuang)	12.06
36	Nanjing Steel (NISCO)	Nankin (Jiangsu)	11.58
39	Sanming Steel	Sanming (Fujian)	11.37
41	Anyang Steel	Anyang (Henan)	11.20
42	Donghai Special Steel	Tangshan (Hebei)	10.88
46	Xinyu Steel	Xinyu (Jiangxi)	9.89
47	Jiuquan Steel	Jiayuguan (Gansu)	8.75
50	Jinxi Steel	Beijing (Beijing)	8.01

Source: authors based on World Steel Association data

The distribution of the 28 largest concerns in China is presented in Figure 4. These concerns are based in 15 provinces and special regions; however, 16 concerns are located in six coastal administrative division units and have as much as 74.8% of the production share of Chinese companies from the Top 50 list. It should be noted that as of 2020 these provinces are inhabited by 24.7% of the Chinese population and 30.0% of its GDP is produced there. The province of Hebei surrounding Beijing is of particular importance. Six companies from the Top 50 list have their headquarters in Hebei, a 23.7% share in the production of Chinese companies from this list, and in Beijing, there are two companies (6.3% share). The second important area of concentration in China is Shanghai (the seat of the world's largest concern, the China Baowu Group, with 18.2% of Chinese production from the Top 50 list) and the adjacent province – Jiangsu (3 concerns; 10.3%).

Figure 4. Distribution of the largest steel concerns in China in 2020

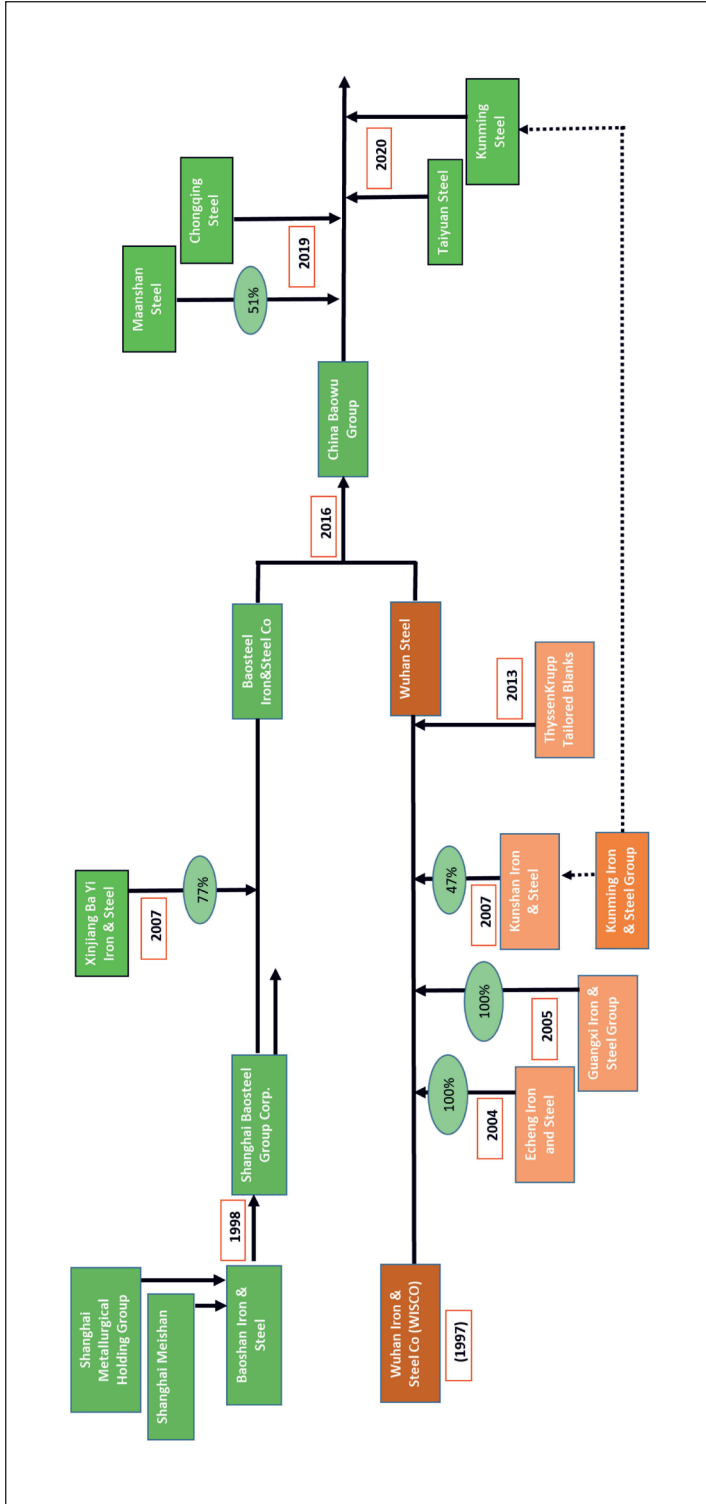


Source: authors based on WSA data

The growing importance of Chinese steel concerns is systematic and associated with an increase in production volume and organisational changes, i.e. capital concentration and the creation of large metallurgical plants. Figures 5 and 6 show examples of the consolidation of the largest Chinese steel mills and the emergence of new concerns with huge potential, winning the competitive struggle with existing world leaders in this industry.

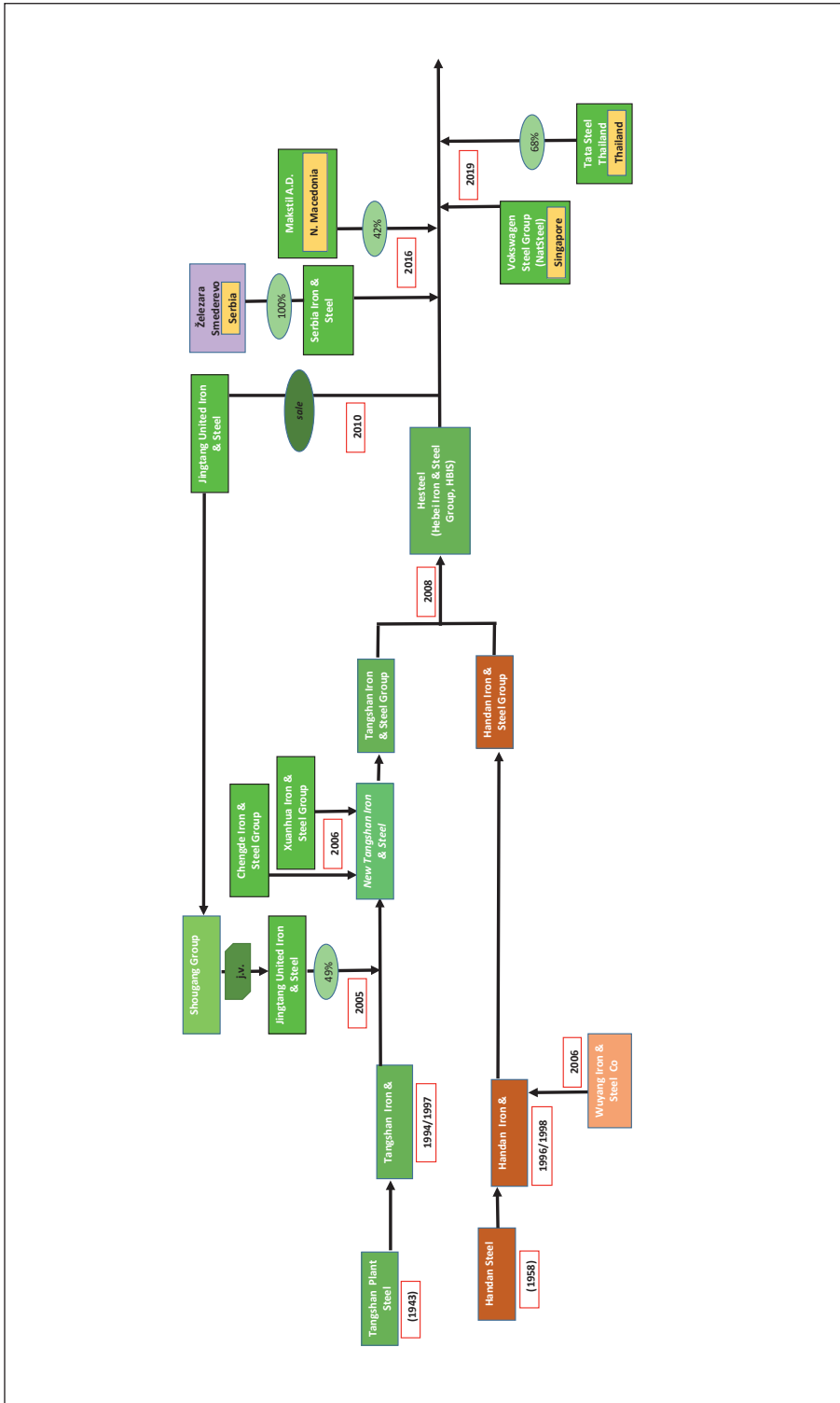
The consolidation of Chinese steel producers was largely steered by state authorities and the Chinese Communist Party. For this purpose, the Commission for Supervision and Administration of State Property (SASAC) was established in 2003, consolidating the previous activities of ministerial institutions. Provincial authorities also have ownership stakes in these concerns (e.g. the Shougang Group, the sixth-largest steel producer in China, is owned by the city of Beijing). An important activity of many steel concerns as early as in the 1990s was the creation of subsidiaries in the form of joint-venture companies or separate joint-stock companies (covering only part of the holding's value) aimed at raising investment capital on the stock exchanges in Shanghai, Shenzhen and Hong Kong. Initially, the acquisition of new technologies took place through the creation of a joint-venture (with dominance on the Chinese side), and in recent decades, through the acquisition of foreign subsidiaries. An example of such activity may be a joint-venture established in 1997 with the participation of Shanghai Metallurgical Holding (now part of the largest concern – China Baowu Group) and ThyssenKrupp, or the acquisition of ThyssenKrupp Tailored Blanks by Wuhan Steel (part of the China Baowu Group since 2016) (Figure 5). Sometimes joint ventures were also

Figure 5. China Baowu Group: created as a result of internal consolidation and concentration



Source: authors' work

Figure 6. HBIS: emergence as a result of the processes of internal consolidation and concentration



Source: authors' work



created in the Chinese steel market to improve their condition. For example, in 2005, Jingtang United Iron and Steel became a member of the Shougang Group and Tangshan Iron and Steel (part of HBIS since 2008), to be sold back by HBIS in 2010. It should also be noted that in the last decade, HBIS (based in Shijiazhuang) took over or acquired shares in several steel mills abroad, e.g. in Serbia, North Macedonia, Singapore and Thailand (Figure 6).

## CONCLUSIONS

Analysis of global steel production and individual countries indicates a considerable increase in production in the first two decades of the 21st century despite quite significant fluctuations related to financial and social crises. There were also substantial changes in the geographical pattern of the leading producers of this raw material, which is strategic for many sectors of economies, i.e. the concentration of production in a relatively small group of countries and the relocation of the main production centres to Asia. China has contributed to the increase in annual production by over one billion tonnes, and it has not only become the global leader in steel production but has also had more than half of world production since 2017. In 2019 and 2020, it produced more than one billion tonnes of steel. In addition, there are some strategic changes in steel production, i.e. the consolidation of Chinese producers into powerful steel concerns, dominating the global steel market and exceeding the former leaders in this industry. An example is this year's move of the China Baowu Group to number one in the global ranking over ArcelorMittal. This enormous increase in steel production in China is justified by the country's needs related to the fast pace of socio-economic development. Undoubtedly, it is also a sign of China's joining the global economy and can even be read as an apparent attempt to take control of its mechanisms through the very dangerous dependence of steel recipients from other countries on Chinese suppliers (see the problems of pharmaceutical companies during the pandemic, dependent on the supply of raw materials from China).

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