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Comparative Advantage and the Knowledge-Based Economy. Experiences from Polish-Chinese trade*

Abstract

RESEARCH OBJECTIVE: The aim of this study was to identify trade patterns between Poland and China in the context of the theory of comparative advantage and the knowledge-based economy.

THE RESEARCH PROBLEM AND METHODS: The central question was to answer whether Poland has strengthened its competitive advantage in any product categories through recorded increases in normalized revealed comparative advantage (NRCA), using the modified indicator version. The approach of the above analysis enabled the conducted research to assess whether Poland's trade with China, especially those in the field of high-technology, were carried out in accordance with the theory of comparative advantage, during the analyzed decade (2013–2022).

THE PROCESS OF ARGUMENTATION: In the first stage, a review of the literature on foreign trade was carried out. This was important as it sheds light on the issues of comparative advantage, with a particular emphasis on its links with the knowledge-based economy. Then, the main characteristics of Polish-Chinese trade were analysed and presented together with their results in order to identify areas of comparative advantages using the NRCA index.

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RESEARCH RESULTS: Poland-China trade reveals gradual change and this is evidenced by changes in the NRCA index, which is in line with changes in the export structure of both countries. However, in the case of Poland, the nature and direction of these advantages is – although slowly changing – towards those appropriate for more knowledge-based economies.

CONCLUSIONS, INNOVATIONS, AND RECOMMENDATIONS: Further strengthening comparative advantages in the field of high-tech.

Keywords:
comparative advantage, knowledge-based economy, exports, imports, *high-tech* goods

A knowledge-based economy (KBE), as defined by the European Commission, is the commercial extraction of new technologies, ideas or methods through which new products and processes are introduced or existing ones are improved (Simme et al., 2002). Changes in conditions through which modern countries operate, and in which the latest technologies are playing an increasingly important role, strive to shape their respective knowledge-based economies. This has a strong impact on their technological competitiveness and has become an important trend across countries. On the other hand, due to the following – with varying intensity – intensification of globalization processes, international trade links and the benefits resulting from them are becoming increasingly important. This further gives rise to many problems of a more theoretical nature, among which is the issue of the topicality of the concept of comparative advantage under conditions of the knowledge-based economy. The theory of comparative advantage was developed over two hundred years ago. Importantly, to this day, it is considered to be a determinant of the trade structure of a given country and this leads to specialization in international trade. The classical model, although not able to explain all of the complexities of contemporary trade relations, has been the subject of numerous empirical studies for many years. Economists are looking for an answer to the question of the extent to which it is useful in explaining trade flows in the global economy. Over the years, it has been developed and reinterpreted, and contemporary literature devotes a lot of attention to, among others, shaping and understanding comparative advantage in the knowledge-based economy. Countries, which invest in research

and development (R&D) and support the creation of new technologies and innovations, can develop a comparative advantage in knowledge-based sectors, such as advanced technologies, IT, biotechnologies or IT services. The possession of a qualified workforce and institutions supporting innovation can also contribute in increasing a country's competitive advantage. Research developing the theory of comparative advantage therefore supports and complements not only the classical model, but also other analyses focusing on alternative theories of foreign trade, which is further discussed in this publication.

This article analyses trade between Poland and the PRC. China is a country that has made great strides in its transformation into a knowledge-based economy. Although they still differ from countries such as Japan, Korea or the USA in this respect, they are a key player in global supply chains (GVC) in the field of *high-tech* goods. Due to the size of the Chinese economy and its fast-growing consumer sector, it is a very promising market for Polish exporters. Economic cooperation with China may also be crucial in the context of Poland's strong dependence on its main, and at the same time geographically close, trade partner, which is Germany (Michalski, 2017, p. 202–203). However, competition based on advantages resulting mainly from location is not always optimal. In this context, it is important to empirically verify the potential of Polish exports and imports in trade with China by determining the mutual comparative advantages of individual sectors and their changes over time. Due to the importance of this area of specialization, these studies were conducted with particular emphasis on *high-tech* industries. The share of *high-tech* goods in foreign trade, and especially in exports, is an important criterion determining a state's technological potential. Developing a comparative advantage in these types of sectors contributes to the creation of an innovative and competitive society based on knowledge and skills. Thus, it has long-term benefits for the economic and social development of a country.

LITERATURE REVIEW

Since the classical era, differences in comparative costs between countries have been considered as one of the main causes of trade. These views derive from the concept of comparative advantage proposed

by D. Ricardo (1817). This author recognized the relative advantage in trade as the basic cause of international specialization occurring when a given country can produce a good at a lower opportunity cost than its trading partner. Importantly, as D. Ricardo himself pointed out, technological differences between countries are the main source of this advantage.

Ever since the start of the classical era, this theory has frequently returned in scientific debates. A kind of reinterpretation of the classical concept of relative costs became, among *others*, the H-O-S model (Heckscher, 1919; Samuelson, 1948 and 1949; Ohlin, 1967). According to this concept, a country has a comparative advantage in the goods for which it uses its relatively abundant (or inexpensive) resources more intensively.

From the 1950s, studies referring to the classical model began to appear, many of which concerned the relationship between relative labor productivity, relative wages and the structure of exports. Research carried out by G.D.A. MacDougall (1951) and later by R.M. Stern (1962) and B. Balassa (1965) provide arguments confirming the truth of D. Ricardo's theory. Further developments in classical theory also began to appear. According to D.B. Keesing (1966), apart from work, human skills should also be considered as a factor of production. This author believed that countries relatively rich in this resource will have a comparative advantage in those products for which capital is used more intensively. R. Vernon (1966) noted, however, that a comparative advantage may also result from a technological gap between countries or a product cycle that takes into account the nature and volume of demand. Importantly, based on theoretical grounds, the first studies revealing the more dynamic – not static – nature of comparative advantage started to appear. According to A. Deardorff (1980), whose research (with some reservations) confirmed the validity of the theory of comparative advantage as a determinant of the structure of international trade. Other authors (Dornbusch et al., 1977; Krugman, 1987), using the Ricardian model of the goods continuum, indicated that comparative advantage may change over time. This is due to its current impact on production and the pace of learning by doing, which in turn affects the future formation of comparative advantage (return impact). R.E. Lucas (1988) in his research used a two-sector model of the economy, in which

both sectors differed in terms of the pace of learning by doing. He proved that, depending on the patterns of comparative advantage, opening the economy to foreign trade may lead to specialization in a sector with a lower rate of learning by doing, thus lowering the rate of economic growth.

From the late 1980s, along with progress in economic theory and changes related to the global economic environment, research indicating that a knowledge-based economy can stimulate the development of comparative advantage in specific sectors of the economy began to develop dynamically. Knowledge, innovation and skills are key factors in creating high-quality products and services that can be competitive in international markets. G.M. Grossman and E. Helpman (1989) claimed, for example, that R&D allowed for the creation of new intermediate products and reduced research costs. This made it possible to deepen the specialization of the production of consumer goods, as well as to increase the efficiency of final production. As a result, observed changes in patterns of comparative advantage (resulting from differences in R&D efficiency between countries) thus influenced economic growth. In a subsequent article, developed using R&D-based endogenous models of innovation, these authors also pointed out that specialization consistent with comparative advantage can positively affect aggregate economic growth, but for this to happen, the right conditions must be met (Grossman, & Helpman, 1991). On the other hand, A. Young (1991) proved that in the case of trade between countries with different levels of technological advancement, a country less developed in this respect specializes in goods with a lower level of technology (with a finite potential for learning by doing). As a result, specialization pursued in accordance with comparative advantage allows for obtaining only static welfare gains, with dynamic welfare losses. Similar conclusions were also drawn by S.J. Redding (1999), who pointed to a dilemma that developing countries participating in international exchange may face. Some of them will have to choose between specialization pursued in accordance with the existing comparative advantage (in goods with a low level of technology) or taking up the challenge of entering sectors where they do not have such an advantage (high-technology). In the latter case, they may – as a result of productivity growth – gain an advantage in *high-tech* goods. At the same time, this

means that maintaining the status quo (specialization in accordance with the current comparative advantage in *low-tech* goods) may negatively affect the prosperity of a given country.

At the beginning of the 21st century, which brought about significant developments in IT, research on comparative advantage and the knowledge-based economy became even more important. There were numerous scientific publications, reports and analyzes on the impact of innovation, knowledge and skills on the competitiveness of countries. These analyzes focused on various aspects of the interplay between comparative advantage and the knowledge-based economy. They concerned e.g. how comparative advantage affects the development of the knowledge-based economy and how innovation and technological development can affect comparative advantage. Such analyzes were often conducted through the prism of a country's economic growth and prosperity. Much research has focused on the role of human capital as a source of comparative advantage and a benchmark for international specialization (Grossman, & Maggi, 2000; Grossman, 2004; Ohnsorge, & Trefler, 2004; Costinot, 2009). Other researchers have pointed out that the dynamics of comparative advantage is endogenously determined by innovation and technological change (Redding, 2002). D. Acemoglu (2003) in his research also addressed the subject of comparative advantage and related changes in technology. He argued that – given constant technology – investment in innovation in the workforce can lead to an increase in the supply of skills, which in turn reduces the skill premium. This increase in the supply of skills is the cause of the endogenous change in technology. According to research by A. Navas (2017), innovativeness of companies is stronger precisely in those industries where the economy shows a comparative advantage. As M. Somale (2021) points out, analyzes should focus on selected goods in the economy. According to this author, trade determines the direction of innovation by its influence on the expected size of the market for an invention, which leads to a two-way relationship between trade and technology. C. Jie et al. (2022) – using an endogenous growth model in which comparative advantage is determined by innovation and diffusion – presented the relationship between trade, innovation and knowledge diffusion. According to these authors, the reduction of trade costs results in the reallocation of R&D and comparative

advantage between sectors. The diffusion of knowledge in this model reinforces the effects of specialization resulting from the reallocation of R&D caused by trade, becoming an important source of wealth. Other publications emphasize the role of comparative advantage as a source of endogenous innovation and economic growth (Melitz, & Redding, 2022). International trade, as stated in these studies, also induces specialization according to comparative advantage. Here it is important to distinguish between targeted and untargeted technological change. Technological change is targeted if actors can channel endogenous investment in innovation towards specific sectors. Specialization according to comparative advantage – where sectors differ from each other in terms of their pace of innovation and growth – can affect aggregate growth rates precisely by changing the sectoral structure.

Most studies, therefore, indicate a relationship between comparative advantage and the knowledge-based economy. Comparative advantage can be the basis for the development of a knowledge-based economy, provided investment in human capital, R&D, and international cooperation. The combination of these factors can contribute to long-term economic growth and increase the country's competitiveness in the international arena.

METHODOLOGY

The study used source data obtained from the United Nations (UN Comtrade) database at the three-digit level of disaggregation, using the Standard International Trade Classification (SITC3). The actual determination of technological advancement [*high-tech* (HT), *mid-tech* (MT), *low-tech* (LT), *resource based* (RB), *primary products* (PP) and *others* (O)] of the analyzed product groups was made on the basis of the classification adopted by the World Bank as part of the World Integrated Trade Solution (WITS). Grouping is based on the origin of the raw material and the level of technology and skills of the workforce within a given raw material. The use of a three-digit classification allows the character of products to be presented according to the similarity of technology and factors of production (Greenway, & Milner, 1986; Menon, 1996).

However, the measure most often used in trade research so far is the Revealed Comparative Advantage (BRCA) indicator (Balassa, 1965). Although this indicator has various limitations, the usefulness of the measure of comparative advantage has so far not been challenged in trade studies. However, various authors point to the problem of static or asymmetric value of the BRCA index (Laursen, 1998). Others raise issues of the logarithmic transformation (Hoen, & Oosterhaven, 2006) as well as the importance of considering the import side at the same time (Vollrath, 1991). Some researchers also warn against the possibility of distorting trade patterns by government intervention. The above BRCA problems have contributed to the emergence of alternative measures of comparative advantage. These include: Relative Trade Advantage (RTA), Logarithm of Relative Export Advantage (ln RXA) and Revealed Competitiveness (RC) (Vollrath, 1991), Balance of Trade Index (TBI) (Lafay, 1992), Hidden Revealed Comparative Advantage (IRCA) (Greenaway, & Milner, 1993), symmetric revealed comparative advantage (SRCA) (Dalum et al., 1998; Laursen 1998); weighted revealed comparative advantage (WRA) (Proudman, & Redding, 1998), monotonic transformation of the Balassa index (Hinloopen, & van Marrewijk, 2006), or additive revealed comparative advantage (ARCA) (Hoen, & Oosterhaven, 2006). Although these indicators provide the opportunity to circumvent some negative aspects of the BRCA, they cannot be used for comparisons in space or time (Fakhrudin et al., 2019, p. 112). A certain solution to this issue may be the use of the Normalized Revealed Comparative Advantage (NRCA) index (Yu et al., 2009). This indicator, which is symmetrical, additive for the range of countries and goods, and comparable between countries, goods and time, is a kind of hybrid of the previously proposed solutions. Due to its characteristics, the NRCA can therefore be used in time series analysis, as well as in studies of comparative advantage between countries with the analysis of panel data (Fakhrudin, & Hastiadi, 2016, p. 7). The range of NRCA values is around the neutral value of 0, between –0.25 and 0, and between 0 and 0.25. Due to the relatively low index values obtained, they were multiplied by 100 (Yue, & Hua, 2002). Importantly, if the NRCA has values above zero, the commodity/group of commodities has an actual export value greater than the comparative advantage in the neutral value. Conversely, when the NRCA for a given good/

group of goods is less than 0, the actual export value is less than the comparative advantage in its neutral value. The sum of the NRCA values for all goods of a given country (Poland/China), due to their symmetrical arrangement – is equal to zero (neutral) (Fakhrudin, & Hastiadi, 2016, p. 6). In this study, the comparative advantage was calculated against the rest of the world for selected commodity sectors. This means that if a given sector recorded an increase in comparative advantage for Poland/China, the same sector in other countries (the world) will experience a decrease in its comparative advantage. Importantly, because the theory shows that comparative advantage (measured by the NRCA index) shows export patterns, it is expected that the higher the value of this index, the greater the impact on the volume of Polish exports to China. In addition, comparative advantage may also be one of the factors taken into account when formulating Polish trade policy towards China, in particular with regard to goods that should be focused on in order to increase the share in Chinese imports.

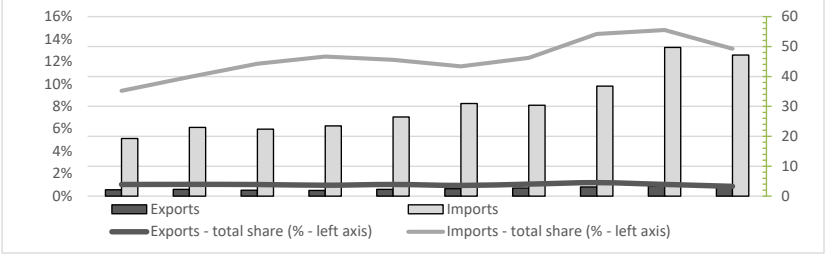
CHARACTERISTICS OF POLAND'S TRADE RELATIONS WITH CHINA IN THE YEARS 2013–2022

Trade between Poland and China, despite the fact that it is carried out in conditions of huge disproportion between the two economies (in favor of the PRC), may, however, be of significant importance from the perspective of Polish economic interests. This is particularly important in the context of the Chinese Belt and Road Initiative (BRI) initiated in 2013, which means strengthening trade and economic ties between China and, among *others*, Europe. Poland, due to its strategic location, provides one of the main "gateways to Europe", and thus becomes an important transport and logistics hub within the BRI. An appropriate trade policy towards China, conducted taking into account the current, strategic interests of the Polish economy, may mean that Poland will be a beneficiary of such cooperation.

The systematic tightening of Polish-Chinese trade cooperation is evidenced by a significant increase in mutual trade. China is the second, after Germany, Poland's main partner in terms of trade volume. At the same time, it is the largest Asian market for Polish exporters.

With this country, however, Poland has the greatest disproportion between exports and imports. In 2022, exports to China accounted for 0.9% of Polish exports, while imports from this country amounted to 13% of total imports (Fig. 1). In the case of exports, this share was very stable, as from 2013 to 2021 it was at the level of 1%. With regard to import, in the years 2013 to 2021, there was a systematic increase from 9% to 15%. In 2013, the value of trade between these countries amounted to over USD 21.5 billion, and by 2022 it had increased to over USD 50 billion, while exports – at that time – increased from USD 2 billion to less than USD 3 billion, while when imports recorded an impressive increase from USD 17 billion to USD 44 billion.

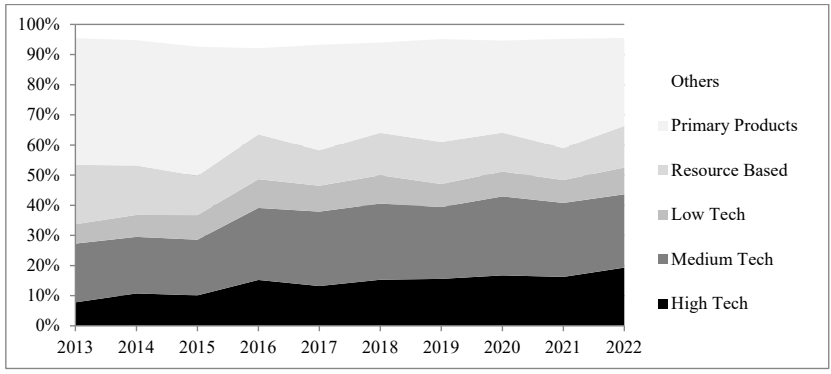
Fig. 1 Poland's trade turnover with China in 2013–2022 (in USD billion and %)



Source: Own elaboration based on: https://comtradeplus.un.org/

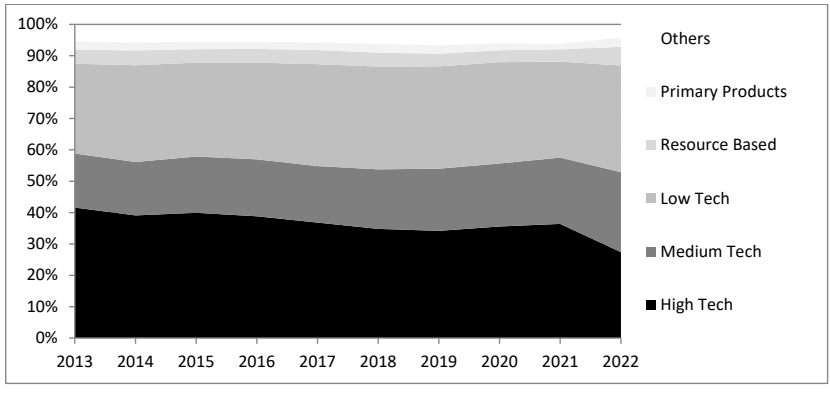
At the initial stage of the study, the evolution of the structure of technological advancement of Polish exports and imports was identified (Figures: 2 and 3), as well as the trade balance in exchange with China. Due to the fact that the high assessment of the competitiveness of economies is evidenced, among *others*, by ability to produce technologically advanced goods, particular attention was paid to this category of goods.

Fig. 2 Evolution of the technological advancement structure of Poland's exports to China in 2013–2022 (in %)



Source: Own elaboration based on: https://comtradeplus.un.org/

Fig. 3 Evolution of the technological advancement structure of Poland's imports from China in 2013–2022 (in %)



Source: Own elaboration based on: https://comtradeplus.un.org/

In the case of Poland, a systematic increase in the share of exports of *high-tech* products in the total value of exports to the Chinese market was recorded in the analyzed period (from 8% in 2013 to 19% in 2022%). The largest share in this group of products in 2022 was held by *electrical machinery and apparatus* (SITC 778), which has been systematically increasing since 2013, from 20.1% to 22.4%, respectively. In second place – in 2022 – among *high-tech* products were *electric power machinery* (SITC 771), which recorded a significant increase in the share in exports of this category of goods to China, from 2.6%

in 2013 to 18%. The third category of *high-tech* goods is *measuring, checking, analyzing and controlling instruments* (SITC 874), whose share remained stable at around 16% (both in 2013 and 2022). A significant decrease in the share was recorded by *telecommunications equipment* (SITC 764) from 35% (2013) to 7.5% (2022). This may be due to the dominance of Chinese manufacturers in this industry, which are world leaders in the production of telecommunications equipment. Chinese products are competitive in terms of price and technology (especially 5G).

The structure of Polish imports from China in terms of technological advancement reveal a significant disproportion in relation to the analogous export in terms of technologically advanced goods (*high-tech*). These goods – in the analyzed period – constituted on average as much as 36% of Chinese exports to Poland, and this share fell from 42% in 2013 to 27% in 2022. This decrease – especially after 2020 – could have resulted from disruptions in GVC deliveries due to the Covid-19 pandemic, which resulted in the search for alternative, diversified sources of supply (China+1 strategy). In 2022, Poland imported from China mainly *electrodiagnostic apparatus* (SITC 759), which accounted for over 55% of Chinese goods imported under the *high-tech* category. *Telecommunications equipment* (SITC 764) and *parts and accessories* (SITC 759) were ranked second and third, accounting for 23.6% and 14.5% of Polish imports from China in the *high-tech* category, respectively. This means some changes compared to 2013, when the analyzed imports were dominated by *parts and accessories* (SITC 759), *electric power machinery* (SITC 771) and *rotating electric plant* (SITC 716) (54.4%, 20% and 9%).

Table 1. Decomposition of Poland's trade balance with China in 2013–2022 (in USD billion)

Symbol	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HT	- 6,32	-7,1	-7,0	-7,2	-7,7	-8,4	-8,1	-9,9	-13,7	-9,6
MT	-2,3	-2,8	-2,9	-3,1	-3,4	-4,2	-4,4	-5,2	-7,5	-7,5
LT	-4,3	-5,6	-5,3	-5,7	-6,9	-8,0	-7,9	-9,2	-11,7	-12,3
RB	-0,4	-0,6	-0,6	-0,6	-0,7	-0,8	-0,7	-0,8	-1,2	-1,8
PP	0,3	0,3	0,3	0,0	0,1	-0,1	0,1	0,1	0,3	-0,4
O	-0,8	-1,0	-0,6	0,0	-1,1	-1,4	-1,6	-1,6	-2,3	-1,4

Source: Own elaboration based on: https://comtradeplus.un.org/

As shown in table one, when trading with China, Poland recorded the largest deficits in the *high-tech* goods category throughout the analysed period. These data may indicate Poland's technological dependence on the Middle Kingdom resulting from a limited capacity in the production of these goods in its own market. It can also be concluded that foreign investments in Poland (including from China) are located in sectors with lower technological added value, which result in the import of technologically advanced products. This deficit may also reflect differences in the level of technological development between the two countries.

IDENTIFICATION OF COMPETITIVE ADVANTAGES IN POLAND'S TRADE WITH CHINA

The last stage of the analysis focused on the identification of product groups that were characterized by a relative competitive advantage and trends in the NRCA index in the analyzed period.

Table 2. Sector Specific Normalized Revealed Comparative Advantage (NRCA) for Poland in trade with China (2013–2022)

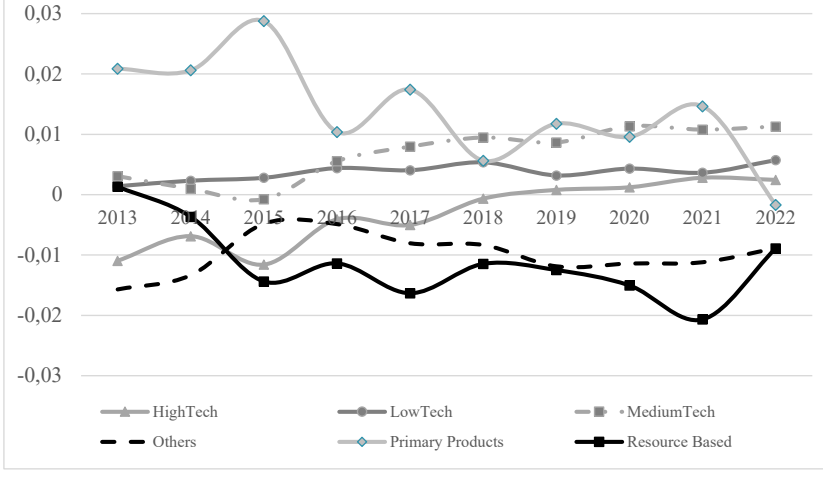
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HT	-0,01095	-0,00688	-0,01159	-0,00408	-0,00502	-0,00066	0,00079	0,00122	0,00281	0,00244
MT	0,00307	0,00096	-0,00076	0,00555	0,00796	0,00947	0,00865	0,01134	0,01078	0,01129
LT	0,00140	0,00232	0,00280	0,00440	0,00405	0,00536	0,00319	0,00432	0,00364	0,00572
PP	0,02087	0,02060	0,02876	0,01039	0,01740	0,00564	0,01175	0,00958	0,01465	-0,00169
RB	0,00132	-0,00366	-0,01438	-0,01139	-0,01633	-0,01146	-0,01249	-0,01504	-0,02067	-0,00890
O	-0,01570	-0,01334	-0,00482	-0,00488	-0,00805	-0,00834	-0,01188	-0,01141	-0,01120	-0,00887

Explanation: The brighter the color of the field, the greater the comparative advantage.
Source: Own elaboration based on: https://comtradeplus.un.org/

Poland – in most of the analyzed sectors – obtained very low NRCA values in the analysed period (Table 2). This observation concerned, among *others*, *high-tech* goods, which in this respect fared worse than sectors such as primary products, medium tech or *low-tech*. This means that Poland is not competitive in *high-tech* industries, which means it does not have relative cost advantages or production skills – signaling a very low level of competitiveness in relation to

other countries' exports to China. However, as shown in Figure (4) below, NRCA values in *high-tech* industries have however been gradually increasing. This trend was particularly visible after 2017, which indicates a gradual strengthening of competitiveness in this industry. A similar trend, which started in 2015, has occurred in the medium tech sector. Importantly, these two sectors (MT and HT) in 2022 had the highest NRCA values among all the surveyed sectors. A significant decrease in NRCA, which previously remained at favorable (positive) levels, was recorded in primary products. This may mean a gradual change in the traditional comparative advantage, and thus export patterns, and an evolution of Poland's comparative advantage in trade with China. Especially that, as it was shown earlier, the share of these product categories in Polish exports to China has also been growing in recent years.

Fig. 4 Evolution of the NRCA indicator in Polish trade with China (2013–2022)



Source: Own elaboration based on: https://comtradeplus.un.org/

Chinese exports to Poland were accompanied with high NRCA index values in the field of *high-tech* goods (significantly exceeding those obtained by Poland) throughout the analysed period. *Low-tech* goods were also an important Chinese export sector (Table 3). This may be due to the fact that China is also rich in various types of natural resources.

Table 3. Sector Specific Normalized Revealed Comparative Advantage (NRCA) for China in trade with Poland (2013–2022)

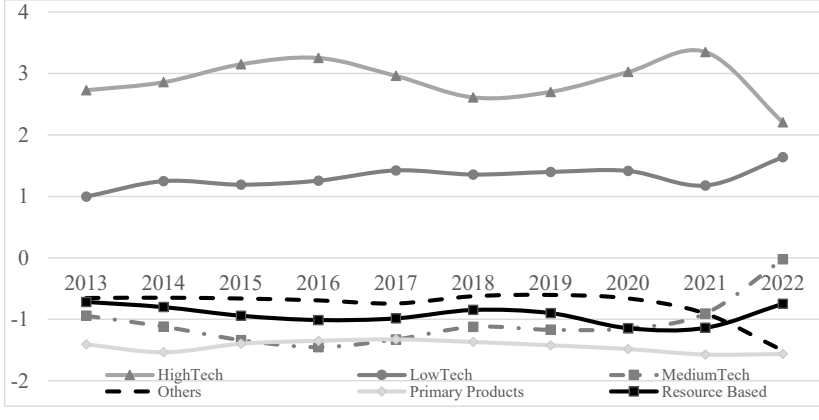
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HT	2,72594	2,85681	3,14918	3,25141	2,95969	2,60930	2,70024	3,02328	3,34868	2,20536
MT	-0,94336	-1,11820	-1,33839	-1,45299	-1,32804	-1,12315	-1,17076	-1,14902	-0,90538	-0,02220
LT	0,99604	1,24826	1,19009	1,25554	1,42258	1,35532	1,39721	1,41438	1,17682	1,63656
PP	-1,40866	-1,53650	-1,39701	-1,34956	-1,32660	-1,36867	-1,42354	-1,48372	-1,57397	-1,56393
RB	-0,71704	-0,80170	-0,94204	-1,01192	-0,98501	-0,84801	-0,89962	-1,14473	-1,13895	-0,74605
O	-0,65291	-0,64866	-0,66183	-0,69248	-0,74261	-0,62478	-0,60353	-0,66019	-0,90720	-1,50974

Explanation: The brighter the color of the field, the greater the comparative advantage.

Source: Own elaboration based on: https://comtradeplus.un.org/

As shown in Figure (5) below, the NRCA index for China, despite its high values, after the increases recorded after 2018, started to decrease significantly from 2021. It was also the year when a significant decline in *high-tech* goods in the structure of Polish imports from China began. Since this year, NRCA increases have been recorded for less processed goods (MD, LT and RB).

Fig. 5 Evolution of the NRCA indicator in Chinese trade with Poland (2013–2022)



Source: Own elaboration based on: https://comtradeplus.un.org/

The reasons for the observed decrease in the NRCA values for China may be various, such as increased production costs in China,

increasing competition from other countries in their respective access to technologies or the development of own capabilities in the *high-tech* sector by Poland. These areas will be the subject of further research by the author of this paper.

CONCLUSIONS

This research has confirmed that trade between Poland and China is carried out and is consistent with each country's comparative advantage. This is evidenced by changes in the NRCA index and in line with changes in the export structure of both countries. However, the nature of these advantages reveals – in the case of Poland – a process of slow change, but towards one observed and appropriate for knowledge-based economies. The increase in the share of *high-tech* products in Polish exports to China proves the growing dynamics and advancement of the Polish technology sector. It also signals that the Polish economy is becoming more knowledge-based, and thus more competitive on the international market. In order to strengthen this trend and reverse the unfavorable asymmetry in Polish-Chinese trade, Poland should also strive to selectively attract the types of desired capital it requires in terms of sector and technology. At the same time, Poland is opening up more to China, which is facilitated by, among *others*, appropriate trade policy. Therefore, Polish-Chinese investment and economic cooperation, especially *high-tech* cooperation, seems to be of key importance, which should contribute to a further increase in the export of goods from this sector. It is also important to monitor and develop local production capacity in this sector to reduce dependence on imports and to increase exports of Polish innovative technological products. It should be emphasized that Poland is gradually investing more and more in the development of its *high-tech* sector, supporting innovative enterprises and start-ups. This development leads to the production and export of *high-tech* products that also find customers in the Chinese market, as reflected in the evolution of the NRCA index for *high-tech* goods. China is one of the largest and fastest growing consumer markets in the world. The growing demand of Chinese consumers for innovative and technologically advanced products opens up opportunities

for Polish exporters. It also seems particularly important to build and strengthen Poland's growing reputation as a producer of high-quality and technologically advanced products that will be attractive for Chinese buyers looking for new, innovative solutions.

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