

PRACE NAUKOWE

Uniwersytetu Ekonomicznego we Wrocławiu

RESEARCH PAPERS

of Wrocław University of Economics

Nr 370

Redefinition of the Role of Asia-Pacific Region in the Global Economy

edited by
Bogusława Drelich-Skulska
Anna H. Jankowiak
Szymon Mazurek



Publishing House of Wrocław University of Economics
Wrocław 2014

Copy-editing: Agnieszka Flasińska

Layout: Barbara Łopusiewicz

Proof-reading: Magdalena Kot

Typesetting: Małgorzata Czupryńska

Cover design: Beata Dębska

Information on submitting and reviewing papers is available on
the Publishing House's website
www.pracnaukowe.ue.wroc.pl
www.wydawnictwo.ue.wroc.pl

The project has been cofinanced by the National Science Centre according to the decision
No. DEC-2011/01/D/HS4/00639

The publication is distributed under the Creative Commons Attribution 3.0
Attribution-NonCommercial-NoDerivs CC BY-NC-ND



© Copyright by Wrocław University of Economics
Wrocław 2014

ISSN 1899-3192

ISBN 978-83-7695-494-3

The original version: printed

Publication may be ordered in Publishing House
tel./fax 71 36-80-602; e-mail: econbook@ue.wroc.pl
www.ksiegarnia.ue.wroc.pl

Printing: TOTEM

Contents

Preface.....	9
--------------	---

Part 1. Current Trends and Perspectives in Economic Policy of the Asia-Pacific Countries

Katarzyna Żukrowska: The role of Asia-Pacific region in current stage of development of world economy	13
Elżbieta Czarny, Jerzy Menkes: Role and significance of Asia and Europe in the U.S. policy	28
Marcin Grabowski: The role of transnational integration in forming of Northeast Asian Community.....	41
Szymon Mazurek: Diversity of cluster policies in Asian countries.....	57
Tomasz Wojciech Wiśniewski: The concept of energy security – overall analysis approach.....	71
Magdalena Broszkiewicz: Corporate Social Responsibility as a new source of competitiveness in Asia	89
Joanna Kos-Łabędowicz, Sylwia Talar: South Korea model of development of Internet economy infrastructure	100
Po Kai Fang: Taiwan’s position in Asia-Pacific economic integration after the ECFA.....	116
Sebastian Bobowski: Thai clustering – typology of the emerging market	127
Paweł Dobrzański: Government’s role in Asia-Pacific market economies. Japan vs. China	138

Part 2. Prospects of Trade, Investment and Finance in Asia-Pacific Region

Elżbieta Majchrowska: New trends in the global trade: TPP – pivot to Asia?	153
Jerzy Dudziński: Remarks on export of developing countries of Asia, Africa and Latin America in the 21 st century	164
Elżbieta Czarny, Paweł Folfas: Changes in trade introversion of Asian regional trade agreements as a measure of their openness to regional and global cooperation (comparative analysis)	176
Artur Klimek: Asian stock exchanges: Position and development.....	188

Ewa Trojnar: Taiwan's trade relations in the Asia-Pacific: Current stage and future challenges.....	197
Agnieszka Kukulka: Natural disasters and FDI inflow in the developing countries of South-Eastern Asia.....	208
Paweł Pasierbiak: International fragmentation of production and foreign trade of Japan.....	217
Iwona Pawlas: The role of India in the global economy in the beginning of the 21 st century	228
Iwona Sobol: Islamic banking – the case of Malaysia.....	240

Part 3. The challenges for the Chinese economy in the 21st century

Marcin Jałowiecki: China's economy in the future till 2030.....	253
Anna H. Jankowiak: Economic differentiation of regions in China	267
Malgorzata Smagorowicz-Chojnowska: <i>Xiao</i> as a way to the future capital leadership of the Asian-Pacific region founded on Confucian values (based on the Chinese example).....	281
Malgorzata Dziembala: Prospects for the development of economic cooperation between China and African countries.....	294
Kuang-yi Chao: Leadership or partnership – how China's Shanghai Pilot Free Trade Zone will promote RMB internationalization?.....	305
Lukasz Gacek: Challenges for the gas sector in China.....	313
Tomasz Bieliński: Development of human capital and governmental support as strategic advantages of Chinese high technology companies	326
Karolina Łopacińska: The competitive advantage of Chinese companies on the European market, and methods of building their market position.....	342

Streszczenia

Część 1. Współczesne trendy i perspektywy w polityce ekonomicznej regionu Azji i Pacyfiku

Katarzyna Żukrowska: Rola regionu Azji-Pacyfiku na obecnym etapie rozwoju światowej gospodarki	26
Elżbieta Czarny, Jerzy Menkes: Rola i znaczenie Azji i Europy w polityce USA.....	40
Marcin Grabowski: Rola integracji regionalnej w Azji w tworzeniu Wspólnoty Azji Północno-Wschodniej.....	55
Szymon Mazurek: Zróżnicowanie polityki klastrowej w krajach azjatyckich	70

Tomasz Wiśniewski: Pojęcie bezpieczeństwa energetycznego – podejście do całościowej analizy	88
Magdalena Broszkiewicz: Społeczna odpowiedzialność przedsiębiorstw jako nowe źródło konkurencyjności firm azjatyckich	99
Joanna Kos-Łabędowicz, Sylwia Talar: Południowokoreański model rozwoju infrastruktury gospodarki internetowej.....	115
Po Kai Fang: Pozycja Tajwanu w integracji ekonomicznej regionu Azji-Pacyfiku po ECFA.....	126
Sebastian Bobowski: Tajski klastering – typologia rynku wschodzącego.....	137
Paweł Dobrzański: Rola państwa w gospodarkach rynkowych Azji i Pacyfiku. Japonia vs. Chiny	150

Część 2. Perspektywy handlu, inwestycji i finansów w regionie Azji i Pacyfiku

Elżbieta Majchrowska: Nowe trendy w światowym handlu: TPP – zwrot w stronę Azji?	163
Jerzy Dudziński: Uwagi o eksporcie rozwijających się krajów Azji, Afryki i Ameryki łacińskiej w XXI wieku	175
Elżbieta Czarny, Paweł Folfas: Zmiany wewnętrznej orientacji handlowej azjatyckich ugrupowań integracyjnych jako miary ich otwarcia na współpracę regionalną i globalną (analiza porównawcza).....	187
Artur Klimek: Azjatyckie giełdy papierów wartościowych: pozycja i rozwój	196
Ewa Trojnar: Stosunki handlowe Tajwanu z regionem Azji i Pacyfiku: bieżący stan i przyszłe wyzwania	208
Agnieszka Kukulka: Katastrofy naturalne a bezpośrednie inwestycje zagraniczne w krajach rozwijających się Azji Południowo-Wschodniej	216
Paweł Pasierbiak: Międzynarodowa fragmentaryzacja produkcji a handel zagraniczny Japonii	227
Iwona Pawlas: Rola Indii w globalnej gospodarce początku XXI wieku.....	239
Iwona Sobol: Bankowość islamska – przykład Malezji	250

Część 3. Wyzwania dla gospodarki Chin w XXI wieku

Marcin Jałowiecki: Gospodarka Chin do roku 2030	266
Anna H. Jankowiak: Zróżnicowanie ekonomiczne regionów Chin.....	280
Małgorzata Smagorowicz-Chojnowska: <i>Xiao</i> jako droga wiodąca do przywództwa regionu Azji i Pacyfiku, oparta na wartościach konfucjańskich (na przykładzie Chin)	293

Malgorzata Dziembała: Perspektywy rozwoju współpracy gospodarczej Chin z krajami Afryki	306
Kuang-yi Chao: Przywództwo czy partnerstwo – jak pilotażowa szanghajska strefa wolnego handlu będzie promować internacjonalizację RMB?.....	312
Łukasz Gacek: Wyzwania stojące przed chińskim sektorem gazowym	325
Tomasz Bieliński: Rozwój kapitału ludzkiego oraz pomoc rządowa jako przewagi strategiczne chińskich firm sektora wysokich technologii.....	341
Karolina Łopacińska: Konkurencyjność firm z kapitałem chińskim na rynku europejskim i sposoby jej kształtowania	355

Paweł Pasierbiak

Maria Curie-Skłodowska University in Lublin

e-mail: pawel.pasierbiak@umcs.lublin.pl

INTERNATIONAL FRAGMENTATION OF PRODUCTION AND FOREIGN TRADE OF JAPAN

Abstract: The article analyses the process of international fragmentation of production and its implications for foreign trade of Japan after 1995. Using a new method of measuring trade, based on the concept of value-added, selected changes in the foreign trade of the country were presented. The author showed that the share of Japan in the international fragmentation of production, although growing, is small. From the point of view of the balance of trade, Japan showed a tendency to increase the trade surplus in the field of labour-intensive products and the decline in terms of capital-intensive goods. In addition, the value-added method allowed us to assess the comparative advantage of Japan. After taking into account fragmentation, RCA indicators for the country are more favourable, which means that revealed comparative advantage of Japan is higher.

Keywords: international fragmentation of production, trade in value-added, foreign trade, Japan, RCA.

DOI: 10.15611/pn.2014.370.17

1. Introduction

The processes of international fragmentation of production belong to the phenomena that reflect changes taking place in the contemporary international trade. A more and more intensified process of transnational division of the production process between the vertically integrated industries is a consequence of many factors. These are among others: development of globalization processes, trade barriers reduction, increasing freedom of services movement, liberalization of capital flows but also decrease in costs of transportation and communication. The process, previously integrated within a single state, nowadays takes place in many different international locations. As a result, the international division of labour is subject to changes and at the same time geographical structure of countries involved in international trade evolves. Enterprises (usually from developed countries), looking for the benefits of transferring parts of their operations abroad, locate it where it is optimal from

their point of view. An increasingly intensive trade in intermediate goods makes traditional measures of international trade less relevant. These measures do not reflect adequately the real significance and competitiveness of individual countries in international trade. A method which allows for measuring the international trade in more realistic way is a method based on value-added.

From this point of view, using a new method of measuring the trade, the situation of Japan will be considered – the situation of developed economy which is heavily involved in both international trade and the changes that occur in it. The main objective of this study is to assess the impact of the fragmentation of production on the foreign trade of Japan. Using the value-added method, the author will show the trends and will assess the advantage of Japan in international trade. The method of statistical analysis will be complemented by the method of inference and description. The research period covers the years after 1995 (until 2009), for which statistics are available regarding trade measured by value-added. The main source of statistical information will be the data of OECD/WTO. The structure of the article is as follows. First, the concept of the new method to measure international trade by value-added is presented. Then, we synthetically present theoretical background of the fragmentation. In further analysis, the foreign trade of Japan is analysed from the viewpoint of Japan's participation in the international fragmentation of production processes.

2. Concept of trade in value-added and survey of theory

2.1. Concept of trade in value-added

The concept of measuring trade in value added is a relatively new method of measuring the flow in the international trade. In terms of increasing globalization and internationalization of economic activity of companies, the traditional approach does not fully reflect current processes taking place in the real economy. In traditional terms, there is a problem with so-called double counting. If the country exports the final product, entire value of these exports is put into its account. It would be appropriate if the product was created entirely in that particular country. However, today the final product is often formed as a result of cooperation between entities located in many different countries. Thus, to better reflect the actual trade flows, it is necessary to distinguish between values that have been added in all the countries participating in the formation of the final product. A method, which allows to measure flows of trade in more realistic way in today's global economy, is a method of measurement in the value-added which addresses the double counting implicit in current gross flows of trade. The method measures flows related to the value that is added (labour compensation, taxes and profits) by a country in the production of any good or service that is exported. The graphical illustration of the method is depicted in Figure 1. This is a simple numerical example which explains differences between methods, both "new" and "traditional."

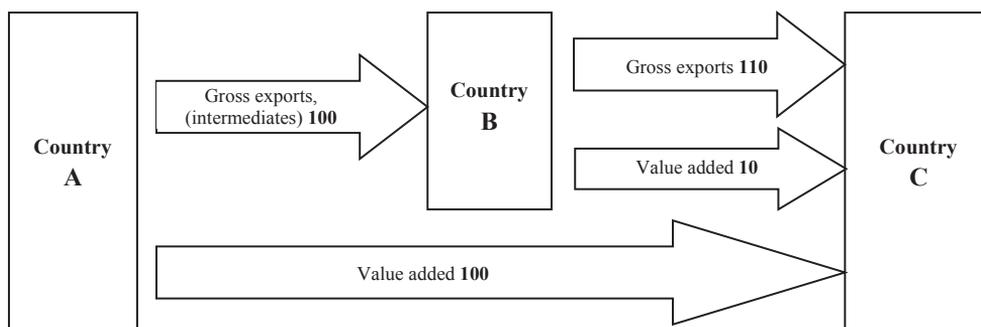


Figure 1. Trade in value-added

Source: *Interconnected Economies: Benefiting from Global Value Chains*, OECD, Paris 2013, p. 55.

Country A exports goods produced entirely in A worth 100 USD to country B. Country B further processes these goods before exporting them to the final destination – country C. Country B adds value of 10 USD to the goods, so it exports 110 USD to C. If we measure trade flows in traditional way total global exports and imports would be of 210 USD but only 110 USD of value-added has been generated in their production. Conventional measures also show that country C has a trade deficit of 110 USD with country B, and no trade at all with country A. It is even though, country A is the main beneficiary of country C's consumption.¹ Taking into account flows of value added, trade deficit of country C with B can be recalculated on the basis of the value-added C "purchases" from B as final demand. Such an approach gives a result of a deficit reduction of the country C with B to 10 USD. If one makes a similar calculations to country A's value added, country C will have a deficit of 100 USD with a country A. What is important, an overall trade deficit of country C's with the world remains at 110 USD. These recalculations influenced bilateral positions of every country involved in the process.²

2.2. Survey of selected theory

Theories explaining the process of international fragmentation of production can be classified into two basic groups: 1) the neoclassical trade model and 2) the model of industrial organization.

A general theoretical framework for the international fragmentation of production within the mainstream neoclassical economics was developed by R. Jones and

¹ *Ibidem*, p. 55.

² *Ibidem*.

H. Kierzkowski in 1990.³ Then, it was developed in the works of authors such as S.W. Arndt (1997), A. Venables (1999), R.W. Jones and H. Kierzkowski (2001), W. Kohler (2001), G. Grossman and E. Rossi-Hansberg (2008) as well as R. Baldwin and F. Robert-Nicoud (2007). The standard approach to explain the phenomenon of fragmentation usually starts with the basic neoclassical models of international trade (the Ricardian model, the Heckscher-Ohlin model, among others). According to them, labour-intensive elements (fragments) of the production process will be located in countries rich in labour, and capital-intensive components in countries rich in capital. R.W. Jones and H. Kierzkowski have considered the production process as a series of blocks arranged in different production countries, which are connected to each other by different services (service link).⁴ These services consist of, among others, transportation, communication, services related to the supply and quality control, service coordination, etc. Those services, and especially their costs, are crucial from the point of view of fragmentation. An international fragmentation of production will give intended effects of reducing the total cost of production only when the savings resulting from the access to cheaper production factors outweigh the costs of disintegration of production (transport, communication, etc.). Therefore, a necessary condition for the fragmentation of production is low costs of this service link (the disintegration of costs of production).

The neoclassical approach, where the main reason for making the fragmentation of production is differences in the cost of factors of production, was questioned. Costs of production factors were still important, but other factors, such as the ability to deliver the goods by local suppliers, infrastructure, well-organized distribution network, should also be taken into account. Linking the trade theory with the industrial organization model provides a basis for fragmentation analysis from the point of view of the enterprise. The company undertakes two key decisions on the organizational form of international production:⁵ 1) whether to produce parts and components in-house or acquire them from unaffiliated firms, and 2) whether to manufacture parts and components at home or at a foreign country. The first question concerns the ownership structure which determines the boundaries of the company. An involvement in international fragmentation of production means that the company must decide whether to keep production of components within its own boundary or acquire them from unaffiliated suppliers, i.e. whether to engage in intra-firm or

³ The first work in the field of international fragmentation of production was the paper: R.W. Jones, H. Kierzkowski, The role of services in production and international trade. A theoretical framework, [in:] R.W. Jones, A.O. Krueger (eds.), *The Political Economy of International Trade. Essays in Honour of Robert A. Mundell*, MIT Press, Cambridge, MA, 1990.

⁴ See among others R.W. Jones, H. Kierzkowski, A framework for fragmentation, [in:] S. Arndt, H. Kierzkowski (eds.), *Fragmentation: New Production Patterns in the World Economy*, Oxford University Press, New York 2001, pp. 17–34.

⁵ See among others N. Yamashita, *International Fragmentation of Production. The Impact of Outsourcing on the Japanese Economy*, Edward Elgar, Cheltenham 2010, p. 16.

arms'-length transactions. Both choices involve additional costs (e.g., increased production costs, the additional costs of searching for a partner and negotiating with him in the case of transactions with independent parties) and benefits (for example lack of costs of direct investment). The greater centralization of ownership, the greater is the possibility of control of an enterprise and the division of profits. The second question is associated with the location of production in the fragmentation process. According to G.M. Grossman and E. Helpman, every company faces the choice between domestic and international subcontracting.⁶ Every company should look for such suppliers who can produce the particular customized components with the appropriate expertise. Different countries might differ in their degrees of contract incompleteness. This introduces the important role of a market thickness, the stability of the legal system and institutional quality of government. These elements are the basis for making decisions about the choice of location in the process of production fragmentation.

3. International fragmentation of production of Japan

The process of an international fragmentation of production became an important source of comparative advantage for transnational corporations already in the 60s of the 20th century. The initiators and the main beneficiaries of this process were initially firms from the United States but in the late 70s European companies also joined.⁷ Japanese corporations have begun to actively participate in the process of fragmentation in the late 80s, when they began to establish assembly operations, mainly in the countries of Southeast Asia. Since the 90s, when companies of all major centres of the world economy have engaged in this process, fragmentation of production accelerated, becoming one of the most important features of modern international trade.

As a result of the ongoing phenomenon of sharing the production process internationally, exports of a particular country do not contain only domestic value added in this country. Increasingly, exports contain so-called foreign value added, which was previously imported (e.g. in the form of components). It is worth noting that the largest share of foreign value added in the exports have those countries which are specialized and relatively small at the same time, while large countries with diversified range of manufactured products for export, have much lower shares. Table 1 presents data illustrating this issue.

The highest shares of foreign value added in exports of the country had countries such as Luxembourg and Hungary, and the United States and Russia showed much lower shares. Based on the data from Table 1 we can also assess the position of Japan

⁶ G.M. Grossman, E. Helpman, Integration versus outsourcing in industry equilibrium, *The Quarterly Journal of Economics* 2002, February, pp. 85–119.

⁷ N. Yamashita, *op.cit.*, p. 8.

in shaping the foreign and domestic value added in its exports. As could be expected, in the case of Japan, there was a high share of domestic value in exports, although there is some noticeable downward trend. According to the data from the table, the share of foreign value added in Japanese exports increased from 6.8% in 1995 to 15.8% in 2007. In the subsequent years, with the global economic crisis and the weakening of trade in intermediate products and components, the share of foreign value added in the case of Japan fell to 14.4% in 2009.⁸

Table 1. Foreign value added content of exports in the years 1995–2009 (%)

Specification	1995	2000	2005	2007	2009
Luxembourg	45.0	58.3	59.2	61.7	61.7
Hungary	30.3	49.4	46.4	49.4	43.7
China	15.9	17.1	25.3	24.6	23.9
USA	9.9	11.1	12.2	12.9	10.7
Russia	7.7	10.0	7.6	7.0	6.1
Japan	6.8	8.7	12.3	15.8	14.4

Source: own preparations based on R. Stehrer, N. Foster, G. de Vries, *Value Added and Factors of Trade: A Comprehensive Approach*, The Vienna Institute for International Economic Studies, Working Paper, no. 80, June 2012, p. 11.

Analysing exports in terms of industry, it is clear that the degree of fragmentation is different depending on the sector. Only in some sectors the share of foreign value-added is high and it usually applies to industrial products that require more processing (*machinery and equipment, electrical and optical equipment and transport equipment*, among others). The relatively low degree of fragmentation is characteristic in such sectors as *agriculture, hunting, forestry and fishing* but also *mining and quarrying*. Table 2 presents data on the degree of fragmentation of the various industries in Japan, set against the background of South Korea.

The data in Table 2 indicate that in 1995–2009 the share of Japan in the process of fragmentation of production has increased in general, due to the fact that every industry saw an increase in the share of foreign value added in the export of that country. The highest values were recorded in 2008, while data for 2009 show a negative impact of the global economic crisis on international production network, and decreases were recorded in all industries. Fragmentation is of utmost importance for such product groups as *chemicals and non-metallic mineral products* (21.06% in 2009), *basic metals and fabricated metal products* (19.46%), and *electrical and optical equipment* (17.78 %). For these groups, the share of foreign value added exceeded the average for the country, and generally showed an increasing trend. It

⁸ See also *Interconnected Economies...*, p. 57.

Table 2. Foreign value added share of gross exports, manufacturing goods, %

Industry		TOTAL	Agriculture, hunting, forestry and fishing	Mining and quarrying	Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood, paper, paper products, printing and publishing	Chemicals and non-metallic mineral products	Basic metals and fabricated metal products	Machinery and equipment, nec	Electrical and optical equipment	Transport equipment	Manufacturing nec; recycling
Japan	1995	6.85	3.58	3.65	7.8	8.76	5.72	9.67	10.8	5.2	7.61	5.32	7.85
	2000	9.91	5.48	7.88	7.27	9.8	6.26	11.69	11.8	8	11.54	10.4	9.47
	2005	13.75	8.02	11.26	9.6	14.5	8.21	18.55	16.14	10.93	16.3	14.17	13.36
	2008	19.35	11.37	15.33	13.55	17.38	12.47	31.85	24.38	14.35	21.01	18.66	18.71
	2009	14.79	8.5	11.73	9.71	13.86	8.63	21.06	19.46	11.48	17.78	14.15	14.33
Korea	1995	23.71	9.41	9.3	20.06	24.74	19.23	32.23	30.3	22.7	26.43	21.09	21.74
	2000	32.93	9.82	12.44	17.93	27.1	24.58	47.14	32.81	24.49	38.54	26.64	24.05
	2005	37.72	1.74	15.79	7.86	32.29	23.73	49.79	41.46	28.97	44.78	34.16	23.14
	2008	43.42	18.73	17.25	31.1	33.77	27.7	64.77	48.01	33	44.78	36.11	25.22
	2009	40.64	16.2	13.58	28.64	31.87	23.1	60.81	43.52	31.76	46.57	36.49	25.55

Source: *OECD-WTO: Statistics on Trade in Value Added*, http://www.oecd-ilibrary.org/trade/data/oecd-wto-statistics-on-trade-in-value-added_data-00648-en (retrieved: 25.05.2014).

should also be noted that in 2000 and 2005 Japan showed a higher than average level of involvement in the fragmentation in the industry of *transportation equipment*, but in subsequent years this share has fallen. Comparing the intensity of international fragmentation of production of Japan with that of South Korea it can be seen that in the case of the latter, the country's average level of involvement in this process is much higher (40.64% in 2009). It can therefore be concluded that Korea is a more specialized country, and much more engaged in trade of intermediate goods. At the same time there is a similarity between Japan and Korea in terms of industries, whose involvement in the processes of fragmentation is higher than national average.

Analysis of the fragmentation according to a factor contribution to the overall trade balance of Japan also brings interesting results. In the years 1995–2009 surplus in the export of labour-intensive products clearly increased (from 92.7 billion USD in 1995 to 118.7 billion in 2008), while the surplus in capital-intensive products decreased (from 37.6 to 22.7 billion in the same period). These results may seem surprising, but similar trends are shown by other developed countries, including

United States. However, there is an explanation for this phenomenon. In the case of developed countries, their exports can be considered as labour intensive due to the relatively high “science” intensiveness of *high-tech* products. In the case of developing countries assembly processes provided by low-skilled and low cost workers can be considered to be capital-intensive due to the use of, for example, production lines.⁹ In Japan, the country with the highest number of industrial robots used in the world,¹⁰ such factors should also be considered as positively influencing a positive balance of trade in labour-intensive goods. An interesting phenomenon in this aspect is the fact that to a positive trade balance of Japan in the field of labour-intensive products contributed workers mostly with medium and high level of education. In 2009, the total value of the trade balance amounting to +79.5 billion USD consisted of: surplus earned by workers with a medium level of education (81.4 billion USD), and a high level of education (33.6 billion), and a contribution of workers with low educational level was negative (35.5 billion).¹¹

From the point of view of the country’s competitiveness in international trade, one of the most commonly used indicators is an index developed by B. Balassa – index of revealed comparative advantage (RCA), which compares the export performance of the country in relation to the selected reference group.¹² The use of this index in terms of international fragmentation of production changes the assessment of the competitiveness of trading countries, including Japan. The relevant data illustrating this phenomenon were gathered in Table 3.

The analysis of the data in Table 3 demonstrates that in 2009 Japan showed a revealed comparative advantage in the four product groups: *basic metals and fabricated metal products; machinery and equipment, nec; electrical and optical equipment and transport equipment*. In 1995, Japan did not yet have the advantage in a group of *basic metals and fabricated metal products*. If we compare the RCA indicators measured by the traditional method with those measured using the domestic value-added, we obtain interesting results. In 2009, the international competitiveness of Japan in terms of these four product groups was higher when measured by the new method of value-added. However, in these groups of products, which, according to the traditional method of measuring Japan, showed no advantage, her situation by the new method was even less favourable. The analogical data for South Korea give similar results, provided, however, that Korea showed a comparative advantage in only two groups of products: *electrical and optical equipment and transport equipment*.

⁹ R. Stehrer, N. Foster, G. de Vries, *op.cit.*, p. 12.

¹⁰ In 2004 42% of world’s number of industrial robots operated in Japan. See *Japan. An International Cooperation*, Keizai Koho Center, Tokyo 2007, p. 44.

¹¹ R. Stehrer, N. Foster, G. de Vries, *op.cit.*, pp. 13, 15.

¹² $RCA_{ij} = (x_{ij}/X_i) / (x_{aj}/X_a)$, where: x_{ij} – exports of product j from country i ; X_i – total exports from country i ; x_{aj} – total exports of product j from the reference area (e.g. the EU); X_a – total exports from reference area. A country reveals comparative advantages in products for which the RCA indicator is higher than 1.

Table 3. Revealed comparative advantage of selected countries in the years 1995 and 2009

Specification		Food products, beverages and tobacco	Textiles, textile products, leather and footwear	Wood, paper, paper products, printing and publishing	Chemicals and non-metallic mineral products	Basic metals and fabricated metal products	Machinery and equipment, nec	Electrical and optical equipment	Transport equipment	Manufacturing nec; recycling
2009										
Japan	GE	0,1022	0,1418	0,1552	0,6936	1,0915	1,2223	1,3848	1,8836	0,9386
	DVA	0,0963	0,1357	0,1487	0,6903	1,0427	1,2291	1,4954	1,9528	0,9118
Korea	GE	0,1915	0,5374	0,1884	0,8247	0,9143	0,7516	1,7160	1,6234	0,1850
	DVA	0,2144	0,6114	0,2283	0,6122	0,9204	0,8752	1,8091	1,8706	0,2347
1995										
Japan	GE	0,0679	0,2156	0,2695	0,5852	0,7101	1,347	1,8137	1,6774	0,3916
	DVA	0,0639	0,2147	0,2575	0,5858	0,6875	1,3033	1,8668	1,7183	0,3821
Korea	GE	0,2714	2,3087	0,1971	0,7799	0,9051	0,5635	1,608	0,907	0,6832
	DVA	0,2782	2,3835	0,2027	0,7359	0,8604	0,5587	1,6563	0,9729	0,7114

Note: DVA – Revealed comparative advantage based on domestic value added embodied in gross exports; GE – Revealed comparative advantage based on gross exports.

Source: *OECD-WTO...*

4. Conclusions

The intensifying process of international fragmentation of production leads to changes both in the area of international trade and a foreign trade of individual countries. Previously integrated production process currently is divided into elements (fragments) which are undertaken in many countries. Traditional methods of measuring of international trade do not reflect the growing importance of international fragmentation. Therefore, it is necessary to use other than the traditional methods of measuring international trade. One solution is to use a method based on the concept of the trade in value-added.

As a result of the use of this method for the assessment of foreign trade of Japan, the analysis carried out in this paper allows to draw a number of conclusions.

1. Japan hardly participates in the international fragmentation of production, as measured by the share of foreign value added in exports of the country. Although this rate slightly increases, it remains at a low level of about 15%. For comparison, in South Korea it reaches the level of 40% and in China 24%. Lower values than Japan were shown in the United States.

2. The most important process of international fragmentation of production for Japan occurred in the area of *chemicals and non-metallic mineral products, basic metals and fabricated metal products, and electrical and optical equipment*.

3. Japan shows typical for developed countries tendency to increase the trade surplus in the field of labor-intensive products and the decline in the capital-intensive products.

4. An exports' surplus of labour-intensive products was the result of the contribution mainly of workers with the medium level of education and to a lesser extent, employees with the high level of education. Employees with low level of education reduced the overall surplus of exports.

5. Japan showed revealed comparative advantage (RCA) for the export of such product groups as: *basic metals and fabricated metal products; machinery and equipment, nec; electrical and optical equipment and transport equipment*. And if the new method of measuring trade was applied, the advantage of Japan was even higher.

The process of fragmentation of production by Japanese corporations, which started in the late 80s of the twentieth century, has not yet reached a high level of intensity. However, factors associated mainly with globalization will motivate Japanese companies, in their searching for improvements in efficiency, to become increasingly involved in the process.

References

- Grossman G.M., Helpman E., Integration versus outsourcing in industry equilibrium, *The Quarterly Journal of Economics* 2002, February.
- Interconnected Economies: Benefiting from Global Value Chains*, OECD, Paris 2013.
- Japan. An international comparison*, Keizai Koho Center, Tokyo 2007.
- Jones R.W., Kierzkowski H., A framework for fragmentation, [in:] S. Arndt, H. Kierzkowski (eds.), *Fragmentation: New Production Patterns in the World Economy*, Oxford University Press, New York 2001.
- Jones R. W., Kierzkowski H., The role of services in production and international trade. A theoretical framework, [in:] R.W. Jones, A.O. Krueger (eds.), *The Political Economy of International Trade. Essays in Honour of Robert A. Mundell*, MIT Press, Cambridge, MA, 1990.
- OECD-WTO: Statistics on Trade in Value Added*, http://www.oecd-ilibrary.org/trade/data/oecd-wto-statistics-on-trade-in-value-added_data-00648-en (retrieved: 25.05.2014).
- Stehrer R., Foster N., de Vries G., *Value Added and Factors of Trade: A Comprehensive Approach*, The Vienna Institute for International Economic Studies, Working Paper, no. 80, June 2012.
- Yamashita N., *International Fragmentation of Production. The Impact of Outsourcing on the Japanese Economy*, Edward Elgar, Cheltenham 2010.

MIĘDZYNARODOWA FRAGMENTARYZACJA PRODUKCJI A HANDEL ZAGRANICZNY JAPONII

Streszczenie: Autor artykułu analizuje proces międzynarodowej fragmentaryzacji produkcji oraz jego implikacje dla handlu zagranicznego Japonii po 1995 r. Wykorzystując nową metodę mierzenia handlu, opartą na koncepcji wartości dodanej, przedstawia wybrane zmiany w handlu zagranicznym kraju. Autor wykazał, że udział Japonii we fragmentaryzacji, choć rosnący, jest niewielki. Z punktu widzenia bilansu handlowego Japonia wykazywała tendencję do wzrostu nadwyżki handlowej w zakresie artykułów pracochłonnych i jej spadku w zakresie artykułów kapitałochłonnych. Ponadto, metoda wartości dodanej pozwoliła na ocenę przewagi komparatywnej Japonii. Po uwzględnieniu fragmentaryzacji, wskaźniki RCA dla tego kraju są korzystniejsze, co oznacza, że ujawniona przewaga komparatywna Japonii jest wyższa.

Słowa kluczowe: międzynarodowa fragmentaryzacja produkcji, handel zagraniczny, Japonia, RCA.