10 COMPUTATION OF CHINA'S EXPORT PERFORMANCE

Gheorghe ZAMAN[1]
Iulia Monica OEHLER-ŞINCAI[2]

Abstract

The main purpose of this paper is to present a new metrics of export competitiveness, coined as neighborhood export competitiveness. Neighborhood competitiveness refers to competitors with similar export competitive capacity as reflected by world export shares. We estimate the neighborhood export competitiveness by the number of lost/won positions by exporters worldwide over a given period of time, which is relevant from the standpoint of losses/gains in terms of competitive capacity. We test our interpretations resorting to the index of revealed comparative advantage and illustrate the benefits of this method by means of the case study on China, which is the most active exporter worldwide. Our method employed to estimate the export competitiveness in general and in the particular case of China generates more tangible results as compared to classical techniques and approaches. It implies both cross-sectional and longitudinal analyses, as it presents the situation of major competitors at a given time, but also in its dynamics. It has a direct practical applicability as it outlines the degree of achievement of strategic export objectives and it is also a useful tool to establish distinct types of competition based on neighborhood intervals, each group of competitors revealing specific behaviors. Finally, China's case study is significant as it underscores this emerging economy's uniqueness with reference to its speed of climbing up the global competitiveness ladder and its ability to maintain in the long run the gained positions. The originality and value of the present paper are conferred by the newly defined neighborhood export competitiveness, which is tested first in comparison with the already generally accepted index of revealed comparative advantage and, second, on the case of China.

1. Introduction

Since 2010 China has been the largest manufacturing producer worldwide, followed by the United States, Japan, Germany, India and the Republic of Korea. Its share in total

---

[1] Corresponding member of the Romanian Academy. Institute of National Economy, Romanian Academy. E-mail: gheorghezaman@ien.ro.
[2] Institute for World Economy, Romanian Academy. E-mail: monica.oehler@iem.ro.

manufacturing value added doubled from 12.6% in 2006 to 24.4% in 2016, while the United States' share declined from 20% to 16% over 2006-2016 (UNIDO, 2017, pp. 157-158). According to the Global Manufacturing Competitiveness Index GMFI (Deloitte, 2016), China still is the most competitive manufacturing nation; however, the United States is expected to take over China and regain its first position until 2020. In our opinion, China's actual path towards technological progress has the potential to make it maintain its leadership, as it is a relevant part of the mix of determinants of global manufacturing competitiveness, as presented in the Figure 1.

Figure 1

Drivers of Global Manufacturing Competitiveness, Associated with Factors of Export Competitiveness: (1) Foreign Market Access, (2) Export Constraints/Stimuli, (3) Participation in the GVCs
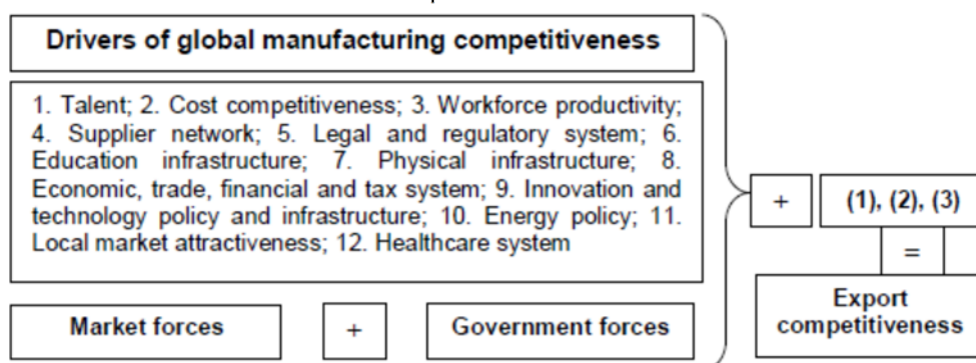
Source: Own representation based on Deloitte (2016).

Large manufacturing nations are at the same time significant exporters. Traditionally, export competitiveness, as a driver of economic growth, was defined as a country's "ability to sell domestically produced goods and services on global markets" (Ketels, 2010). From this standpoint, export performance means export competitiveness. This ability evolved together with technological progress and development of GVCs (IBRD-The World Bank, 2018), that is, different stages of the production process are split across different countries, and multinational corporations restructure their international operations through outsourcing and offshoring of their activities. The diamond of national advantage, as it was set forth by Michael Porter in 1990 (and defined as: conditions related to factors of production, demand conditions, industries and the way the companies are created, organized and managed) explains different specialization patterns of countries and their participation in global production networks (GPNs). In the context of GPNs, export performance means also export competitiveness, but induced more and more via narrower specialization patterns.

China overtook Japan as the world's third largest exporter in 2004, United States in 2007 and Germany in 2009. Its accession to the World Trade Organization in December 2001 meant a gradual liberalization of its trade flows as well as a deeper integration into the world economy. China's increasing sophistication of exports, its move towards higher technologies and growing skill content, accompanied by a permanent integration into the global production networks are just several factors lying behind the evolution of its exports. Definitely there are many specific determinants of this progress, such as those related to the supply side (correlated with specific measures of economic policy), demand side (rapid urbanization, growing middle class, change in the consumption habits, increasing

importance of sophisticated buyers and their specific needs, both in China and outside China), the evolution of the Chinese development model and market access factors. However, in this paper the focus is not set on such determinants but on the interpretation of export statistics.

China's catch up in terms of world rankings was generally accompanied by a strong increase in its share in world exports over the last 10-15 years. In some cases, there was no decrease during the whole period or only a minor decrease, followed by rapid recovery. In other cases, there were ups and downs recorded over shorter periods of time but followed by increases. Nevertheless, there were exceptions as well, as China recorded significant jumps for certain categories of products, but accompanied by modest/insignificant increase in terms of its share in world exports. That was due to the more modest evolution recorded by other competitors on markets dominated by one, two or several large exporters.

Even if this paper does not correlate data with specific determinants of China's advancement, it underlines its rapid catching up with the most active world traders as regards lower-medium technologies and a slower progress in terms of higher technologies. However, the reform dividend, especially in the field of research and development allows for better performances of the category of high technology exports in the long run.

The paper is structured as follows. After the introduction, in the second section we interpret the neighborhood export competitiveness from the perspective of the classical formula of revealed comparative advantage. In the third section, we argue that China is the country with the highest impact on the world trade after 2001 and that technological progress is one of the main determinants of the Chinese export competitiveness. In the fourth section, we focus on the statistical analysis and test our method in practice resorting to the case study of China during the 2001-2016 interval. This period is relevant for our research as it includes major changes in the Chinese economic policies after its accession to the WTO (December 2001) and the dataset is long enough in order to underline a general trend in terms of export performance, and even to emphasize the continuation of this trend in the long run. The fifth section concludes the paper.

2. Methodology

This paper builds upon a previous research (Zaman, Tudor, 2016) on the calculation of Romania's lost/won positions in the hierarchy of world exporters in a given period of time. In our research we refer to the most active trader, China, which competes with the United States, Germany and Japan and we explain how China managed to surpass its competitors, but also how in the long run it will be able to keep a leading position for the majority of export categories. Besides, we add to the previous analysis the conceptual framework of neighborhood export competitiveness. There is no such cross-sectional and longitudinal investigation in the literature, the novelty being this instrument of the competitiveness metrics.

We express the **neighborhood export competitiveness** by means of an indicator reflecting the positions/rankings of exporters worldwide in a comparative manner, from the static and dynamic viewpoints. We stress that a reasonable way to define intervals is based on intervals expressed in %, as follows: (0; 2], (2; 4], (4; 6], etc. It takes into account the hierarchy of the main exporters as well as the evolution over time of their ranking. The indicator shows the number of lost/won positions in a given period of time and it is relevant from the standpoint of losses/gains in terms of competitive capacity.

In this paper we answer the following **questions**: (1) Which is the total number of positions won/lost by China as compared to the other major traders, namely the United States, Germany and Japan within world exports hierarchy by the main 96 chapters of the HS-2 (2 digit harmonized system) in 2005, 2010, 2015, 2016 relatively to 2001? This reflects its catch up with the world major traders in terms of export competitiveness. (2) For how many chapters of the HS-2 it improved its rankings by more than 10 positions during 2001-2016 as compared to US, Germany and Japan? (3) How is China's catch up in terms of rankings correlated with that in terms of export shares? (4) For how many chapters does China held the first position and how many of these include high-technology products?

Our main **objective** is to calculate the total number of positions won/lost by China as compared to the other major traders, namely the United States, Germany and Japan within world exports hierarchy by the main 96 chapters of the harmonized system during 2001-2016. We resort to the International Trade Centre data, which offers information about the most active traders as regards their export rankings and shares.

In order to answer these questions, we use the indicator reflecting the position of an exporter worldwide, from the static and dynamic viewpoints. It takes into account the hierarchy of the main exporters as well as the evolution over time of their rankings. The indicator shows the number of lost/won positions in a given period of time. It is unquestionable that lost positions express loses in terms of competitive capacity, while gained positions suggest gains in reference to the competitive capacity.

We **test our interpretations by the index of revealed comparative advantage**. The Balassa index of the revealed comparative advantage (RCA) is used in the literature pre-eminently as a method to identify one country's strong export sectors, resorting to the following formula (with different variants):

$$RCA_k^i = \frac{\left(\dfrac{X_k^i}{X_n^i}\right)}{\left(\dfrac{X_k^r}{X_n^r}\right)}, \tag{1}$$

where: X represents the value of exports, "i" the exporting country, "k" the industry (or the product exported), "r" the group of exporters or even all the exporter countries and "n" all the industries.

The simultaneous calculation of the Grubel-Lloyd index offers additional information about the role of trade in intermediate products in export competitiveness:

$$GL_k = \frac{\left(X_k + M_k\right) - \left|X_k - M_k\right|}{X_k + M_k} = 1 - \frac{\left|X_k - M_k\right|}{X_k + M_k} \tag{2}$$

where: X represents the value of exports, M the value of imports of a specific country in the case of the "k" the industry (or the product exported). In this paper, we take into account only the revealed comparative advantage, but we consider that such parallel analyses from both perspectives are useful in future researches.

Referring to (1), it compares the share of an industry/product "k" in the total exports of the country "i" with the share of the exports of the industry/product "k" in the total exports of group "r" (or in the global exports). If the country "i" has a RCA > 1, then it has a comparative advantage among the countries of the group. We take as example those HS-2 categories of

products for which China managed to reach the first place in the hierarchy of world exporters over the 2001-2016 period, with an obvious ascending trend.

We start from the following working hypotheses. *First*, on the competitive scale, we assume that the higher a competitor advances in the hierarchy, the more difficult it is to gain a position and the easier it is to lose it. The hardest is to keep the first position. *Second*, there is a direct proportional or quasi proportional relationship between the top positions and the shares of competitors holding these positions in total world exports. *Third*, several types of competition can be established depending on the so-called neighborhood intervals and for each resulting groups of competitors, there are specific behaviors as well as particular competitiveness strategies. For competitive neighbors, competitive features can enrich the typological palette, which implies specific adaptations of export strategies according to the specific skills. The measures and action plans, as well as the strategic objectives of each competitor, reveal a differentiation according to the intensity, magnitude and dynamics of each competitive neighborhood, resulting undoubtedly greater difficulty and complexity in the case of the first competitive neighborhood dominated by the leader. *Fourth*, for certain export categories, the size of the national economy can be a determining factor in holding several leading, advanced or higher positions. In fact, this confirms the exception that proves the rule, for example South Korea's specialization in ship exports. The principle of specialization on a wider or narrower scale is facilitated by the globalization process (which allows for a fragmentation or segmentation of the world market for goods and services, particularly in the intermediate sector), by the specific global value chains corresponding to particular sectors, where opportunities for international specialization are much more numerous, and the best chances of success in capitalizing this opportunity is commonly used by early adopters of technical progress and innovation, unlike the majority and delayed adopters which, although having some economic and financial advantages based on the practical experiences of the early ones, hardly manage to catch up with the leaders.

In the literature there is a strong evidence (Posner, 1961, Krugman, 1979, Fagerberg, 2003, Fagerberg, 2018) of the correlation between technological progress, innovation on the one hand and trade openness and export competitiveness on the other hand. We consider necessary a section referring to the Chinese export competitiveness under the influence of various factors, out of which the most relevant nowadays is the technological progress, section followed by statistical evidences.

3. China's Path of Technological Progress

The Chinese growth model has been advancing towards a *more sustainable and balanced growth*, innovation and technology have become the new pillars of the economy. In the 40 years of Chinese reform and opening up since 1978, the first three decades were dominated by three dividends: the demographic one, that of reforms and that of globalization (Cheng, 2013). The most recent decade added the dividend of homemade technologies, reflecting the future path "from *made in* China, to *created in* China", from "world's factory" to "world-leading science and technology power". Definitely exports and foreign direct investment will continue to play a major role for the Chinese growth, however the accelerated export and investment-led growth period has come to an end.

In the Chinese 13th five-year plan for the period 2016-2020, the second part is focused on innovation-driven development (Central Compilation and Translation Press, 2016). Among the main targets in terms of innovation-driven development are included the following: (1) R&D expenditures as % of GDP should increase from 2.1% in 2015 to 2.5% in 2020; (2)

patents per 10,000 people should reach 12% in 2020 as compared to 6.3% in 2015; (3) contribution of scientific and technological advances to economic growth should improve from 55.3% in 2015 to 60% in 2020. The motto is: "Innovation – the primary driving force for development", and according to this new philosophy, "innovation must be placed at the heart of China's development and advanced in every field, from theory to institutions, science, technology and culture." Until 2030, the priorities of the science and technology programs are related to: "aircraft engines and gas turbines, deep-sea stations, quantum communications and computing, brain science and brain-inspired research, national cyberspace security, deep space explorations and in-orbit spacecraft servicing and maintenance services", while the projects will set the accent on nine sectors, namely: "seed industry innovation, clean and efficient coal use, smart grids, integrated space-terrestrial information networks, big data, smart manufacturing and robotics, key new materials research, development and application, environmental governance in Beijing-Tianjin-Hebei region and health care".

China has the advantage of implementing selective policies, which enables the "significant technological upgrading and deepening", required to sustain export growth (Lall, 2000). In the literature it is pointed to the Chinese "high-tech revolution", as answer to the global competition challenges but also to Germany's "Industry 4.0" and to the "Industrial Internet" in the United States (Meissner, Wuebbeke, 2016). There is already a *Made in China 2025* strategy, one of the necessary steps to sustain the plans of transforming China into a *leading innovator by 2030* and a *world-leading science and technology power by 2049* (China Daily, 2017). Veugelers (2017) underlines that "Chinese R&D investment has grown remarkably over the past two decades. It is now the second-largest performer in terms of R&D spending, on a country basis, and accounts for 20 percent of total world R&D expenditure, with the rate of R&D investment growth greatly exceeding that of the U.S. and the EU."

OECD (2017) estimates that "over 2012-2015, China, Chinese Taipei, Korea, Japan and the United States were responsible for developing between 70% and 100% of the top 20 cutting-edge ICT technologies"; nevertheless, only Japan and Korea were able to innovate across the whole spectrum of ICT technologies. Moreover, during the past 15 years, "China has tripled its high-impact scientific efforts – as measured by its share of top 10% most-cited publications (14%) – making it the second largest scientific powerhouse, behind the United States (25%)."

Recently, China has encountered new technology access obstacles. For instance, developed countries have intensified their monitoring attributions by trying to block China's access to technology companies (*e.g.* the EU framework for investment screening proposed in September 2017). As FDI is considered an important contributor to enhancing a country's competitiveness on the international markets through the channel of technological content of exports (Fugazza, 2004), any attempt to obstruct this channel might stimulate once more domestic R&D in the actual stage of economic development.

According to relevant statistics (WIPO, 2017), "China's State Intellectual Property Office (SIPO) received the highest number of patent applications in 2016, a record total of 1.3 million. It was followed by the United States Patent and Trademark Office (USPTO) (605,571), the Japan Patent Office (JPO) (318,381), the Korean Intellectual Property Office (208,830) and the European Patent Office (EPO) (159,358). On a per-capita basis, patent filings in China ranked behind those in Germany, Japan, the Republic of Korea and the U.S." In 2015, SIPO became the first office to receive over a million patent applications in a single year and since 2011 it is the world's top office in terms of patent filings received. China is

specialized in (1) digital communication, (2) computer technology and (3) electrical machinery, apparatus and energy.

As there is a close relationship between technological progress and the quality of education, the Chinese "Double World-Class Project" was launched in 2015 in order to develop world-class universities and first-class disciplines. There were two other similar projects in the 1990s, namely "211" and "985", however those were criticized from the perspective of widening the gap between the selected universities (most of them situated in the eastern part of China) and the common public universities. From the total of over 2000 universities and colleges in China, 42 universities and colleges are included in the actual project, and 95 institutions (including the previously mentioned 42 universities) are designated to provide world-class courses (Gao, 2017). As of 2018, China had a number of seven universities among the best 200 ranked worldwide, as compared to 47 in the United States or 28 in the United Kingdom. However, we should also take into consideration the increasing number of Chinese students enrolled at universities abroad. For instance, the Chinese students had a share of 32% of the international students in the United States in 2016 (Schulmann and Ye, 2017).

It should be also mentioned that even if China has 18 companies included in the Forbes list of 100 largest public companies (as compared to 30 American companies, 8 Japanese, 8 German, 5 British, 3 French or 1 South Korean), nevertheless, in terms of most innovative 100 companies, it is surpassed not only by the United States but also by Japan (Forbes, 2018a and 2018b). In the cases of China and other countries such as Germany, there are more companies included in the list of 100 largest public companies than in that of 100 most innovative ones; therefore, a larger company is not automatically more innovative. By contrast, in the United States, United Kingdom, South Korea and even India not only the largest companies are innovative.

Taking into account that China's actual export performance is influenced by both market forces and government forces, and the latter ones are still stronger than the former in spite of the progresses recorded in the transition process towards the market economy status, the following figure shows the permanent evolution of the Chinese export competitiveness under the influence of various factors.

Figure 2

Black Box of the Chinese Export Competitiveness
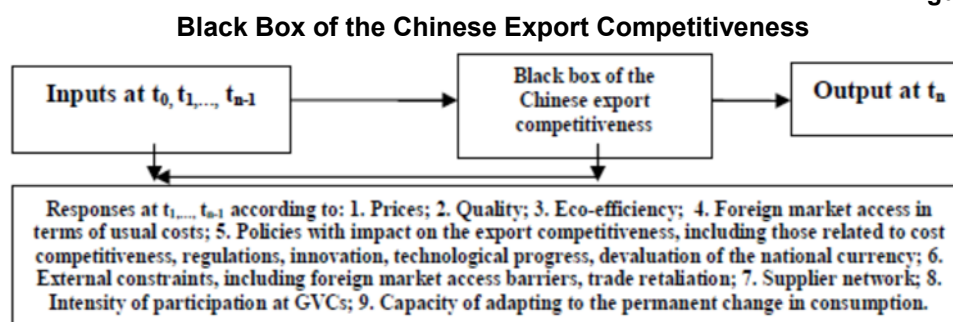
Source: Own representation.

4. Interpretation of Results

4.1. Statistics in a Nutshell

An in-depth analysis of the International Trade Centre data leads to the following conclusions. As of 2016, out of 96 sections, China had: (1) Shares over 10% in the world exports for 55 chapters; (2) Increases ≥ 10 percentage points in its world exports shares for 38 chapters, ≥ 20 percentage points for 13 chapters and ≥ 30 percentage points for 4 chapters as compared to 2001; (3) Improved ranking by more than 10 positions for 12 chapters over 2001-2016; (4) The status of largest exporter for 49 chapters (as compared to 12 in the cases of the US and Germany and 1 for Japan); (5) The position of second larger exporter for 5 chapters; (6) The position of third larger exporter for 7 chapters.

As regards the total number of positions won/lost by China as compared to the other three major traders, namely the United States, Germany and Japan within world exports hierarchy by the main 96 chapters of the HS-2 the following table offers a detailed picture of China's progress and its intensity during 2001-2016. One may notice an accelerated catch up process during 2001-2005, which slowed down subsequently. Japan lost the most positions among the Big Four traders, followed by the United States and Germany. However, the estimations for 2016 as compared to 2015 indicate that China has started to lose positions, the number of lost positions being similar to that of the United States, while Japan and Germany have regained some lost positions.

Table 1

The Total Number of Positions Won/Lost by China as Compared to the US, Germany and Japan within World Exports Hierarchy by the Main HS-2 Chapters in 2005, 2010, 2015 and 2016

Period	China	US	Germany	Japan
2005/2001	210	-111	39	-232
2010/2005	60	9	-24	-4
2015/2010	55	20	-51	-220
2016/2015	-25	-24	21	84
2016/2001	300	-106	-15	-372

Source: Own representation and calculations based on ITC (2018).

4.2. Breakdown by HS-2 Chapters

Table 2 reflects China's export performance during 2001-2016 for each of the 96 analyzed chapters, highlighting several main conclusions:

(1) It kept the first place for 14 categories of goods. Nonetheless, most of them are resources or resource-based manufactures, several are low technology manufactures (textiles, footwear, headgear, umbrellas) and only one chapter includes medium-high technology products (*86 Railway or tramway locomotives, rolling stock and parts thereof, track fixtures*).

(2) It recorded higher rankings for 47 chapters, with an obvious ascending trend. China managed to reach the first position in the world hierarchy for 31 chapters. Most of them are resource-based manufactures, low technology products and only three medium-high or high technology categories: *85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles* (fifth place in 2001, first place in 2005, 2010, 2015

and 2016), *88 Aircraft, spacecraft and parts thereof* (from the 20th position in 2001 to the 12th place in 2016), *89 Ships, boats and floating structures* (from the 6th position in 2001 to the second place in 2016). However, for the category including high-tech products (88), China could not catch up with the most competitive countries (US, France, Germany, UK, Canada, Singapore and Japan) and its ascension was very slow.

(3) China had in 2016 better rankings as compared to 2001 at 18 chapters, with ups and downs, most of them in the category of resources or resource-based manufactures but also high-tech products – 30 Pharmaceuticals (from the 19th place in 2001 to the 16th place in 2016) – and medium-high technology – 31 Fertilizers (from the 9th place in 2001 to the first place in 2005 and second place in 2016).

(4) It recorded lower rankings in 2016 as compared to 2001 for 11 categories (resources or resource-based manufactures). For six categories the losses were significant: *10 Cereals* (25 positions), *78 Lead and articles thereof* (20 positions), *79 Zinc and articles thereof* (17 positions), *80 Tin and articles thereof* (16 positions), *02 Meat and edible meat offal* (11 positions) and *26 Ores, slag and ash* (10 positions).

(5) It kept a constant ranking, but lower than the first position or returned to the same position in 2016 as in 2001 for 6 categories (four resource-based manufactures and one medium-tech category – *36 Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations, first place* – and one high-technology – *91 Clocks and watches and parts thereof, third place*).

Table 2

China's Evolution in Terms of Higher/Lower Ranking during the 2001-2016 Period (World Exports)

| Evolution 2016/2001	Chapters (according to the Annex)	Total
Constant first place	5, 42, 46, 50, 53, 55, 61-66, 86, 96	14
Better ranking, obvious ascending trend, but still not the first place	6, 11, 17, 21, 24, 32, 34, 35, 37, 38, 48, 49, 71, 88, 89, 90	16
Better ranking, obvious ascending trend, to the first place	3, 7, 20, 25, 28, 29, 39, 40, 43, 44, 52, 54, 56, 57, 58, 59, 60, 67, 68, 69, 70, 72, 73, 76, 82, 83, 84, 85, 92, 94, 95	31
Better ranking, ups and downs, but still not the first place	8, 9, 18, 22, 23, 30, 31, 33, 45, 47, 74, 75, 87, 93, 97	15
Better ranking, ups and downs, to the first place	13, 14, 16	3
Lower ranking, sharp decrease	2, 10, 26, 78, 79, 80	6
Lower ranking, moderate decrease	1, 4, 12, 19, 41	5
The same place in 2016 as in 2001	15, 27, 36, 51, 81, 91	6

Source: Own representation and calculations based on ITC (2018).

4.3. China's Catch-Up Process
China managed to increase its market shares for most of the chapters of exported goods. In 2016, it had global market shares larger than 30% for 19 chapters (for 11 of them China managed to reach the first position and for 8 to keep its first place) and in 12 cases the increases over 2001-2016 surpassed 20 percentage points (Figure 3).

Figure 3

China – Chapters with International Market Shares Increases > 20 Percentage Points during 2001-2016 (Left) and Global Market Shares > 30% (Right)
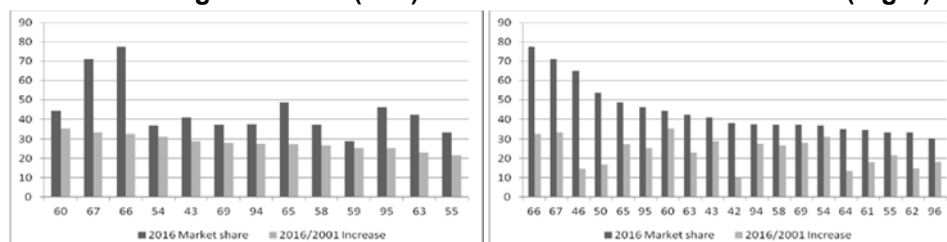
Source: Own representation and calculations based on ITC (2018).

However, none of these categories belong to the medium-high or high technologies, which emphasizes that the process of catching up with "established" high-tech exporters is gradual.[3]

China's catch up in terms of world rankings was generally accompanied by a strong increase in its shares of world exports over the last 10-15 years. In some cases, there was no decrease during the whole period (*87 Vehicles other than railway or tramway rolling stock, and parts and accessories thereof*) or only one minor decrease, followed by rapid recovery (*90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus*). In other cases, there were ups and downs recorded in shorter periods of time, but succeeded by increases (see for instance *86 Railway or tramway locomotives, rolling stock and parts thereof, track fixtures*, *89 Ships, boats and floating structures*).

Nevertheless, there were exceptions as well (with insignificant growth). China recorded significant jumps for certain categories of products but accompanied by modest/insignificant increase in terms of its share in world exports. That was due to the more modest evolution recorded by other competitors on markets dominated by one, two or several large exporters. For instance, in the case of chapter *88 Aircraft, spacecraft and parts thereof*, on the one hand, its share in world exports increased very slowly (even if more rapidly than of other countries) and it did not exceed 1.1% of the world exports. The main three exporters (United States, France and Germany) had a share of 71% of world exports in 2016, about 3 percentage points higher as compared to 2001. On the other hand, China's ranking improved from the 20th place in 2001 to the 16th place in 2005, 15th in 2010, 13th in 2015 and 12th in 2016, surpassing countries such as Belgium, Switzerland or the Netherlands.

For *17 Sugars and sugar confectionery*, a jump from the 22nd position to the 6th position was reflected by an increase by 2.8 percentage points in terms of export shares during the mentioned period. On the contrary, switching from the second to the first place in the world hierarchy of exporters of *16 Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates* meant an increase by 5 percentage points as regards the export shares. In the case of *13 Lac, gums, resins and other vegetable saps and extracts*, a gain of six positions (from place seven to the first place) was accompanied by 14 percentage

---

[3] This assertion seems to be contradicted by the World Bank statistics, which underscores that China is the largest world exporter of high-technology products, followed by Germany, United States, Singapore, South Korea, France, Japan and United Kingdom. Nonetheless, the World Bank includes Taiwan's exports into the Chinese exports, which explains the discrepancy.

points increase in terms of international market share. As a rule, the switch from other positions to the first place meant a robust increase as regards the international market shares.

4.4. Verification of Interpretations through the Index of Revealed Comparative Advantage

The Balassa index of the revealed comparative advantage (RCA) (1) calculated for 31 chapters of products for which China managed to reach the first place over 2001-2016 with an obvious ascending trend (3, 7, 20, 25, 28, 29, 39, 40, 43, 44, 52, 54, 56, 57, 58, 59, 60, 67, 68, 69, 70, 72, 73, 76, 82, 83, 84, 85, 92, 94, 95) highlights several notable conclusions. Table 3 depicts the RCA for each of these chapters, the values are <1 for nine and >1 for 22 chapters.

Table 3

China's RCA for 31 Chapters, 2001-2016

Chapters	RCA in 2016, comments
3, 7, 20, 25, 28	<1, decreasing trend
29, 39, 40	<1, increasing trend
44	<1, ups and downs
56, 59, 72, 76, 84	>1, but with values <1 in the 2000s
52, 54, 57, 58, 60, 67, 68, 69, 70, 72, 73, 82, 83, 85, 92, 94, 95	>1, the whole period; highest values: 67 (5.4-8.8); 95 (3.3-4.8); 58 (2.4-4.2), all with a diminishing trend.

Source: Own representation and calculations based on ITC (2018).

In this context, we consider significant the correlation between the leader's *position* in the world hierarchy of a given category of exported goods and its *share* in world exports. If the shares of the largest three or four competitors are similar or close to each other, that means that there is a temporary and fragile advantage of the leader. The close followers are permanently threatening the leadership position, as the competition is taking place among close competitors in terms of competitive power. On the contrary, if between the leader and the other competitors the distance is large, it is difficult to remove the leader from its first position; hence, the chance of maintaining it in the long run. In this case, only a coalition of lower-end competitors would have the possibility to dethrone the leader. Taking as example the same 31 chapters of products for which China managed to reach the first place over 2001-2016 with an obvious ascending trend, one may remark that China's position is threatened for 11 chapters (3, 7, 20, 25, 28, 29, 39, 40, 44, 57, 76) (with different intensities), it has a sufficient margin for 7 chapters and a very large margin for 13 chapters.

By comparing the two sets of results, we can conclude that they are largely similar (with the exception of chapters 57 and 76), but positions-shares correlations indicate details which are not revealed by RCA and vice-versa. However, the former exports are much more labor intensive than the latter. From the above-mentioned rationales, one may infer the relationship between countries' competitive positions and the correspondent percentage share in world exports as highlighted by the following table.

<div align="right">**Table 4**</div>

In Lieu of a Model – Relationship between Countries' Rank (Competitive Positions) and Percentage Share in World Exports. Types of Competitiveness Strategies

Types of current competition	Ranks (positions)	Percentage share (%)	Competition gap in p.p. measured in relationship with the leader	Competitors' behaviors and types of future competitiveness strategies
I. Tight, quasi equal high competition No price-makers	1 2 3 4	Similar shares, close to 25-30 (for instance, 26, 25, 24, 23)	Between 1-5 (in our case, -, 1, 2, 3)	- Promotion of high technology innovative-based strategies; - Creation of new international value chains and trade networks;
II. Monopoly competition with one price-maker	1 2 3 4	Largest exporter with extraordinarily large market shares, even over 50 and higher (for instance, 80, 15, 3, 2)	Higher than 20 (in our case, -, 65, 77, 78)	- One large-sized exporter dominates the market and tries to maintain this position for a certain period; - Weaker competitors try to promote aggressive attacks;
III. Market with several medium sized competitors quasi equally distributed among them	1 2 3 4 5	Similar shares, close to 10-15 (for instance, 15, 14, 13, 12, 11)	Between 1-5 (in our case, -, 1, 2, 3, 4)	- All competitors have the chance to become price-makers if an adequate strategy is adopted; - This equilibrium situation of the market could stimulate cooperation between competitors in order to solve some common technological, scientific, environmental problems;
IV. Many competitors, with relative weak competitive capacity but with strong international specialization	1 2 3 4 5 6	Similar shares, lower than 10 (for instance, 7, 6, 6, 5, 4, 4)	Between 1-5 (in our case, -, 1, 1, 2, 3, 3)	- It seems that cooperation among competitors is more fruitful than aggressive competition; - The market divided between small scale producers offers a necessary and sufficient profit margin for all.
V. Several competitors with similar shares larger than 10%, followed by smaller competitors	1 2 3 4 5 6	(For instance, 14, 12, 6, 6, 5, 5)	Between 1-10 (In our case, -, 2, 8, 8, 9, 9)	- Strong competition between the major competitors; - The followers have the chance to catch up with the leaders by specific export strategies.

Source: Own representation.

These schemes of relationships between countries' ranks and their corresponding shares in world exports offer a specific typology of competitiveness, which we name **neighborhood competitiveness**. It corresponds to all the types of competition presented in Table 3, with the exception of the situation of monopoly. The monopoly competition with one price-maker (second type presented in the Table above) encourages competitive attacks as suggested by the increasing number of disputes under investigation at the WTO Dispute Settlement Body. Such attacks are more remarkable in the case of industries considered of strategic importance for the national economy.

Neighborhood competitiveness refers to competitors with similar export competitive capacity as reflected by the world export shares. Neighborhood export competitiveness may be defined in terms of smaller of larger intervals. A reasonable way to define intervals is based on intervals expressed in % as follows: (0; 2], (2; 4], (4; 6], etc. From this viewpoint, China is the absolute leader for many export categories, as it has shares larger than 10% in the world exports for 55 chapters (and even larger than 20% for 33 chapters). In other words, it does not show neighborhood export competitiveness with any followers for many export categories. It is worth mentioning that most of them are resource-based or low technology products. However, as regards medium and high-technology exports, it still does not show any neighborhood export competitiveness as compared to the leaders. For instance, for chapter *30 Pharmaceutical products*, China belongs only to the seventh group of countries taking into account its neighborhood export competitiveness. In the first group it is only one country, namely Germany, in the second Switzerland, in the third the USA and Belgium, in the fourth the United Kingdom, Ireland and France, in the fifth Italy, in the sixth Netherlands, India, Denmark and Spain and in the seventh all the other exporters, including China.

5. Conclusions

This paper introduces the new concept of neighborhood export competitiveness and resorts to the verification of results by means of the index of revealed comparative advantage. The main limit of this method is the laborious computation process, while its major advantage is the clear image of the most competitive exporters in a given period of time.

Neighborhood export competitiveness, even if it is more laborious than the other methods, including RCA, has evident advantages. First, it generates more relevant tangible results. On the one hand, these take into account the number of lost/won positions by a country in a specific timeframe, which is relevant from the standpoint of losses/gains in terms of competitive capacity. On the other hand, they reflect the distance between competitors in terms of shares in world exports for each significant chapter of HS-2.

Second, it implies both cross-sectional and longitudinal analyses, as it presents the situation of major competitors at a given time but also in its dynamics. This instrument does not depart from economic reality even if it might be considered as being simple and empirical.

Third, it has a direct practical applicability as it demonstrates to what extent the strategic export objectives have been reached or not. This reflects the reality and represents a tool substantiating the national trade policy.

Fourth, the results of our research highlight the strong leaven of competition and competitiveness on the international market, in terms of major traders' rapid change of their competitive export positions. The capacity of maintaining advanced rankings underlines a country's potential of resilience. Usually, this potential is stronger in case of larger countries, which have multiple possibilities of specialization as compared to the small and medium-sized competitors, with a narrow specialization, which implies also strong brands.

Fifth, China's case study is significant as it is a country with an emerging economy which managed to record a sustainable growth for decades and which, due to national economic policies it managed to climb the global competitiveness ladder much more rapidly than other large competitors.

The scheme of relationships between countries' ranks and their corresponding shares in world exports offers a specific typology of competitiveness, coined as neighborhood competition. We define it as competition between exporters with similar export competitive capacity as shown by shares in world exports for each of the 96 major chapters of HS-2. From this viewpoint, China is the absolute leader for many export categories, as it has shares larger than 10% in the world exports for 55 chapters (and even larger than 20% for 33 chapters). In other words, it does not show any neighborhood export competitiveness with any followers for many export categories; however, most of them are resource-based or low technology products. The "black box" of Chinese competitiveness synthesizes the permanent evolution of the Chinese export competitiveness under the influence of various factors, including both market-led and government forces.

In the evolution of international competitiveness in trade, one can remark China's gradual shift from labor-intensive to capital-intensive exports which is continuing to date and in the future with science/innovation-intensive products, and also a shift from tight protectionism to China's integration in the global economy as a main driving force of economic growth. At the same time, its competitiveness is spurred by vertical FDI with spillovers for the national economy, complementarity between FDI and trade, creating an increase in trade flows through fragmentation of the production process. Finally, this investigation emphasizes that China's catching up with "established" high-tech exporters is gradual. China has already started its long path "from *made in* China, to *created in* China", from "world's factory" to "world-leading science and technology power". Its future rankings in the world high-tech exports will continue to reflect its own development stage and the priorities of national economic policies, and also the permanent transformation of its *Black box* of export competitiveness.

This research demonstrated our working hypotheses. *First*, it is very difficult to obtain a higher position in the hierarchy of major exporters and maintain it. *Second*, as a rule, there is a direct proportional or quasi proportional relationship between the top positions and the shares of competitors holding these positions in total world exports. *Third*, we can distinguish between the following types of competition: (1) tight, quasi equal high competition, with no price-makers; (2) monopoly competition with one price-maker; (3) market with several medium sized competitors quasi equally distributed; (4) many competitors, with relative weak competitive capacity but with strong international specialization; (5) several competitors with similar shares larger than 10%, followed by smaller competitors. *Fourth*, for certain export categories, the size of the national economy can be a determining factor in occupying several leading, advanced or higher positions.

The example of the Chinese "economic miracle", as well as that of other Asian and non-Asian competitors, highlights a dialectic with a legitimate regime in the sense that in the first stage the largest role was played by the transfer and assimilation of technologies and products on the basis of imported patents, licenses, industrial brands, which were later enforced and improved, including through own efforts of research, development and adaptation to market requirements, thus achieving superior competitive positions and moving from the stage of late adopters of technologies to that of early adopters. It is worth underlining that the assimilation of products and services from the developed economies in the developing countries considered as *success stories* was not achieved under

circumstances of deterioration of the qualitative and technical-economic parameters, but, sooner or later, it led to their improvement.

As regards future research directions, we consider useful to take into account indicators of probability of winning/losing positions in a given period of time or of events considered as situations of won/lost positions. According to preliminary calculations, the Spearman rank correlation coefficient and the coefficient of variation of export shares in a given period of time are effective tools to deepen the analysis of neighborhood export competitiveness. Competitiveness is a relative metric and comparisons between different competitors are linked to the game theory, as one country's gains are equivalent with others' losses.

References

Balassa, B., 1965. *Trade Liberalization and "Revealed" Comparative Advantage. The Manchester School of Economic and Social Studies*, 33(2), 99-123.

Central Compilation and Translation Press (CCTP), 2016. *The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China 2016-2020.* Beijing.

Cheng, H., 2013. *The Chinese growth miracle: What can make it continue, what can make it go over?* University of Stavanger, Norway.

China Daily, 2017. *Xi Jinping's remarks on scientific innovation*, January 6. Available at: <http://www.chinadaily.com.cn/a/201706/01/WS59bbe083a310ded8ac188cae.html> [Accessed on March 16, 2019].

Deloitte, 2016. *Global Manufacturing Competitiveness Index,* London.

Fagerberg, J., 2003. *The dynamics of technologies, growth and trade: A Schumpeterian Perspective*, Working Paper 25. Centre for technology, innovation and culture, University of Oslo, Norway.

Fagerberg, J., 2018. *Innovation, Economic Development and Policy – Selected Essays*. UK: Edward Elgar.

Forbes, 2018a. *The World's Largest Public Companies.* Available at: <https://www.forbes.com/global2000/#726d5554335d>. [Accessed on April 16, 2019].

Forbes, 2018b. The *World's Most Innovative Companies. A*vailable at: <https://www.forbes.com/innovative-companies/list/>. [Accessed on April 16, 2019].

Fugazza, M., 2004. *Export performance and its determinants: supply and demand constraints*. UNCTAD, New York and Geneva.

Gao, C., 2017. *A Closer Look at China's World-Class Universities Project*. The Diplomat, September 22.

International Bank for Reconstruction and Development (IBRD)-The World Bank *et al.*, 2017. *Global Value Chain Development Report 2017: Measuring and Analyzing the Impact of GVCs on Economic Development*, Washington D.C. Available at: <https://www.wto.org/english/res_e/booksp_e/gvcs_report_2017.pdf> [Accessed on April 25, 2019].

International Trade Centre (ITC), 2018. International Trade in Goods, Value of exports and imports for China, the United States, Germany, Japan and highly

specialized countries, such as South Korea. Database. Available at: <http://www.intracen.org/itc/market-info-tools/statistics-export-product-country/> [Accessed during January-April, 2019].

Ketels, C., 2010. *Export Competitiveness: Reversing the Logic*. Harvard Business School.

Krugman, P., 1979. A model of innovation, technology transfer and the world distribution of income. *Journal of Political Economy,* 87, pp.253-266.

Lall, S., 2000. The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-1998. Queen Elisabeth House, University of Oxford, Working Paper 44.

Meissner, M. and Wuebbeke, J., 2016. *China's High-Tech Strategy Raises the Heat on Industrial Countries*. The Diplomat, December.

OECD, 2017. *Science, Technology and Industry Scoreboard 2017: The Digital Transformation, OECD Publishing, Paris, published on November 22, available at: <https://www.oecd.org/sti/oecd-science-technology-and-industry-scoreboard-20725345.htm> [Accessed on April 23, 2019].*

Porter, M.E., 1990. *The Competitive Advantage of Nations*. Harvard Business Review, March-April, pp. 73-91.

Posner, M.V., 1961. International Trade and Technical Change. *Oxford Economic Papers,* 13, pp.323-341.

Quacquarelli Symonds (QS), 2018. *World University Rankings*. Available at: <https://www.topuniversities.com/university-rankings/world-university-rankings/2018>. [Accessed on April 23, 2019].

Schulmann, P. and Ye, Z. C., 2017. China: Can the World's Top Source for International Students Become Its Leading Destination?. World Education Services, August 16.

United Nations Industrial Development Organization (UNIDO), 2017. *Industrial Development Report: Demand for Manufacturing, Driving Inclusive and Sustainable Industrial Development*. Vienna. Available at: <https://www.unido.org/sites/default/files/files/2017-11/IDR2018_FULL%20REPORT.pdf> [Accessed on April 23, 2019].

Veugelers, R., 2017. *China is the world's new science and technology powerhouse*. Bruegel, August 30.

World Bank, 2018. *High-technology exports*. Database available at: <https://data.worldbank.org/indicator/TX.VAL.TECH.CD>

World Education Services, 2017. *China: Can the World's Top Source for International Students Become Its Leading Destination?*, Paul Schulmann, Ziyi Christine Ye, August 16.

World Intellectual Property Organization (WIPO), 2017. Intellectual Property Statistics, available at: <http://www.wipo.int/ipstats/en/> [Accessed on April 30, 2019].

Zaman, G. and Tudor, A.C., 2016. The Evolution of the Romanian Exports' Competitiveness on the International Market during 2001-2014. *The Annals of the University of Oradea, Economic Sciences*, 15(2), December.

Annex

Acronyms:

FDI – Foreign Direct Investment; GPNs – Global Production Networks; GVCs – Global Value Chains; IBRD – International Bank for Reconstruction and Development; HS-2 – Harmonized System, two-digit codes; ICT – Information and Communication Technology; ITC – International Trade Centre; OECD – Organization for Economic Cooperation and Development; p.p. – percentage points; RCA – revealed comparative advantage; R&D – research and development; RDI – research, development, innovation; UNCTAD – United Nations Conference on Trade and Development; UNIDO – United Nations Industrial Development Organization; WIPO – World Intellectual Property Organization; WTO – World Trade Organization.

List of HS-2 chapters

SECTION I – LIVE ANIMALS; ANIMAL PRODUCTS

01 Live animals; 02 Meat and edible meat offal; 03 Fish and crustaceans, mollusks and other aquatic invertebrates; 04 Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included; 05 Products of animal origin, not elsewhere specified or included

SECTION II – VEGETABLE PRODUCTS

06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage; 07 Edible vegetables and certain roots and tubers; 08 Edible fruit and nuts; peel of citrus fruits or melons; 09 Coffee, tea, maté and spices; 10 Cereals; 11 Products of the milling industry; malt; starches; inulin; wheat gluten; 12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder; 13 Lac; gums, resins and other vegetable saps and extracts; 14 Vegetable plaiting materials; vegetable products not elsewhere specified or included

SECTION III – ANIMAL OR VEGETABLE FATS AND OILS AND THEIR CLEAVAGE PRODUCTS; PREPARED EDIBLE FATS; ANIMAL OR VEGETABLE WAXES

15 Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes

SECTION IV – PREPARED FOODSTUFFS; BEVERAGES, SPIRITS AND VINEGAR; TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES

16 Preparations of meat, of fish or of crustaceans, mollusks or other aquatic invertebrates; 17 Sugars and sugar confectionery; 18 Cocoa and cocoa preparations; 19 Preparations of cereals, flour, starch or milk; pastrycooks' products; 20 Preparations of vegetables, fruit, nuts or other parts of plants; 21 Miscellaneous edible preparations; 22 Beverages, spirits and vinegar; 23 Residues and waste from the food industries; prepared animal fodder; 24 Tobacco and manufactured tobacco substitutes

SECTION V – MINERAL PRODUCTS

25 Salt; sulphur; earths and stone; plastering materials, lime and cement; 26 Ores, slag and ash; 27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes

SECTION VI – PRODUCTS **OF THE CHEMICAL OR ALLIED INDUSTRIES**

28 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes; 29 Organic chemicals; 30 Pharmaceutical products; 31 Fertilizers; 32 Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other coloring matter; paints and varnishes; putty and other mastics; inks; 33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations; 34 Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, 'dental waxes' and dental preparations with a basis of plaster; 35 Albuminoidal substances; modified starches; glues; enzymes; 36 Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations; 37 Photographic or cinematographic goods; 38 Miscellaneous chemical products

SECTION VII – PLASTICS AND ARTICLES THEREOF; RUBBER AND ARTICLES THEREOF

39 Plastics and articles thereof; 40 Rubber and articles thereof

SECTION VIII – RAW HIDES AND SKINS, LEATHER, FURSKINS AND ARTICLES THEREOF; SADDLERY AND HARNESS**; TRAVEL GOODS, HANDBAGS AND SIMILAR CONTAINERS; ARTICLES OF ANIMAL GUT (OTHER THAN SILK-WORM GUT)**

41 Raw hides and skins (other than fur skins) and leather; 42 Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silkworm gut); 43 Fur skins and artificial fur; manufactures thereof

SECTION IX – WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL; CORK AND ARTICLES OF CORK; MANUFACTURES **OF STRAW, OF ESPARTO OR OF OTHER PLAITING MATERIALS; BASKETWARE AND WICKERWORK**

44 Wood and articles of wood; wood charcoal; 45 Cork and articles of cork; 46 Manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork

SECTION X – PULP OF WOOD OR OF OTHER FIBROUS CELLULOSIC MATERIAL; RECOVERED (WASTE AND SCRAP) PAPER OR PAPERBOARD; PAPER AND PAPERBOARD AND ARTICLES THEREOF

47 Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard; 48 Paper and paperboard; articles of paper pulp, of paper or of paperboard; 49 Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans

SECTION XI – TEXTILES **AND TEXTILE ARTICLES**

50 Silk; 51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric; 52 Cotton; 53 Other vegetable textile fibers; paper yarn and woven fabrics of paper yarn; 54 Man-made filaments, 55 Man-made staple fibers, 56 Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof; 57 Carpets and other textile floor coverings; 58 Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery; 59 Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind suitable for industrial use; 60 Knitted or crocheted fabrics; 61 Articles of apparel and clothing accessories, knitted or crocheted; 62 Articles of apparel and clothing accessories, not knitted or crocheted; 63 Other made-up textile articles; sets; worn clothing and worn textile articles; rags

SECTION XII – FOOTWEAR, HEADGEAR, UMBRELLAS, SUN UMBRELLAS, WALKING-STICKS, SEAT-STICKS, WHIPS, RIDING**-CROPS AND PARTS THEREOF; PREPARED**

FEATHERS AND ARTICLES MADE THEREWITH; ARTIFICIAL FLOWERS; ARTICLES OF HUMAN HAIR

64 Footwear, gaiters and the like; parts of such articles; 65 Headgear and parts thereof; 66 Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof; 67 Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair

SECTION XIII – ARTICLES **OF STONE, PLASTER, CEMENT, ASBESTOS, MICA OR SIMILAR MATERIALS; CERAMIC PRODUCTS; GLASS AND GLASSWARE**

68 Articles of stone, plaster, cement, asbestos, mica or similar materials; 69 Ceramic products; 70 Glass and glassware

SECTION XIV – **NATURAL OR CULTURED PEARLS, PRECIOUS OR SEMI-PRECIOUS STONES, PRECIOUS METALS,** METALS **CLAD WITH PRECIOUS METAL AND ARTICLES THEREOF; IMITATION JEWELLERY; COIN**

71 Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal, and articles thereof; imitation jewelry; coin

SECTION XV – BASE METALS AND ARTICLES OF BASE METAL

72 Iron and steel; 73 Articles of iron or steel; 74 Copper and articles thereof; 75 Nickel and articles thereof; 76 Aluminum and articles thereof; 77 *(Reserved for possible future use in the Harmonized System);* 78 Lead and articles thereof; 79 Zinc and articles thereof; 80 Tin and articles thereof; 81 Other base metals; cermets; articles thereof; 82 Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal; 83 Miscellaneous articles of base metal

SECTION XVI – MACHINERY AND MECHANICAL APPLIANCES; ELECTRICAL EQUIPMENT; PARTS THEREOF; SOUND RECORDERS AND REPRODUCERS, TELEVISION IMAGE AND SOUND RECORDERS AND REPRODUCERS, AND PARTS AND ACCESSORIES OF SUCH ARTICLES

84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof; 85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles

SECTION XVII – VEHICLES, AIRCRAFT, VESSELS AND ASSOCIATED, TRANSPORT EQUIPMENT

86 Railway or tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signaling equipment of all kinds; 87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof; 88 Aircraft, spacecraft, and parts thereof; 89 Ships, boats and floating structures

SECTION XVIII – OPTICAL, PHOTOGRAPHIC, CINEMATOGRAPHIC, MEASURING, CHECKING, PRECISION, MEDICAL OR SURGICAL INSTRUMENTS AND APPARATUS; CLOCKS AND WATCHES; MUSICAL INSTRUMENTS; PARTS AND ACCESSORIES THEREOF

90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof; 91 Clocks and watches and parts thereof; 92 Musical instruments; parts and accessories of such articles

SECTION XIX – ARMS AND AMMUNITION; PARTS AND ACCESSORIES THEREOF

93 Arms and ammunition; parts and accessories thereof

SECTION XX – MISCELLANEOUS MANUFACTURED ARTICLES

94 Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings; 95 Toys, games and sports requisites; parts and accessories thereof; 96 Miscellaneous manufactured articles

SECTION XXI – WORKS OF ART, COLLECTORS' PIECES AND ANTIQUES

97 Works of art, collectors' pieces and antiques; 98 Commodities specified at chapter level only; 99 Commodities not elsewhere specified,

Note: In this paper we analyzed the chapters 1-97.