



FOREIGN EXPERIENCE IN ASSESSING THE EXPORT POTENTIAL OF THE CHEMICAL INDUSTRY

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Article history:	Abstract:
<p>Received: January 20th 2022 Accepted: February 20th 2022 Published: March 30th 2022</p>	<p>This article examines the state and development of the chemical industry in foreign countries such as Germany, China and the United States. Analyzed the main products of the chemical industry, their production, trade, value added, the state of enterprises, exports, imports and trade balance of countries in the trade of chemicals.</p>
<p>Keywords: Chemical industry, manufacture, foreign trade, product, export, import, materials, plastics, synthetic rubber, economic development.</p>	

Since 2015, sales of the chemical industry have not shown a pronounced upward or downward trend. Global sales of chemical products in 2020 amounted to \$3.88 trillion. A distinctive feature of the chemical industry is a large number of demand-generating industries and a wide range of products. Key consumers are manufacturers of plastics and synthetic rubber products, which account for 17.3% of global chemical demand. Among the main chemicals, ethylene, propylene, methanol, benzene, paraxylene and chlorine are the most in demand and are the basis for the production of a significant number of consumer goods.

The chemical industry has seen significant changes over the past decade, with China nearly doubling chemical sales from \$850 billion in 2009 to \$1,625 billion in 2020. At the same time, the share of the EU-27 in global sales of chemical products fell from 20.8% in 2009 to 14.8% in 2019. Over the past 10 years, there has been a decline in the share of sales of chemical products in the USA, Japan, Germany, Taiwan and Brazil. The US share of global sales declined from 17.0% in 2009 to 13.8% in 2019¹. Japan's market share declined from 6.9% to 4.6% over the same period.

Germany is the leader of the chemical industry in Europe. In the structure of the country's gross value added, the chemical industry reached 1.6%, or \$54.6 billion, in 2020².

The industry is the third largest in Germany after the automotive and engineering industries, generating 7.5% of the value added of all manufacturing industries.

The added value of the chemical industry in Germany until 2018 grew on average by 3.2% annually. German chemical industry sales totaled \$166.3 billion in 2020.

At the same time, over the past decades, industry indicators show positive dynamics:

- The average growth rate of income from the chemical industry over the 60-year period from 1960 to 2020 was 4.8%;

- With a 69% increase in production between 1990 and 2017, specific energy consumption fell by 14% due to the tightening of EU energy policy aimed at reducing the use of energy resources;

- R&D spending by chemical companies amounted to €4.4 billion in 2019. The share of spending on R&D in the German economy remains at the level of 2.9-3.1% of GDP;

- 14% of chemical patents registered with the European Patent Office are owned by German companies.

Basic chemicals account for 31% of sales of the chemical industry in Germany, plastics and synthetic rubber in primary forms - 22%, pesticides and other agrochemicals - a total of 6% of industry sales.

The trade balance of the German chemical industry is positive and amounted to \$19.8 billion in 2020³.

Foreign trade plays a key role for the German market. Export volumes account for 73.5% of the industry's revenues. At the same time, exports consist of high-tech chemical products specialized for the unique purposes of different industries.

¹ <https://www.euromonitor.com/>

² <https://cefic.org/a-pillar-of-the-european-economy/landscape-of-the-european-chemical-industry/germany/>

³ <https://www.bmbf.de/bmbf/en/research/hightech-and-innovation/high-tech-strategy-2025/high-tech-strategy-2025.html#:~:text=The%20High%2DTech%20Strategy%202025,the%20players%20involved%20in%20innovation.&text=The%20HTS%202025%20represents%20an,among%20innovation%20actors%20in%20Europe.>

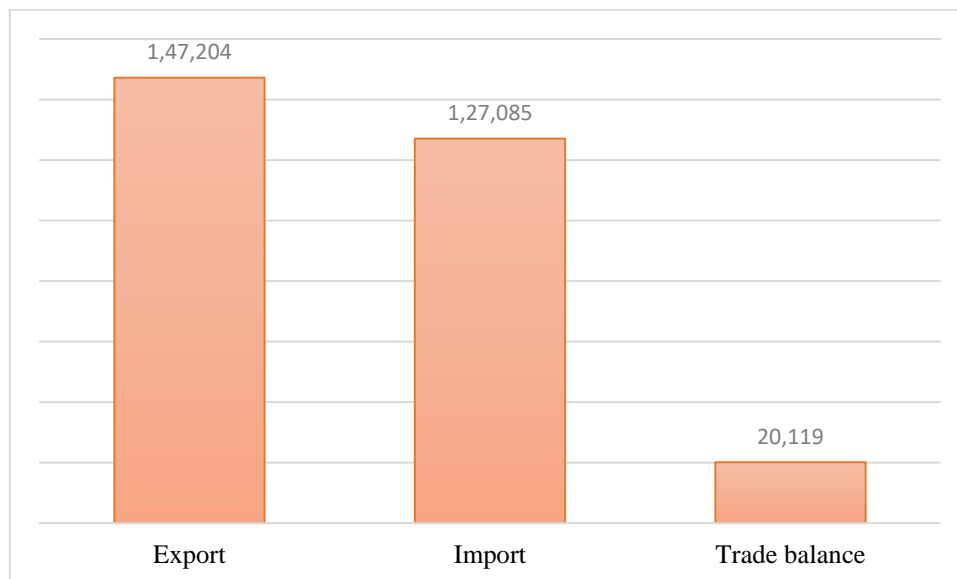


Fig.1. Export, import and trade balance of Germany for trade in chemicals, million dollars, 2020

In 2020, there were about 4,700 chemical companies in Germany, 85% of which were small and medium-sized (SMEs). The market share of large companies was 94.7%⁴.

Medium-sized companies are not so much suppliers as customers of large companies. Large chemical companies often supply intermediate products that medium-sized companies process into final products. The SME portfolio includes a wide range of products such as lacquers, paints, adhesives, furniture polishes. Some large international chemical companies (eg BASF, Covestro, Henkel, Bayer, Evonik) are of German origin. The top 10 German companies in the domestic market account for 32.5% of revenue⁵.

China's chemical industry is the largest in the world. In 2019, it accounted for 28% of the global value added of the chemical industry and about 40% of global revenue⁶.

In the structure of China's gross value added in 2020, the share of the chemical industry was 2.3%, or 7.7% of all manufacturing industries.

The chemical industry in China has 25.8 thousand enterprises, the largest of which occupy a small market share. So, for example, the share of revenue of the industry leader Sinopec was 3.6% of the total revenue of the country's chemical industry, the share of PetroChina was 1.3%. Shares of other

enterprises do not exceed 1%. The top 10 companies account for 8.9% of China's market revenue⁷.

The low share of large companies is typical not only for the chemical industry, but also for the Chinese economy as a whole. The share of small and medium-sized enterprises is more than 90%, and their contribution to GDP is more than 60%. About 80% of the Chinese population is employed in small and medium-sized enterprises. Small and medium enterprises began to become widespread in the 1980s. During this period, China was actively implementing reforms to transition to a market-oriented economy, in which private small and medium-sized enterprises were recognized as a key factor for economic development. Subsequent reforms in the 2000s led to an almost complete transition from state-owned companies to small and medium-sized enterprises.

If in China the top 10 companies account for 8.9% of the industry's revenue, then in Germany the top 5 companies account for about 20%. This difference is due to China's policy aimed at the development of small and medium enterprises, with lower requirements for small enterprises. It is easier for large companies to comply with stringent legal requirements in terms of environmental friendliness, efficiency and safety of production, as well as to allocate funds for R&D. That is why in Germany, where the requirements are higher, there are more large companies⁸.

⁴ https://www.bmw.de/Redaktion/DE/Publikationen/Industrie/industriestrategie-2030.pdf?__blob=publicationFile&v=20

⁵ <https://www.oecd-ilibrary.org/sites/31f5c0a1-en/index.html?itemId=/content/component/31f5c0a1-en>

⁶ <https://www.statista.com/statistics/783899/china-number-of-small-to-medium-size-enterprises/>

⁷ <https://www.eria.org/SME%20Development%20in%20China%20a%20Policy%20Perspective%20on%20SME%20Industrial%20Clustering.pdf>

⁸ <https://www.euromonitor.com/>



More than 60% of Chinese chemical industry enterprises are small, they account for 11% of the market in monetary terms. The number of enterprises is the largest of the countries under consideration. There are 3,492 large enterprises operating in China's chemical industry, and their market share is 78%.

In monetary terms, the most growing segments in the period from 2015 to 2019 were:

- base materials and fertilizers, with an average growth of 5.8% per year due to growth in sales of base materials;
- artificial fibers, growth 6.1%;
- paints and coatings, up 4.7%.

Significant decline was shown by: ▪ pesticides and agrochemicals – reduction by 13.1%; soap, detergents and cosmetics - a reduction of 7.7%. In 2020, the dynamics of the segments changed slightly.

Thus, 2020 contributed to the growth in sales of soap, detergents and cosmetics (+10.9%). The dynamics of output in physical terms generally corresponds to the dynamics in monetary terms.

China's chemical industry is focused on the needs of the domestic market. The volume of exports amounted to 8.4% of the companies' revenue. The share of imports in the Chinese market is 11.4%⁹.

The export of chemical products in 2020 amounted to \$136.9 billion. The main exported products are plastics and rubber (55.5%), artificial fibers (13.2%), basic chemicals (7.1%)¹⁰.

Imports of chemical products in 2020 amounted to \$185.2 billion. The main goods supplied to the Chinese market are plastics and rubber (54.1%), soap, detergents, cosmetics (15.8%), basic chemicals (6.9 %).

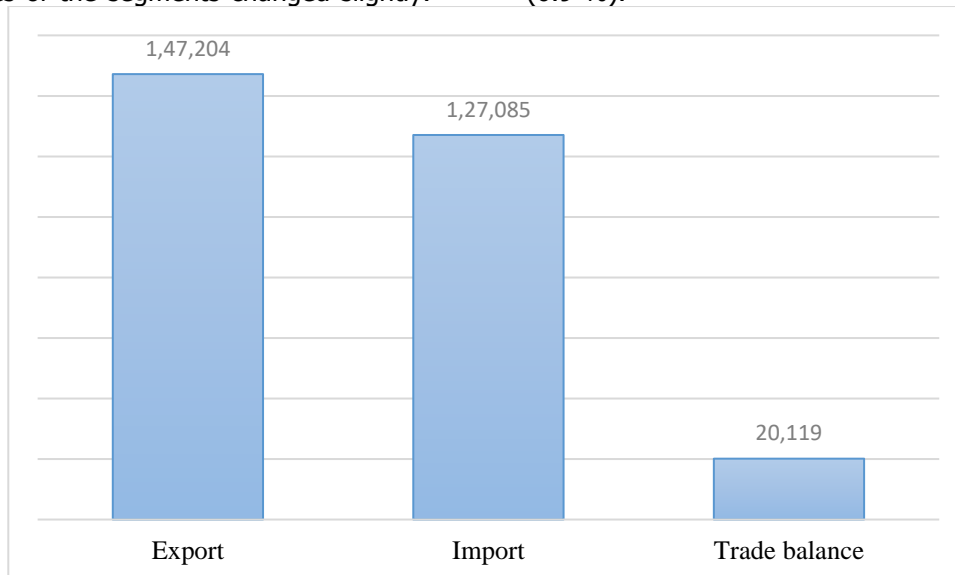


Fig.2. Export, import and trade balance of China on trade in chemicals, million dollars, 2020¹¹

China's role in foreign trade is to buy and process raw materials in primary forms and sell finished products.

China imports plastics in primary forms for the production and export of plastic products for transportation and packaging, tableware and kitchen utensils, floor coverings, and boards, sheets, films and tapes. Similarly, China imports rubber in primary forms for the manufacture and export of tires and tyres, clothing and rubber clothing accessories.

China is the world's largest producer of man-made fibers - 8 out of 10 man-made fiber factories in the world are located in China¹². A large share of artificial fibers in the structure of the chemical industry

and the country's exports is associated with the wide development of the textile industry in the country. China's key foreign trade partners are the United States, India, South Korea, Japan, and Brazil.

Since 2018, there has been a slowdown in the growth rate of the chemical industry, which is due to the general pace of development of industries in China. Previously, China was characterized by the presence of large state-owned enterprises that attracted an excess amount of investment and production capacity, and there was an overproduction of products. This allowed the industry to grow at a high rate, despite the existing production volumes.

⁹ <https://www.trademap.org/Index.aspx>

¹⁰ <https://ihsmarkit.com/products/fibers-chemical-economics-handbook.html>

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http://www.stats.gov.cn/enGLISH/PressRelease/202101/t20210119_1812525.html

¹² <https://www.marketline.com/>



At the moment, the Chinese market is undergoing changes associated with the transition to a new qualitative level of economic development - the transition from extensive to intensive development.

The US share of the global chemical industry market in 2020 was 12.9%. In the period up to 2024, a CAGR of 1.2% to \$673.8 billion is projected. In the structure of the total gross value added, the chemical industry occupies 1.2%, in the value added of manufacturing industries - about 10% (Fig.). It is expected that global demand will stimulate the growth of exports and the development of the domestic market in the United States. The average growth rate of exports of chemical products will be 6.5% per year until 2025¹³.

The US chemical industry is a \$502 billion sector. The share of value added in revenue is one of the highest among the countries analyzed, which underlines the industry's focus on the production of technological products¹⁴.

In 2016 and 2017, the chemical industry accounted for nearly half of construction spending across the entire U.S. manufacturing industry. Much of the output from these facilities is destined for export, reflecting investors' understanding that the United States is globally competitive.

Today, most basic and specialty chemicals companies typically dedicate 2-3% of their annual revenue to R&D. Unlike many other manufacturing industries that receive government funding for research, the chemical industry in the United States is

characterized by a large number of private R&D investors¹⁵.

The US chemical market is characterized by high competition, the market is dominated by large transnational companies. The total number of enterprises in the US market exceeds 17 thousand. Large enterprises occupy a share of 94% of the market in terms of value.

The largest segment of the US market is bulk chemicals and products, which accounted for 40% of total chemicals revenue in 2019. The sales structure is dominated by basic chemicals with a share of 40.5%¹⁶, then equal shares are occupied by plastics and synthetic rubber in primary forms, 17.6% each, then soap, detergents and cleaning products, cosmetics with a share of 17.5%¹⁷.

The U.S. chemicals trade has grown steadily over the years. The US chemical industry maintained its position as a net exporter. The chemical industry is one of the leading export industries in the US, accounting for 9.5% of all exports. Exports of chemical products in 2020 amounted to \$147.2 billion¹⁸.

The U.S. chemicals trade surplus was \$20.1 billion in 2020 (Fig.3). Taking into account the competitive advantage created by investments and developments in the field of shale gas, according to experts, by 2024 it will grow to \$ 61 billion. The share of exports in the revenue of chemical industry enterprises in 2020 amounted to 29.3%.

¹³ <https://www.americanchemistry.com/chemistry-in-america/news-trends/press-release/2021/mid-year-outlook-u.s.-chemical-industry-rebounds-as-global-recovery-continues>

¹⁴ <https://www.marketline.com/>

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¹⁶ <https://www.americanchemistry.com/chemistry-in-america/news-trends/press-release/2021/mid-year-outlook-u.s.-chemical-industry-rebounds-as-global-recovery-continues>

¹⁷ <https://www.commerce.gov/>

¹⁸ <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement>

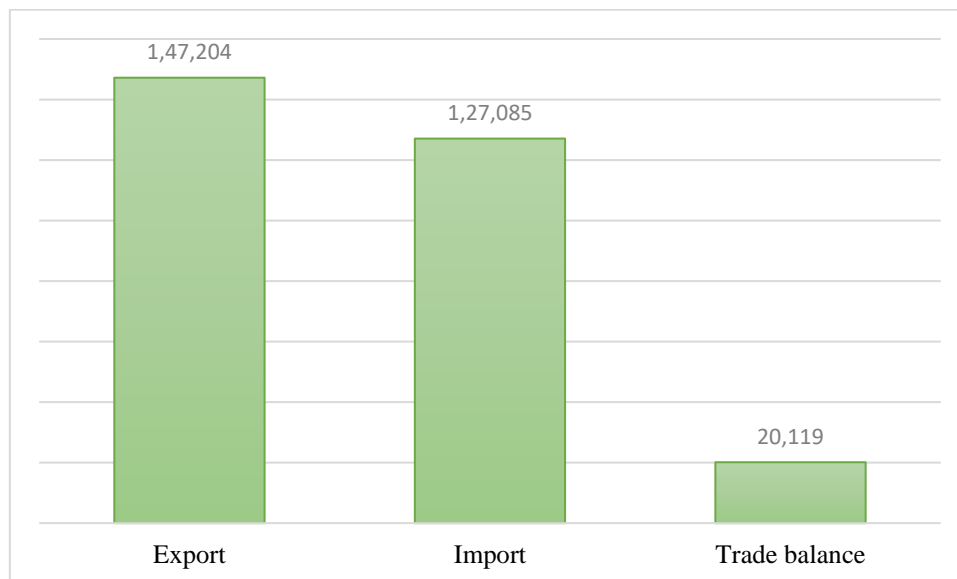


Fig. US exports, imports and balance of trade in chemicals, mln USD, 2020

More than half of US imports are raw materials and materials used for domestic production. In the structure of imports, the largest share in monetary terms, or 60%, is made up of basic chemicals. 21% is for specialized light-duty chemicals, 11% for final products, and 8% for agrochemicals.

Key trading partners in the chemical industry for the US are Canada, Mexico and China. The shares of these countries were:

- In imports - 51%: Canada - 25%, Mexico - 16%, China - 11%;
- In export - 60%: Canada - 25%, Mexico - 24%, China - 11%.

Both exports and imports are expected to grow in the United States in the coming years:

- U.S. chemical exports are on the rise as economies recover and demand grows in partner countries. After falling by 7.6% in 2020, exports of chemical products will grow by 5.8% in 2021 and by 13.8% in 2022;
- U.S. imports of chemicals, after falling 5.1% in 2020, will rise 1.6% in 2021 and 13.7% in 2022¹⁹.

One factor behind the positive outlook is the new USMCA North American trade agreement, which will boost the market in the long term.

High shale gas reserves in the US will drive growth in the North American chemicals market. Exports of shale gas chemicals are projected to reach \$123 billion by 2030, more than double the 2014 figure.

One of the main demand-generating industries for chemical products are construction and the automotive industry. But these markets are experiencing a decline in demand. New home

construction in the United States has shown a gradual increase since 2015 (CAGR of 8.58%) with a notable drop in 2020 due to sector restrictions during the COVID-19 pandemic. Since sales volumes are still far from the pre-crisis levels of 2008 - 1.94 million units, housing/month, – there are reasons to expect a further slight increase in demand from the construction sector (about 4-5% annually).

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