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# THE CHANGING ROLE OF THE SERVICE SECTOR IN AN INNOVATION-ORIENTED ECONOMY

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### Abstract

The development of a service economy and the more and more noticeable phenomenon of servicization have become inseparable elements in the evolution of the modern economy. The goal of this paper is to analyse the impact of servicization on selected economies, both in terms of GDP and employment structure, as well as on changes in foreign trade. The secondary, but still important aim is to examine the relationship between servicization and innovation processes. Based on the conducted research, it can be stated that the process of servicization occurs in both developed post-industrial economies and increasingly often in developing countries. Moreover, the analysis of the relationship between the general level of innovation in the economy and the degree of its servicization, showed that in many countries higher innovation is often associated with a stronger role of the service sector in the economy. The dynamics of structural change taking place in the "deagrarianization-deindustrialization-servicization" chain is therefore substantially influenced by technological progress.

Keywords: servicization, innovation process, service sector role

JEL classification: O14, O30, F10

## Introduction

The growing role of the service sector in the economy, commonly referred to as servicization, is a process that has been occurring over several decades. It has been accompanying the rapid changes in the modern global economy, e.g. the growing importance of technical and technological development, especially in the areas of telecommunication and information technology (ICT). This development of the international service market has given many countries – including the developing world – the chance to find their own fields of international specialization. However, the latest global crisis has also shown the disastrous consequences of dependence on the third sector and of its detachment from the real economy. This paper aims to analyse the impact of servicization on selected economies, both in terms of GDP and employment structure, as well as on changes in foreign trade. In addition, it has been examined whether servicization could foster innovation. The study was primarily based on a comparative and descriptive analysis covering the years 1995–2013, depending on data availability, based on statistics published by international economic organizations such as UNCTAD, World Bank and World Trade Organization.

#### 1. Servicization in the modern global economy

Development of the so-called service economy and the servicization of economic life have become inseparable elements in the evolution of today's modern economy. It must still be kept in mind that defining the notion of a "service economy" poses many difficulties due to the fact that even the terms "service" and "service sector" have not yet been clearly defined in literature on the subject (Nakonieczna-Kisiel, 2007; Rogoziński, 2000; Dąbrowska, 2008; Masłowski, 2000).<sup>1</sup> Moreover, the modern economy is experiencing an intensified blending of areas associated with the production, distribution and consumption of material goods and services. Nonetheless, one can assume that servicization is due mainly to the growing impact of new technologies on the development of the global services economy, in which knowledge and information are becoming increasingly important. According to O. Giarini (1986), a service economy is when at least half of all costs generated during manufacturing operations are

<sup>&</sup>lt;sup>1</sup> This is a consequence of the traditional approach to services as a residual activity, i.e. outside of the processing industry, mining and agriculture. A significant problem with the definition of services is also associated with the emergence of more and more new service activities, as exemplified by modern business services. With this in mind, international organizations involved in the examination of trade in services, such as the WTO, Eurostat and the International Monetary Fund, do not define services, but rather only use the classification of services (in a narrow or wide approach).

associated with rendered services. Currently, a service economy is deemed to have the largest share of value added and total employment in the third sector.

Given the structural changes in today's global economy, it is difficult to explain the genesis of the recently intensified servicization if we base our considerations on the traditional concept of a three-sector economic structure. The underlying theory of this division is the thesis of the changing role of individual sectors in the development of economies, i.e. the decreasing importance of the agricultural sector; the growth, stabilization and also decline in the relative importance of the industrial sector; and the continuous growth of the service sector's role.<sup>2</sup> Structural changes in the economy according to the scheme "deagrarianizationdeindustrialization-servicization" are therefore accompanied by the growing importance of the service sector, which in turn determines further economic growth (Katouzian, 1970; Gemmell, 1982; Howells, 2004). The so understood servicization is also the process that determines the competitiveness of economies and their investment attractiveness (Lichniak, 2010). Another manifestation of servicization is the increased importance of different types of service activities, not only related to the service sector, but also to the manufacturing or agricultural sectors (Kłosowski, 2006). This is due to the complementarity of services in relation to other sectors, as well as scientific and technical progress, and the development of telecommunication and information technologies (ICTs) (Gallouj, Weinstein, 1997; Howells, 2001; Hipp, Grupp, 2005; Sheehan, 2006; Jetter, Satzger, Neus, 2009).

As previously mentioned, the most commonly used measures of servicization include the share of the service sector in the GDP and in total employment. The data presented in Table 1 indicate that servicization is most advanced in developed countries, sometimes referred to as "post-industrial economies". From 1995–2013 the share of the service sector in GDP in OECD countries increased by almost 6 percentage points, and approached 80% in the strongest economies of the so-called Golden Triad, such as the United Kingdom, the United States and France. Servicization of the Polish economy was also relatively rapid in that period, but the less than 64 per cent share of services in GDP differs significantly from the average for developed and OECD economies. A relatively low share of services can also be found in the German GDP, which is significant in the context of the 2008 global crisis, particularly its negative consequences for the economies of developed countries. The fact that the German economy

<sup>&</sup>lt;sup>2</sup> According to S. Kuznets, Nobel Prize laureate in economics, the economically developed Western countries have reached a similar economic structure (in terms of production, employment, etc.), even though the process of industrialization had begun at different times and proceeded at different paces. Economies at a low level of development (measured by GDP per capita) also have similar structures. Earlier they were dominated by manufacturing, and later by agriculture (Szymańska, 2015).

was relatively the most successful in coping with the effects of that downturn in the EU is often ascribed to the high share of the industrial sector in the German GDP.

	1995				2013		Change			
Specification	A	Ι	S	А	Ι	S	Α	Ι	S	
		%			%		pero	centage po	oints	
Developed economies	2.0	28.8	69.2	1.5	23.5	75.0	-0.5	-5.3	5.8	
OECD economies	2.2	29.2	68.6	1.7	24.3	74.0	-0.5	-4.9	5.4	
Developing economies	11.7	35.0	53.3	9.2	38.3	52.5	-2.4	3.3	-0.8	
Germany	1.1	32.7	66.2	0.9	30.7	68.4	-0.2	-2.0	2.2	
France	2.7	24.5	72.8	1.7	19.8	78.5	-1.0	-4.7	5.7	
The United Kingdom	1.5	29.9	68.6	0.7	20.2	79.2	-0.8	-9.7	10.5	
Italy	3.3	29.1	67.6	2.3	23.3	74.4	-1.0	-5.8	6.8	
Japan	1.8	33.1	65.2	1.2	26.4	72.4	-0.6	-6.6	7.2	
The United States	1.4	24.6	74.0	1.3	20.3	78.4	-0.1	-4.3	4.4	
Switzerland	1.5	30.0	68.5	0.7	25.7	73.6	-0.8	-4.3	5.1	
Poland	5.3	37.7	57.0	3.3	33.2	63.5	-2.0	-4.5	6.5	
China	20.0	47.3	32.8	10.0	43.9	46.1	-10.0	-3.4	13.3	
Indonesia	15.4	41.6	43.0	14.4	45.7	39.9	-0.9	4.0	-3.1	
Republic of Korea,	5.9	39.1	55.0	2.3	38.6	59.1	-3.5	-0.5	4.1	
Mexico	5.0	37.2	57.8	3.3	37.8	58.9	-1.7	0.7	1.1	
Malaysia	12.6	37.5	49.9	9.4	41.0	49.6	-3.2	3.4	-0.3	
The Philippines	18.8	35.0	46.2	11.2	31.1	57.7	-7.6	-3.9	11.5	
Thailand	9.1	37.6	53.3	9.9	34.1	56.1	0.8	-3.5	2.7	

Table 1. GDP composition change by sectors in selected economies in the period of 1995–2013

A-agriculture, I-industry, S-services.

Source: own elaboration based on UNCTAD data, http://unctadstat.unctad.org/wds (access: 2.11.2015).

Table 1 shows also the change in the share of the service sector in GDP in selected developing countries. Although they are often referred to as the newly industrialized countries, most of them have reported a significant increase in the importance of the service sector. In particular, this applies to China and the Philippines, in which the analysed index increased by more than 13 and almost 12 percentage points, respectively; an increase much greater than in developed countries. It should be noted, however, that in the newly industrialized countries the industrial sector still maintains its crucial position in the economy (its share in the GDP often exceeds 40%).

Another indicator of servicization is the share of the service sector in employment, as shown in Table 2 for selected developed and developing countries. From 1995–2010 the analysed ratio in developed countries increased on average by 10 percentage points, reaching over 70% in most (in the United States it was even more than 81%). The exceptions were Switzerland and

France, where growth in the share of the service sector in employment amounted to about 4 and just over 6 percentage points, respectively. This suggests that the high increase in employment in the service sector of most of the selected countries was due to technological progress and the development of electronic markets; specialization of services and the emergence of new types of service; the growing wealth of nations; and the complementarity of services with regard to other international flows (Nakonieczna-Kisiel, 2007). In Poland the share of the third sector in total employment increased by a record high of 11.6 percentage points in the analysed period. Yet the overall ratio was still much lower than in Japan and Italy – developed countries with the lowest share of services in employment. The growth of services in Polish employment was due to the inflow of foreign direct investment and the establishment of numerous shared service centres and business process outsourcing (BPO).

	1995*				2010*		Change			
Specification	А	Ι	S	A	Ι	S	A	Ι	S	
		%			%		per	centage po	oints	
OECD economies	8.4	28.1	63.3	5.2	22.4	71.8	-3.2	-5.7	8.5	
Germany	3.2	36.0	60.8	1.6	28.4	70.0	-1.6	-7.6	9.2	
France	4.9	26.9	68.1	2.9	22.2	74.4	-2.0	-4.7	6.3	
The United Kingdom	2.0	27.3	70.2	1.2	19.1	78.9	-0.8	-8.2	8.7	
Italy	6.6	33.7	59.8	3.8	28.8	67.5	-2.8	-4.9	7.7	
Japan	5.7	33.6	60.4	3.7	25.3	69.7	-2.0	-8.3	9.3	
The United States	2.9	24.3	72.9	1.6	16.7	81.2	-1.3	-7.6	8.3	
Switzerland	4.4	28.6	67.0	3.3	21.1	70.9	-1.1	-7.5	3.9	
Poland	22.6	32.0	45.3	12.8	30.2	56.9	-9.8	-1.8	11.6	
China	52.2	23.0	24.8	36.7	28.7	34.6	-15.5	5.7	9.8	
Indonesia	44.0	18.4	37.6	38.3	19.3	42.3	-5.7	0.9	4.7	
Republic of Korea	12.4	33.3	54.3	6.6	17.0	76.4	-5.8	-16.3	22.1	
Mexico	23.8	21.5	54.2	13.1	25.5	60.6	-10.7	4.0	6.4	
Malaysia	20.0	32.3	47.7	13.3	27.6	59.2	-6.7	-4.7	11.5	
The Philippines	44.1	15.6	40.3	33.2	15.0	51.8	-10.9	-0.6	11.5	
Thailand	52.0	19.8	28.3	38.2	20.6	41.0	-13.8	0.8	12.7	

 

 Table 2. Employment composition change by sectors in selected economies in the period of 1995–2010

\* Due to estimated data availability, totals may differ from 100 in some cases.

A-agriculture, I-industry, S-services.

Source: own elaboration based on World Bank data, http://data.worldbank.org/indicator (access: 2.11.2015).

Table 3. Relative change of commercial services exports in relation to value of goods expo	rts
for selected economies in the period of 1995–2013	

	Exports	of commercia (US\$ billions	ll services	E	Relative		
Specification	1995	2013	change (1995 = 100)	1995	2013	change (1995 = 100)	change (4 : 7) × 100
1	2	3	4	5	6	7	8
Australia	16.5	53.2	322	53.2	254.5	478	67
Canada	26.1	79.6	304	193.4	466.9	241	126
France	84.0	237.1	282	278.5	575.6	207	137
Germany	82.3	291.3	354	519.9	1,554.6	299	118
Ireland	5.0	125.7	2508	44.4	108.7	245	1024
Israel	8.0	32.5	409	19.5	62.2	319	128
Italy	59.8	111.1	186	233.8	520.0	222	84
Japan	65.3	147.9	227	428.7	686.4	160	142
New Zealand	4.5	13.2	295	13.4	40.0	298	99
Norway	13.7	40.6	297	42.4	153.3	362	82
Spain	40.1	146.2	365	93.4	316.9	339	107
Sweden	15.6	75.4	482	79.2	170.8	216	224
Switzerland	26.4	95.4	361	82.4	260.3	316	114
The United Kingdom	76.4	296.7	388	242.3	476.4	197	197
The United States	219.2	683.5	312	575.2	1,592.3	277	113
Czech Republic	6.7	21.7	323	21.5	135.5	632	51
Poland	10.7	40.1	376	25.0	207.2	827	45
Slovakia	2.4	7.4	313	8.6	85.5	996	31
Hungary	5.2	21.4	411	12.9	103.3	804	51
Argentina	3.8	14.4	377	21.2	83.0	392	96
Brazil	6.1	39.1	638	46.5	242.0	520	123
Chile	3.3	12.8	384	16.0	76.7	479	80
China	19.1	205.9	1,076	128.1	2,222.3	1,735	62
Hong Kong	32.8	133.4	407	173.7	476.2	274	148
India	6.8	151.4	2,235	31.2	312.8	1,001	223
Republic of Korea	23.8	113.0	475	125.0	570.9	457	104
Malaysia	11.6	39.9	344	71.8	215.7	301	114
Mexico	9.8	19.6	200	79.5	381.0	479	42
Peru	1.1	6.1	540	5.5	41.8	761	71
Russia	10.8	65.8	610	82.4	531.0	644	95
Singapore	27.3	122.4	448	132.2	445.2	337	133
South Africa	4.6	14.2	307	29.8	94.9	319	96
Thailand	14.8	59.0	397	55.4	225.4	407	98

Source: own elaboration based on World Trade Organization data, http://stat.wto.org/Home/WSDBHome.aspx? Language=E (access: 3.11.2015).

As in the case of the sectoral structure of GDP, in developing countries the share of services in total employment was lower than in the developed countries. It should be noted, however, that in all the analysed economies employment growth in services was much higher

than in the other sectors. This applies especially to the countries of Southeast Asia, especially South Korea, where the share of the service sector in total employment increased by more than 20 percentage points, reaching a level similar to that recorded in those developed countries with the highest rates of employment in the service sector. In contrast, China, where the share rose by nearly 10 percentage points, as well as in Indonesia, the Philippines and Thailand, are probably still at a stage of deagrarianization, as shown by the relatively high share of agriculture in total employment (exceeding 30%). The decline in employment in agriculture in those countries was accompanied by a proportional increase in the share of the service sector.<sup>3</sup>



Figure 1. Relation between commercial services exports and goods exports value in 1995 and 2013

Source: own elaboration based on World Trade Organization data, http://stat.wto.org/Home/WSDBHome.aspx? Language=E (access: 3.11.2015).

<sup>&</sup>lt;sup>3</sup> The exception is China, where the share of manufacturing increased by almost 6 percentage points, as well as Malaysia, where a similar decline in the share of agriculture and manufacturing coincided with a significant increase in the share of the third sector in total employment.

In addition to the discussed traditional measures of servicization, Table 3 and Figure 1 show changes in the exports of services and goods in selected countries. It was assumed that the relative change in the export of goods may also indicate a progress in servicization. In the group of developed countries, the largest increase in the exports of services in relation to goods was recorded in Ireland (over 10 times), as well as in Sweden, the United Kingdom, Japan and France. In Central and Eastern Europe, the analysed economies in the region experienced at least a twofold drop in the ratio, which could be due, inter alia, to significant inflows of foreign direct investment to the industrial sectors there, significantly increasing the export of processed goods. In the figure below we should have: The United Kingdom, The United States, Republic of Korea, and Czech Republic.

In the group of developing countries, small economies such as Hong Kong and Singapore experienced a faster growth in the export of services than goods. This was probably a consequence of international specialization in the exports of business services, especially financial services and those related to international trade (both those countries achieved significant revenues from the re-export of goods). A higher dynamics in the export of services compared to goods could also be observed in India, a country that for many years has specialized in the export of computer and information services. According to the latest WTO report, India's exports of these services are second only to the European Union, and are ahead of the United States and China (WTO, 2014).

#### 2. Servicization and innovativeness of the economy

The aforementioned analyses confirm that servicization occurs not only in developed countries but also increasingly frequently in developing countries, especially the newly industrialized Asian countries. This is also reflected by productivity figures for individual sectors in 1995–2010 (calculated as the value added in the sector per person employed in that sector), as shown in Table 4 and Figure 2. As could be expected, the developed countries have a considerably greater productivity in all sectors in comparison with the developing countries. The dynamics of these changes present very interesting patterns.

In 1995 in all the developed countries surveyed, productivity in the service sector was much higher than in agriculture, and, outside the United Kingdom and Switzerland, and also higher than in manufacturing, as shown in Figure 2. Fifteen years later the differences in productivity between sectors had decreased significantly and productivity in manufacturing was higher than in services (in particular, this applied to Switzerland and the US, as well as Germany, the UK and Japan).

S	1995				2010		Change (1995 = 100)			
Specification	Α	Ι	S	А	Ι	S	А	Ι	S	
Germany	19.2	52.1	62.4	29.9	68.2	63.9	156	131	102	
France	33.9	55.4	65.1	42.7	61.4	73.6	126	111	113	
Italy	31.7	55.2	72.3	34.0	55.5	71.7	107	101	99	
The United Kingdom	42.7	62.5	55.8	39.4	75.5	69.6	92	121	125	
Switzerland	30.0	90.7	88.4	22.1	125.0	102.9	74	138	116	
Japan	19.1	61.1	67.1	22.0	75.2	70.6	116	123	105	
The United States	34.6	71.3	71.5	56.8	102.0	82.5	164	143	115	
Poland	2.5	12.4	13.3	4.3	20.2	20.8	172	162	157	
China	0.5	2.8	1.8	1.3	7.7	5.9	248	273	326	
Indonesia	0.9	5.6	2.8	1.3	7.8	2.8	148	139	101	
Republic of Korea	11.4	28.2	24.3	15.4	92.7	32.0	135	329	131	
Malaysia	6.7	12.4	11.2	11.6	22.2	11.9	172	179	107	
Mexico	3.5	28.5	17.6	4.7	27.6	17.7	135	97	101	
The Philippines	1.1	5.6	2.9	1.3	7.4	3.6	119	132	126	
Thailand	0.8	8.4	8.3	1.6	11.1	6.9	207	133	83	

Table 4. Productivity changes by sectors in selected economies in the period of 1995–2010 (in US\$ thousands, constant 2005 prices)

A - agriculture, I - industry, S - services.

Marked in grey are sectors of a given economy, in which the highest productivity growth occurred.

Source: own calculation and elaboration based on UNCTAD data, http://unctadstat.unctad.org/wds; and World Bank data, http://data.worldbank.org/indicator (access: 3.11.2015).

In the second group of countries surveyed (also including Poland), differences in productivity between sectors were much smaller. Over the examined 15 years, the manufacturing sector maintained the highest productivity. This was particularly evident in South Korea, which recorded the highest increase in productivity in the manufacturing sector, from about 30,000 dollars to over 90,000 dollars per employee. On the other hand, China, one of the fastest growing economies in the world, was characterized by the lowest productivity in all three sectors. By comparison, in 1995 the productivity of the Polish agricultural sector was 5 times higher, manufacturing – 4 times, and services – more than 7 times higher than in China. 15 years later, the indicators had increased in absolute terms, but they were respectively just 3 times, 2.5 times and 3.5 times higher than in China.

The grey colour in Table 4 highlights sectors that in the analysed period experienced the largest increase in productivity. In the group of developed countries, the biggest increase in productivity occurred in agriculture. As for the other sectors, only in Switzerland and Japan did the biggest increase in productivity occur in manufacturing (by 38 and 23 per cent), with the greatest improvement in productivity in the service sector recorded in the United Kingdom (up 25%). This phenomenon might have had different causes in different countries, but

with a high degree of probability we can assume that two of the factors were scientific and technological progress, and intensified global competition (Fagerberg, Mowery, Nelson, 2005).



Figure 2. Sector productivity in selected economies in 1995 (upper chart) and 2010 (lower chart) Source: own calculation and elaboration based on UNCTAD data, http://unctadstat.unctad.org/wds; and World Bank data, http://data.worldbank.org/indicator (access: 3.11.2015).

It is worth noting that in the period 1995–2010 all sectors of the Polish economy experienced a significant improvement in productivity. The highest rise was recorded in agriculture (an increase of 72%) and the lowest in services (by 57%). Moreover, productivity growth in Poland was the highest among all of the developed countries in our study.

In developing countries, changes in productivity per sector were even higher, but in some of them – similar to Poland – this was due to the low base effect (e.g. China, where a high growth of productivity did not prevent it from being one of the lowest levels in 2010 among the analysed countries). In the countries in this group, the greatest improvement of productivity occurred in agriculture (Thailand) and manufacturing (South Korea). In turn, the largest, a more than 3-fold increase in productivity in the service sector, was recorded in China, although it was still 10 times lower than the lowest productivity levels recorded in the developed countries.

Given the aforementioned data, it can be assumed that a relationship exists between servicization and innovation. To verify this, a synthetic index of servicization (SIS) was calculated for the purposes of this paper. The normalized values for this indicator for 81 countries are presented in Table 5, along with standardized values of the Global Innovation Index (GII) and the Innovation Efficiency Ratio (IER).<sup>4</sup>

	NT 1' 1	Normalized IER 2015	Normalize	d servicizati dices		Difference	
Specification	GII 2015		share in employ- ment (A)	share in GDP (B)	export (C)	SIS	GII and SIS
1	2	3	4	5	6	7	8
Switzerland	1.00	0.99	0.34	0.24	0.06	0.21	0.79
The United Kingdom	0.99	0.84	0.51	0.23	0.12	0.29	0.70
Sweden	0.99	0.84	0.48	0.18	0.09	0.25	0.74
The Netherlands	0.98	0.90	0.35	0.21	0.05	0.20	0.78
The United States	0.97	0.77	0.59	0.35	0.08	0.34	0.63
Finland	0.96	0.75	0.35	0.15	0.07	0.19	0.77
Ireland	0.95	0.86	0.43	0.21	0.21	0.28	0.67
Luxembourg	0.94	0.98	0.59	0.35	0.96	0.63	0.31
Denmark	0.94	0.73	0.49	0.19	0.13	0.27	0.67
Hong Kong	0.93	0.68	1.00	1.00	0.04	0.68	0.25
Germany	0.92	0.85	0.32	0.16	0.04	0.17	0.75
Iceland	0.91	0.96	0.43	0.15	0.16	0.24	0.67
Republic of Korea	0.91	0.78	0.45	0.11	0.04	0.20	0.71
Austria	0.88	0.76	0.32	0.16	0.07	0.19	0.69
Japan	0.87	0.68	0.32	0.25	0.04	0.20	0.67
Norway	0.86	0.71	0.48	0.11	0.06	0.22	0.64
France	0.86	0.73	0.40	0.23	0.09	0.24	0.62
Estonia	0.84	0.84	0.26	0.14	0.08	0.16	0.68
Czech Republic	0.84	0.87	0.20	0.12	0.03	0.11	0.73
Belgium	0.83	0.72	0.42	0.21	0.05	0.23	0.60
Malta	0.82	0.93	0.38	0.24	0.64	0.42	0.40
Spain	0.81	0.70	0.36	0.20	0.08	0.22	0.59
Slovenia	0.81	0.80	0.19	0.13	0.04	0.12	0.69
China	0.80	0.94	0.07	0.08	0.02	0.06	0.74

Table 5. Comparison of GII 2015 and IER 2015 with SIS for selected economies

<sup>&</sup>lt;sup>4</sup> The innovative efficiency ratio corresponds to the relationship between the sub index reflecting the results of innovative activities (Output Sub-Index) and the sub index of investment in innovative activities ("The Global Innovation Index 2015", 2015).

1	2	3	4	5	6	7	8
Portugal	0.79	0.72	0.22	0.20	0.09	0.17	0.62
Italy	0.79	0.72	0.29	0.20	0.04	0.18	0.61
Malaysia	0.78	0.73	0.20	0.09	0.03	0.11	0.67
Latvia	0.77	0.79	0.28	0.17	0.07	0.17	0.60
Cyprus	0.76	0.65	0.43	0.37	1.00	0.60	0.16
Averages for GII 2015* 1 <sup>st</sup> quartile	0.88	0.80	0.38	0.22	0.15	0.25	0.63
Hungary	0.76	0.76	0.25	0.12	0.04	0.14	0.62
Slovakia	0.75	0.74	0.20	0.13	0.02	0.12	0.63
Barbados	0.74	0.79	0.48	0.28	0.64	0.46	0.28
Lithuania	0.74	0.68	0.27	0.14	0.04	0.15	0.59
Bulgaria	0.73	0.81	0.21	0.10	0.06	0.12	0.61
Croatia	0.72	0.74	0.19	0.14	0.21	0.18	0.54
Chile	0.71	0.67	0.27	0.12	0.03	0.14	0.57
Moldova	0.69	0.96	0.12	0.12	0.09	0.11	0.58
Greece	0.69	0.64	0.29	0.26	0.20	0.25	0.44
Poland	0.68	0.64	0.18	0.13	0.04	0.12	0.56
Mauritius	0.66	0.64	0.24	0.17	0.23	0.21	0.45
Costa Rica	0.64	0.77	0.25	0.21	0.12	0.19	0.45
Romania	0.62	0.72	0.10	0.08	0.05	0.08	0.54
Thailand	0.61	0.75	0.10	0.15	0.05	0.10	0.51
Mexico	0.60	0.72	0.21	0.13	0.01	0.12	0.48
Turkey	0.59	0.79	0.14	0.13	0.06	0.11	0.48
Bahrain	0.59	0.62	0.23	0.10	0.03	0.12	0.47
South Africa	0.58	0.64	0.22	0.15	0.03	0.14	0.44
Armenia	0.57	0.77	0.11	0.08	0.15	0.11	0.46
Panama	0.56	0.76	0.24	0.30	0.13	0.23	0.33
Serbia	0.56	0.73	0.15	0.10	0.06	0.10	0.46
Mongolia	0.54	0.60	0.14	0.08	0.03	0.08	0.46
Columbia	0.53	0.59	0.22	0.11	0.02	0.12	0.41
Uruguay	0.52	0.64	0.28	0.14	0.07	0.17	0.35
Oman	0.51	0.66	0.19	0.06	0.01	0.09	0.42
Averages for GII 2015* 2 <sup>nd</sup> quartile	0.64	0.71	0.21	0.14	0.10	0.15	0.49
Peru	0.50	0.59	0.18	0.10	0.03	0.10	0.40
Argentina	0.49	0.73	0.41	0.12	0.04	0.19	0.30
Jordan	0.47	0.70	0.52	0.17	0.15	0.28	0.19
Tunisia	0.46	0.70	0.13	0.13	0.05	0.10	0.36
Bosnia and Herzegovina	0.44	0.38	0.13	0.12	0.06	0.11	0.33
India	0.43	0.77	0.05	0.11	0.09	0.08	0.35
Kazakhstan	0.42	0.51	0.16	0.11	0.01	0.09	0.33
The Philippines	0.41	0.75	0.15	0.13	0.08	0.12	0.29
Sri Lanka	0.40	0.74	0.09	0.13	0.09	0.10	0.30
Albania	0.39	0.48	0.08	0.08	0.21	0.12	0.27
Paraguay	0.38	0.73	0.16	0.08	0.02	0.09	0.29
Dominican Republic	0.37	0.60	0.15	0.16	0.13	0.15	0.22
Cambodia	0.36	0.67	0.06	0.06	0.07	0.06	0.30
Azerbaijan	0.34	0.59	0.13	0.04	0.03	0.07	0.27

1	2	3	4	5	6	7	8
Jamaica	0.32	0.53	0.24	0.18	0.34	0.25	0.07
Indonesia	0.31	0.75	0.10	0.06	0.02	0.06	0.25
El Salvador	0.30	0.60	0.19	0.15	0.07	0.14	0.16
Egypt	0.29	0.66	0.12	0.09	0.13	0.11	0.18
Guatemala	0.29	0.65	0.11	0.14	0.05	0.10	0.19
Averages for GII 2015* 3 <sup>rd</sup> quartile	0.39	0.64	0.17	0.11	0.09	0.12	0.27
Ghana	0.24	0.67	0.10	0.09	0.03	0.08	0.16
Cameroon	0.22	0.82	0.07	0.08	0.08	0.08	0.14
Honduras	0.20	0.56	0.11	0.15	0.06	0.11	0.09
Ecuador	0.16	0.50	0.16	0.09	0.02	0.09	0.07
Bhutan	0.14	0.32	0.07	0.06	0.04	0.06	0.08
Algeria	0.11	0.51	0.17	0.07	0.01	0.08	0.03
Nicaragua	0.08	0.46	0.14	0.09	0.05	0.09	-0.01
Venezuela	0.06	0.66	0.30	0.07	0.00	0.13	-0.07
Averages for GII 2015* 4 <sup>th</sup> quartile	0.15	0.56	0.14	0.09	0.04	0.09	0.06

A – normalized relation between employment in services and total employment in the agriculture and industry sectors of a given country (data for 2010).

B – normalized relation between GDP in services and total GDP in the agriculture and industry sectors of a given country (data for 2013).

C - normalized relation between service export and goods exports of a given country (data for 2013).

Synthetic index of servicization (SIS) - average of A, B, and C.

\* First quartile of GII includes 34 countries, second one -35 countries, third one -35 countries, and fourth one -37 countries. Due to a lack of the data table includes only 81 countries, for which SIS could be calculated.

Source: own calculation and elaboration based on UNCTAD data, http://unctadstat.unctad.org/wds; World Bank data, http://data.worldbank.org/indicator; and World Trade Organization data, http://stat.wto.org/Home/ WSDBHome.aspx?Language=E (access: 5.11.2015).

In the group of countries with a high level of innovation (top quartile of GII), the SIS ranged from 0.06 to 0.68, with an average of 0.25 for this group. However, the differences between GII and SIS were very similar, mostly in the range of 0.59–0.79. The only exceptions were the very small economies specializing in services, such as Luxembourg, Hong Kong, Cyprus and Malta, where the analysed differences were much smaller. The fact that many countries from the top of the innovation ranking had a relatively high SIS (for example the UK, Sweden, the United States, Ireland and Denmark) may indicate that the degree of servicization had an impact on innovation in the economy. On the other hand, high efficiency of innovative activity (IER) accompanied by a lower SIS was typical for economies where the manufacturing sector was still playing an important role as a source of innovation (for example, Germany, the Czech Republic, Slovenia, Italy, and in particular, China).

In the group of countries with a medium-high level of innovation (the second quartile of GII), the average SIS was 0.15, and the difference between GII and SIS was typically in the

range of 0.40–0.63 (except for those countries focused on the development of the service sector i.e. Barbados and Panama). This group also includes Poland, where the low level of innovation is a consequence of the relatively low efficiency of innovative activity, and this in turn results from a relatively low level of servicization and specialization in industrial production, dominated by low and medium levels of technical sophistication.

The aforementioned regularities are also evident in the remaining two groups, i.e. in countries with a medium-low and low innovation level (respectively, the third and fourth quartile of GII). In the former, the average value of servicization was 0.12, while in the latter – just 0.09. Although innovation in those countries was low, it can be observed that the higher rankings in innovation are usually accompanied by a higher value of the servicization index (as in the previous groups, apart from countries with a distinctly narrow international specialization).

#### Conclusions

Based on the conducted research, it can be stated that the process of servicization occurs in both developed post-industrial economies and increasingly often in developing countries. The pace varies, but the growing importance of services in the economies of developing countries (especially in Asia) can be seen in characteristic changes in the structure of GDP, employment and international trade.

The analysis of the relationship between the general level of innovation in the economy and the degree of its servicization, showed that in many countries, especially developed ones, higher innovation is often associated with a stronger role of the service sector in the economy. This may indicate that a substantial contribution to innovation is made not only by manufacturing but also by modern services such as telecommunications, information technology and financial services. The obtained results confirm the argument that the dynamics of structural change taking place in "deagrarianization-deindustrialization-servicization" is substantially influenced by technological progress. Its impact is reflected not only in countries with a large share of manufacturing in GDP or employment (such as Germany, South Korea and China), but also in countries that are at a higher stage of servicization.

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