

## POST-CRISIS PERFORMANCE OF BULGARIAN MACHINERY INDUSTRY

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**Abstract**

The Global Recession influenced negatively the Bulgarian machine building, which is an industry with high export orientation largely dependent on foreign markets for selling its products. The aim of the paper is to review what changes have happened in the last 10 years in Bulgaria's machinery branch that, being technology and capital intensive industry producing high value added and having good conditions for innovative development, is identified for support by various state's agencies and strategies. Various indicators on output, turnover, investment, employment, exports, imports, etc. and their dynamics over the last decade have been analyzed.

**Keywords:** manufacturing, machinery industry, exports, Bulgaria

**JEL code:** F140, L620, L630, L640

**Introduction**

Machine building<sup>1</sup> is a branch with long-standing traditions in Bulgaria. Before the democratic changes the country was heavily specialized in it in the framework of the socialist division of labour within the Council for Mutual Economic Assistance. Actually in 1989 the section "Machinery and equipment" accounted for as much as 60% of total Bulgarian exports (Lozanov, 2009). In the years of transition from a planned to a market economy Bulgarian machine building experienced a severe crisis. Traditional markets were lost, many research institutes and development units were liquidated, large layoffs of skilled industrial workers were made. At the turn of the century the sector has stabilized and started gradually to grow (BBCMB, 2007). However the global economic crisis from 2008-2009 had a strong negative impact on its performance given its high dependence on foreign markets conjuncture. The machinery industry in Bulgaria regained its pre-crisis levels relatively fast and nowadays is largely considered to be among the most dynamic Bulgarian branches.

Machine building has been identified by various institutions and within couple of state's strategies as a priority industry. It is targeted by Invest Bulgaria Agency as an industry with high potential to attract FDI. It is supported by the Bulgarian Small and Medium Enterprises Promotion Agency as an export oriented industry (BSEMA, 2012). It is identified by the "Innovation strategy for smart specialization of the Republic of Bulgaria 2014-2020" within technological field "Mechatronics and Clean Technologies" as a potential sphere for intensive innovation specialization (Ministry of economy of Bulgaria, 2015).

Machinery firms are eligible to apply for getting grants to fund their projects through Operational Programme "Innovation and Competitiveness 2014-2020" supported by the EU structural and investment funds. Its total budget is 1.27 billion EUR and its priorities are connected with technological development and innovation, entrepreneurship and SME growth capacity and energy and resource efficiency.

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<sup>1</sup> The machine building (machinery) industry in the paper is defined broadly and consists of NACE codes C 26 – 30 which include manufacture of computer, electronic and optical products; electrical equipment; machinery and equipment n.e.c; motor vehicles and other transport equipment.

In this background it is interesting to see what changes have happened in the last 10 years in Bulgaria's machinery branch given its large potential for export, employment, foreign investment attraction and development of the country's regions.

### Recent developments in Bulgarian machinery industry

The global economic crisis had a negative impact on Bulgaria's machinery industry. Its turnover declined by 27% in 2009 in comparison to 2008. However it has fully recovered its value already in 2011 and has been on an upward trend since then. In 2016 the machinery sector turnover in Bulgaria stood at 4.8 billion EUR (16.4% of the manufacturing turnover) which is 1.6 times increase since 2008 (11.8%).

Data shows that machinery has had up to 5p.p. higher share in manufacturing value added than in manufacturing production. This signifies that the machinery industry in Bulgaria being an engineering branch produces goods with higher degree of processing and value added than many of the other manufacturing industries in the country. Furthermore while the investment in tangible goods dropped dramatically in 2009 and recovered its pre-crisis level only recently the machinery industry increased its share in manufacturing investment from 12.4% in 2008 to 17.1% in 2016.



Fig. 1 Machinery turnover structure in Bulgaria (2008, 2012 and 2016, million EUR)

Source: Eurostat, Structural business statistics, <http://ec.europa.eu/eurostat/web/structural-business-statistics/data/database>, accessed on 15.07.2018

All of the subsectors of the machinery industry in Bulgaria increased their turnover over the 2008-2016 period. However manufacture of electrical equipment (C27) grew by 75% and assumed the highest share in machinery turnover in 2016 (32.1%) at the expense of manufacture of machinery and equipment n.e.c. (C28) which grew by 23% for the same period and its share dropped from 40.1% in 2008 to 30.7%. The most dynamic growth in turnover was registered by manufacture of motor vehicles and their parts (C29) – over 200%, that resulted in almost doubling of the subsector share in machinery turnover (from 10.9% in 2008 to 20.7% in 2016). Manufacture of other transport equipment (C30) stagnated (a growth of just 0.4%) which led to contraction of its share in machinery turnover from 9.4% in 2008 to 5.9% in 2016. Manufacture of computer, electronic and optical products (C26) has largely retained its share in machinery turnover by registering growth of 67% over the 2008-2016 period.

In 2016 over 2 000 enterprises operated in the Bulgarian machinery industry the vast majority of which fall into the category of SMEs. Among the machinery subsectors manufacture of motor vehicles and their parts (C29) is the only one that increased the number of enterprises

during the last 10 years due to its attractiveness for foreign investors. Many of the enterprises oriented solely to the domestic market didn't survive the economic crisis in 2009.

**Table 1 Number of enterprises operating in the Bulgarian machinery industry (2008-2016)**

NACE_R2/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Machinery&equipment	2 059	2 024	1 964	1 878	1 882	1 921	1 945	2 006	2 031
C26 - Manufacture of computer, electronic and optical products	386	386	364	348	364	382	366	396	375
C27 - Manufacture of electrical equipment	496	530	509	472	487	484	494	488	502
C28 - Manufacture of machinery and equipment n.e.c.	993	918	905	877	854	872	906	936	953
C29 - Manufacture of motor vehicles, trailers and semi-trailers	99	104	110	115	113	115	119	118	122
C30 - Manufacture of other transport equipment	85	86	76	66	64	68	60	68	79

Source: Eurostat, Structural business statistics, <http://ec.europa.eu/eurostat/web/structural-business-statistics/data/database>, accessed on 15.07.2018

The Bulgarian machinery industry has developed on the basis of an ecosystem of transnational and local firms. The transnationals dominate the ranking of the top performers according to revenues in the branch. Only 2 out of the 15 leaders are Bulgarian companies - Monbat PLC (manufacturer of starter lead-acid batteries and AGM batteries for various applications) and Datecs Ltd (a leading manufacturer and developer of innovative POS solutions including mobile payment systems, printers, cash registers, barcode readers, and peripheral devices).

Other successful Bulgarian owned companies, offering competitive products worldwide include – ZMM-Sliven (manufacturer of universal lathes and CNS lathes), M+S Hydraulic – Kazanlak (hydraulic motors used in agricultural industry and transport), Podemcrane - Gabrovo (the biggest producer of wire rope hoists in Central and Eastern Europe), Sparky Eltos – Lovech (producer of power tools), Bulyard –Varna (shipbuilding industry), Shipyard- Ruse, Madara-Shumen (agricultural machinery and farm equipment producer) among others.

**Table 2 Top 15 machinery manufacturers in Bulgaria according to their revenues in 2016**

Company	Head Office	Revenues ('000 BGN)	Employees	Subsector
Liebherr-Hausgeräte Marica EOOD	Radinovo, Plovdiv region	432,917	1,873	C26
Integrated Micro-Electronics Bulgaria Inc.	Botevgrad, Sofia region	381,853	1,560	C29
Ideal-Standart Vidima AD	Sevlievo, Gabrovo region	376,242	3,227	C28
Monbat AD	Montana	352,209	336	C27
ABB Bulgaria EOOD	Sofia	335,137	117	C27
Sensata Technologies Bulgaria EOOD	Sofia	289,854	1,828	C29
Yazaki Bulgaria EOOD	Yambol	283,768	5,005	C29
Montupe EOOD	Ruse	212,083	944	C29
SE Bordnetze Bulgaria EOOD	Karnobat, Burgas region	207,530	3,376	C29
MAGNA Powertrain Plovdiv EOOD	Plovdiv	201,422	371	C28
Schneider Electric Bulgaria EOOD	Sofia	197,568	872	C27
ALS Bulgaria EOOD	Musachevo, Sofia region	165,159	1,231	C29

Company	Head Office	Revenues (‘000 BGN)	Employees	Subsector
SKF Bearings EAD	Sofia	159,450	1,527	C28
Datecs OOD	Sofia	158,381	419	C28
Palfinger Produktionstechnik Bulgaria EOOD	Cherven bryag, Pleven region	135,260	1,063	C28

Source: Kapi database, <https://www.capital.bg/kpro/#kapiForm>, accessed on 15.07.2018

The machine building industry employed 92 thousand people in Bulgaria in 2016 (16.7% of the employees of the manufacturing industry) which is a growth of 6.7% in comparison to 2008 when it employed 86.2 thousand people. However the number of persons employed in some of the individual sub-sectors of the machine-building industry has been reduced since 2008. These are Manufacture of computer, electronic and optical products (C26), Manufacture of machinery and equipment n.e.c (C28), Manufacture of other transport equipment (C30). The growing manufacture of vehicle parts which more than doubled its employees for less than a decade managed to compensate for the drop of the employed persons in the other subsectors. Manufacture of electrical equipment (C27) has also seen an increase in the employees’ number in the past few years and in 2016 it reached 23.5 thousand (an increase of 13.5% from 2008).

**Table 3 Number of persons employed in Bulgarian machinery industry** (in thousands, 2008-2016)

NACE_R2/TIME	2008	2009	2010	2011	2012	2013	2014	2015	2016
Machinery&equipment (C26+C27+C28+C29+C30)	86.2	75.1	71.6	75.1	75.9	77.6	83.5	88.8	92.0
C26 - Manufacture of computer, electronic and optical products	10.2	8.6	8.4	8.7	8.2	8.5	8.8	9.6	9.5
C27 - Manufacture of electrical equipment	20.7	19.0	18.5	18.6	19.7	21.0	21.0	21.7	23.5
C28 - Manufacture of machinery and equipment n.e.c.	37.6	30.8	29.3	29.9	30.4	30.7	31.3	31.5	32.1
C29 - Manufacture of motor vehicles	10.5	10.6	10.2	12.8	12.8	12.8	17.7	21.0	22.1
C30 - Manufacture of other transport equipment	7.2	6.1	5.3	5.0	4.7	4.6	4.8	4.9	4.9
Share of machinery in manufacturing employment (%)	<b>13.5</b>	<b>13.0</b>	<b>13.3</b>	<b>14.0</b>	<b>14.4</b>	<b>14.8</b>	<b>15.6</b>	<b>16.3</b>	<b>16.7</b>

Source: Eurostat, Structural business statistics, <http://ec.europa.eu/eurostat/web/structural-business-statistics/data/database>, accessed on 15.07.2018

Over 280 projects on introduction of new equipment and technologies have been implemented by machine building companies through the OP “Innovation and competitiveness 2014-2020” that has had mostly positive impact on productivity growth and not so much on the increase of the number of hired personnel.

Despite the continuous growth of apparent labour productivity in all subsectors of Bulgarian machine building it remains between 3.7 and 7.8 times lower than the EU-28 average level. At the same time the average personnel costs are between 5.8 and 8.9 times lower. This makes Bulgaria a very attractive destination for relocating production facilities from the other EU countries as it offers much higher wage adjusted labour productivity.

**Table 4 Personnel costs and productivity of the machinery industry in Bulgaria and the EU for 2012 and 2015**

Indicator/NACE code/Year		C26		C27		C28		C29		C30	
		2012	2015	2012	2015	2012	2015	2012	2015	2012	2015
Apparent labour productivity (thousand EUR)	<b>BG</b>	14.2	19.2	11.5	14.3	10.8	13.5	9.8	10.5	9.9	13.0
	<b>EU</b>	65	71	58	60	65	68	66	82	72	80
Average personnel costs (thousand EUR)	<b>BG</b>	6.9	9.0	6.4	7.8	6.4	7.6	5.1	5.7	5.6	6.9
	<b>EU</b>	47.7	52.0	43.3	45.7	46.5	50.6	47.7	50.9	52.0	58.0
Wage adjusted labour productivity (%)	<b>BG</b>	208	214	181	184	169	177	192	184	176	188
	<b>EU</b>	136	143	135	132	140	135	137	161	138	137

Source: Eurostat, Structural business statistics, <http://ec.europa.eu/eurostat/web/structural-business-statistics/data/database>, accessed on 15.07.2018

Bulgaria offers qualified and experienced workforce for the needs of the machine building sector – from assembly workers to highly qualified engineers. Many of the universities and vocational high schools maintain connections with companies in the branch, while the companies are offering internship programs, training courses and stipends for young specialists.

Technical high schools are located all over the county training workforce for the industry. According to the National Statistical Institute data 20 151 pupils graduated vocational secondary schools obtaining professional qualification in 2017.

There are couple of specialized universities in Bulgaria that train personnel for the machinery industry – Technical University of Sofia (with branches in Sofia, Plovdiv and Sliven), Varna technical university, University of Ruse “A. Kanchev”, Technical University of Gabrovo, University “Prof. Dr. A. Zlatarov”-Burgas, Higher School of Transport “T. Kableskov”. In 2017 over 3 600 students finished bachelor’s programmes in the field of engineering, manufacturing and processing, over 2 200 graduated master’s programmes and 160 obtained a PhD degree. In the field of information and communication technologies there were 1 288, 787 and 39 graduates from bachelor’s master’s and doctoral programmes respectively.

### **External Performance of Bulgarian machinery industry**

The exports of Bulgarian machinery products have been steadily growing since 2009. In 2017 the value of exports reached almost 5.8 billion EUR which represents an increase of 142% for 10 years. The only product group which has decreased its exports in 2017 in comparison to 2008 is HS 89 “Ships, boats and floating structures”. Vehicles (HS87) exports have surged by more than 420% for the 2008-2017 period. The exports of electrical machinery, equipment and their parts (HS85) has also boomed increasing by 191% for the same period surpassing 2.6 billion EUR in 2017.

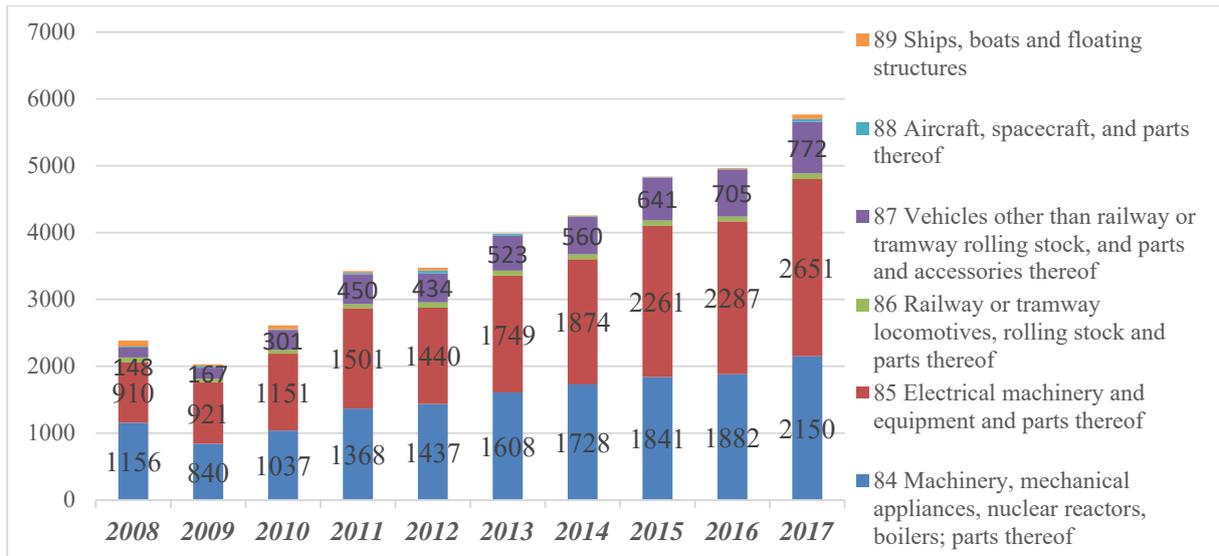


Fig. 2 Exports of machinery from Bulgaria, (2008-2017, million euro)

Source: International Trade Center (ITC), Market Analysis Tools, Trade Statistics, <http://www.intracen.org/itc/market-info-tools/trade-statistics/>, accessed on 15.07.2018

The imports of machinery in Bulgaria was heavily affected by the global economic crisis. In 2009 a drop of nearly 41% was registered that was almost recovered only in 2015. Actually the imports of vehicles (HS 87) has not yet reached its pre-crisis level. On the other hand, the imports of electrical machinery and equipment (HS 85) has been constantly increasing after the decline in 2009. At the end of the period it reached a value of over 2.7 billion EUR – an increase of 43% from 2008.

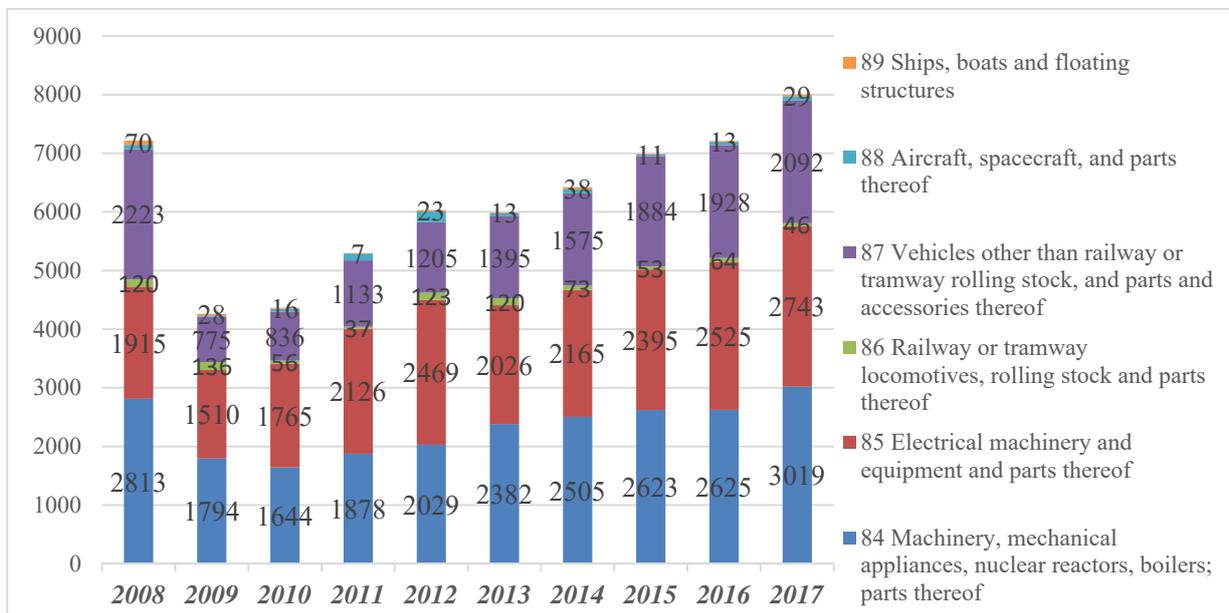


Fig. 3 Imports of machinery to Bulgaria, (2008-2017, million euro)

Source: International Trade Center (ITC), Market Analysis Tools, Trade Statistics, <http://www.intracen.org/itc/market-info-tools/trade-statistics/>, accessed on 15.07.2018

The contraction of imports in a combination with rising exports contributed to a declining negative trading balance of Bulgaria with machinery. In 2017 the exports covered more than 70% of the import needs, while the equivalent ratio back in 2008 was just 1/3.

**Table 5 Top 5 export markets for machinery supplied by Bulgaria in 2017 according to HS groups**  
(% of Bulgaria's exports of machinery)

HS 84	HS 85	HS 86	HS 87	HS 88	HS 89
1. Germany (20%)	Germany (21.1%)	Germany (45.7%)	Germany (34.2%)	Czech rep. (39.5%)	Bahamas (60.1%)
2. Romania (11.4%)	Turkey (9.1%)	Slovakia (8.6%)	Romania (19%)	Cote d'Ivoire (26.8%)	Argentina (25.4%)
3. Italy (9%)	Italy (8.3%)	USA (6.8%)	Turkey (6%)	Moldova (9.1%)	Denmark (6.6%)
4. France (6.3%)	France (6.7%)	Czech rep. (5.6%)	Belgium (5.7%)	Germany (4.7%)	Greece (3.5%)
5. Austria (5.4%)	Czech rep. (5.6%)	France (5.2%)	Greece (4.1%)	Switzerland (4.5%)	Italy (0.8%)

Source: International Trade Center (ITC), Market Analysis Tools, Trade Statistics, <http://www.intracen.org/itc/market-info-tools/trade-statistics/>, accessed on 15.07.2018

The top export market for Bulgarian machinery products is Germany. It gets 20% of Bulgarian machinery and mechanical appliances (HS 84), 21% of electrical machinery (HS 85), 45.7% of railway locomotives, rolling stock and parts thereof (HS 86) and over 34% of vehicles parts (HS 87). Other big export markets are Italy, France, Romania. Among the top export non-EU destinations stands out neighbouring Turkey with over 9% of imports of HS85 and 6% of HS 87 and Bahamas importing over 60% of HS 89.

Top trading partner of Bulgaria with regards to imports is also Germany. It supplies 21.7% of HS 84, 16.6% of HS 85, 28% of HS 86 and HS 87 imports on the Bulgarian market. While Russia is not among the top 5 export destinations it ranks among the top 5 importers in group HS 84 with 4.7% of Bulgarian imports, in group HS 86 (6.9%) and HS 88 (19.4%). Ukraine is the biggest supplier of products from HS 86 (35.2%) while the USA of HS 88 (nearly 30%). China ranks third among top importers to Bulgaria of products from HS 84 (7.1%), fourth (7.6%) and tenth (2.7%) in groups HS 85 and HS 87 respectively.

**Table 6 Top 5 import markets for machinery imported in Bulgaria in 2017 according to HS groups**  
(% of Bulgaria's imports of machinery)

HS 84	HS 85	HS 86	HS 87	HS 88	HS 89
1. Germany (21.7%)	Germany (16.6%)	Ukraine (35.2%)	Germany (28.3%)	USA (29.9%)	Spain (43.3%)
2. Italy (13.3%)	Netherlands (9%)	Germany (28%)	Italy (11.6%)	Russia (19.4%)	Italy (28.7%)
3. China (7.1%)	Hungary (7.6%)	Russia (6.9%)	Turkey (7.4%)	Norway (8.3%)	France (7.8%)
4. Russia (4.7%)	China (7.6%)	Poland (5.8%)	Hungary (6.7%)	Germany (6.2%)	Romania (3.2%)
5. Netherlands (4.7%)	Slovakia (7.5%)	Slovakia (5.2%)	France (5.4%)	France (5.7%)	Belgium (2.7%)

Source: International Trade Center (ITC), Market Analysis Tools, Trade Statistics, <http://www.intracen.org/itc/market-info-tools/trade-statistics/>, accessed on 15.07.2018

The most competitive Bulgarian machinery products for 2017 according to the revealed comparative advantage (RCA) index<sup>1</sup> are presented on table 4. Among these there are diverse

<sup>1</sup> The RCA index represents a ratio of the share of machinery exports in total Bulgarian exports divided to the equivalent share for the world. Values higher than 1 indicate that the country is specialized more than the world on average in the analyzed industry and therefore has a comparative advantage in it. Another indicator used to measure performance developments in international trade over time is the relative trade balance (RTB) which takes into account both exports and imports is The RTB index compares the trade balance (exports minus imports) for a group of products to the total trade (exports plus imports) of that group of products. If the value of the index is positive the national production is considered to be competitive in both foreign and domestic markets.

products such as machinery for beverage and tobacco processing, railway fixtures and wagons, electrical resistors, bicycles, hydraulic turbines, calculating machines, refrigerators.

**Table 7 Bulgarian machinery products with highest competitiveness on the world market in 2017**  
(Revealed comparative advantage index and Relative Trade Balance index, 2008, 2012 and 2017)

HS Code	Product label / Year	RCA			RTB		
		2008	2012	2017	2008	2012	2017
'8435	Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices ...	7.7	11.0	15.1	0.46	0.64	0.45
'8608	Railway or tramway track fixtures and fittings (excluding sleepers of wood, concrete or steel, ...	0.2	0.4	12.5	-0.33	-0.73	0.34
'8478	Machinery for preparing or making up tobacco, not specified or included elsewhere in this chapter; ...	5.8	5.5	11.5	-0.17	-0.20	0.26
'8533	Electrical resistors, incl. rheostats and potentiometers (excluding heating resistors); parts ...	0.1	5.5	9.1	-0.85	0.57	0.56
'8712	Bicycles and other cycles, incl. delivery tricycles, not motorised	4.8	8.3	7.9	0.97	0.98	0.96
'8538	Parts suitable for use solely or principally with the apparatus of heading 8535, 8536 or 8537, ...	1.3	2.2	6.7	-0.16	-0.22	0.19
'8412	Engines and motors (excluding steam turbines, internal combustion piston engine, hydraulic ...	8.9	6.1	6.4	0.81	0.68	0.74
'8606	Railway or tramway goods vans and wagons (excluding self-propelled and luggage vans and post ...	6.8	6.2	5.0	-0.33	0.97	0.89
'8410	Hydraulic turbines, water wheels, and regulators therefor (excluding hydraulic power engines ...	1.7	3.2	4.5	-0.82	0.63	0.52
'8470	Calculating machines and pocket-size "dimensions <= 170 mm x 100 mm x 45 mm" data recording, ...	3.5	3.5	3.7	0.38	0.47	0.46
'8432	Agricultural, horticultural or forestry machinery for soil preparation or cultivation (excluding ...	0.8	2.2	3.7	-0.82	-0.63	-0.36
'8454	Converters, ladles, ingot moulds and casting machines of a kind used in metallurgy or in metal ...	1.3	2.4	3.4	-0.47	0.02	0.57
'8418	Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat ...	3.6	3.6	3.3	0.03	0.35	0.45
'8433	Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers; machines ...	0.3	1.9	3.1	-0.86	-0.48	-0.17

Source: own calculations, based on ITC data

The machine building is among the most attractive Bulgarian manufacturing industries for foreign investors. The Investment Promotion Act envisages various incentives depending on the value, region and sector allocation of the investment which include shorter terms for administrative services; individual administrative services; options for acquisition of title or limited rights over real estates on properties at preferential terms; financial aid for construction of technical infrastructure elements; financial aid for staff training.

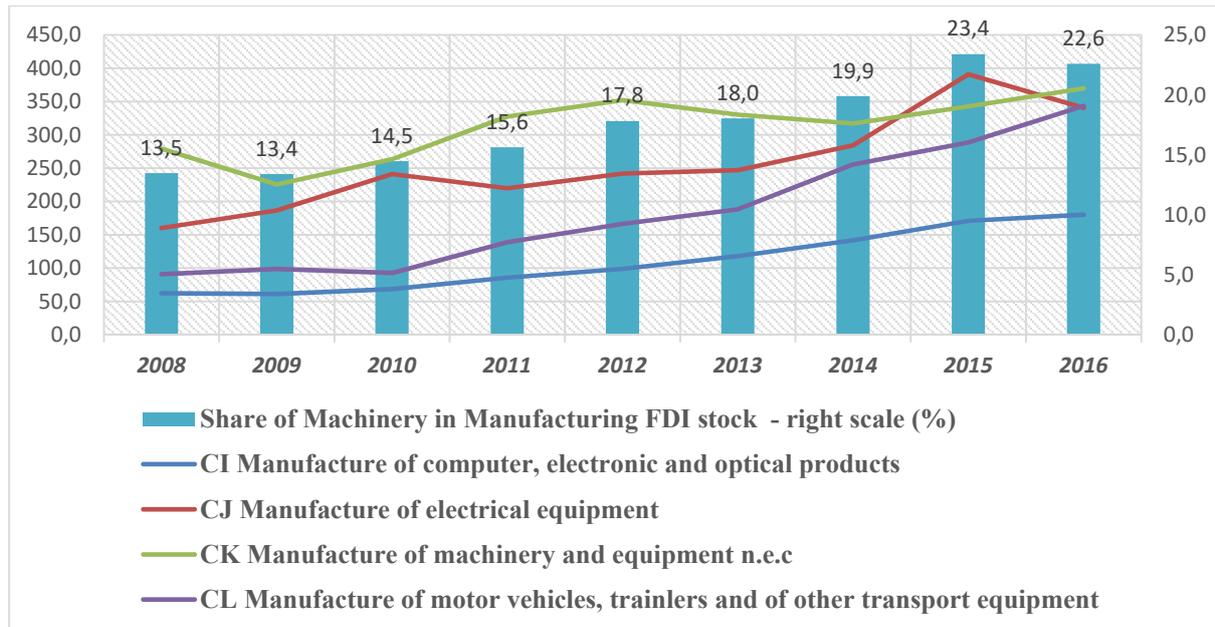


Fig. 4 Inward FDI stock in Bulgarian machine building industry (2008-2016, million EUR)

Source: National Statistical Institute of Bulgaria (NSI), Infostat, [https://infostat.nsi.bg/infostat/pages/module.jsf?x\\_2=12&lang=en](https://infostat.nsi.bg/infostat/pages/module.jsf?x_2=12&lang=en), accessed on 15.07.2018

By the end of 2016 the machinery industry has managed to attract over 1.2 billion EUR which accounts for 22.6% of the total inward FDI stock in Bulgarian manufacturing. From 2008 to 2016 the inward FDI stock increased by 108%. All of the subsectors of the industry registered an increase in their FDI stock but the most dynamic one was manufacture of vehicles and transport equipment that experienced an almost fourfold growth.

### Conclusion

Machine building plays a very important role in Bulgaria's economy. It contributes 16.6% of manufacturing production and 21.6% of country's total exports. Over 2000 enterprises operate in the industry providing jobs for 92 thousand people. Being an export oriented, technology and capital intensive industry producing high value added and having good conditions for innovative development it was selected as a priority branch. It is considered as one of the most dynamic and well positioned industries in Bulgaria. In the post-crisis years it has seen a constant increase in exports, foreign direct investments, employment. With an appropriate infrastructure for the needs of the machinery industry, well-developed network of universities and vocational high schools training high-qualified workforce, very high wage adjusted labour productivity and solid macroeconomic environment Bulgaria has bright prospects for its machine building industry. However, given its high export orientation (around 55-60%) it is exposed to external vulnerabilities and a possible full-fledged trade war between the major actors in the global economy may cause a serious downturn. Besides on the stability of the global trade and investment environment the future development of Bulgarian machinery branch rests on its ability to adopt new environmentally friendly technologies, customer-oriented business models, and creating and retaining high qualified human resources.

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