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## Employment growth and innovation in the economy Poland

### *Abstract*

**RESEARCH OBJECTIVE:** The paper aims to investigate whether product and technological innovations in the manufacturing sector determined its share in total employment in 1995–2018 and, at the same time, how they shaped the processes of change in the real structure of the Polish economy.

**THE RESEARCH PROBLEM AND METHODS:** It was hypothesised that the low level of innovation in the manufacturing sector is a key determinant of the decline in its share in total employment, and the dichotomy of the deindustrialisation process in the Polish economy over the period 1995–2018.

**THE PROCESS OF ARGUMENTATION:** In order to realise the objective, and to verify the hypothesis posed, a statistical analysis of the process of changes in the structure of the Polish economy for the years 1995–2018 in the production category as well as in the employment category was carried out.

**RESEARCH RESULTS:** The analysis of changes in the structure of Poland's economy showed that the strongest growth in the total economy was in the production demand of the industrial sector. The increase in GDP per capita was most determined by the volume of manufacturing production (industrialisation process). In contrast, there was a large decline in employment in industry (deindustrialisation process) and no increase in employment in the total economy.

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### CONCLUSIONS, INNOVATIONS, AND RECOMMENDATIONS:

Research on processes of change in the structure of the economy has shown the existence of the phenomenon of the dualism of the deindustrialisation process, the cause of which is the lack of innovation in the manufacturing sector. This results in jobless economic growth creating a very high level of unemployment, as well as an excess of labour force in agriculture. Hence the need for research into the impact and level of innovation in the structure of the industrial sector itself on its competitiveness. Then, on the basis of these, an appropriate state economic policy aimed at reindustrialisation based on product and technological innovation.

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### KEYWORDS:

changes in the structure of the economy, deindustrialisation, duality of deindustrialisation processes, jobless economic growth, reindustrialisation

## INTRODUCTION

In the last two decades or more of research on the evolution of economies (structural changes in the economic system), three important phenomena have been identified. The first is premature deindustrialisation, followed by jobless industrial growth in the formal sector as well as faster growth in services than industry (Dasgupta, & Singh, 2006, pp. 1–2). Above all, it is perceived in these economies, especially in the industrial sector, that there is little or even no innovation. In addition, it has been observed that there is a production of ‘crisps’ instead of ‘micro chips’ in most of them (Dosi et al., 2020, pp. 16–23). Current literature indicates that the turning point for the share of industrial production and employment in total output and total employment is at a much lower level of *per capita* income than has previously been the case in the economies of today’s highly developed countries (Rowthorn, & Coutts, 2004, pp. 767–790; Palma, 2005, pp. 660–688; Pieper, 2003, pp. 831–850). As well as the fact that structural change processes occur with different patterns of deindustrialisation. Examples include China and South Korea, where there was no dual course of structural change processes in the economic system (Dosi et al., 2020, pp. 16–23). It should be emphasised that it is possible, in view of the stylised facts occurring in economies today,

for an economy to undergo deindustrialisation in the category of employment and yet not to undergo deindustrialisation in the category of demand structure. Such a dual course of deindustrialisation usually occurs with the phenomenon of jobless economic growth, which is very common in economies. Deindustrialisation in the employment category should be a cause for concern if its symptoms appear in many economies with low *per capita* income levels. The occurrence of premature deindustrialisation in the employment category would indicate that a large part of hidden unemployment in agriculture would either remain trapped in this sector or be shifted to low productive industries in the informal sector and informal services (Dasgupta, & Singh, 2006, pp. 5–6). This phenomenon occurring in the economy as indicated by the various patterns of deindustrialisation is primarily due to the industrial sector being characterised by a lack of innovation (Dosi et al., 2020, pp. 23–27).

Hence, the aim of this article is to investigate whether product and technological innovations in the manufacturing sector determined its share in total employment in 1995–2018 and, at the same time, how they shaped the processes of change in the real structure of Poland's economy subjected to trade liberalisation during the analysed period.

It is hypothesised that the low level of innovation in the manufacturing sector is a key determinant of the decline in its share in total employment, and of the dichotomy of the deindustrialisation process in the Polish economy over the period 1995–2018.

## METHODOLOGY

According to Rowthorn and Wells' (1997) basic model of deindustrialisation, confirmed by Rowthorn and Ramaswamy's (1997) extensive research and empirical testing, deindustrialisation in the employment category follows deindustrialisation in the demand structure category. The two causal forces (different rates of growth in labour productivity and changes in demand structure) driving structural change are the foundation of the modern as well as the classical three-sector theory of Clark (1957, p. 492), Fischer (1945, p. 56; 1933) and Fourastié (1972, p. 192), and at the same time constitute the basic criterion for the division of the economy into sectors and sections (its

components) used by the OCDE organisation. In the late 1980s and early 1990s, as a result of technological and technical developments, innovations in services emerged: new methods of producing and delivering services (information-communication technologies, ICT), which resulted in large differences in labour productivity growth rates in the service sector. These changes, according to the theory of Baumol, Blackman and Wolff (1989), distinguished progressive, stagnant and asymptotically stagnant activities in the sector. In recent years, on the other hand, the 4.0 revolution has triggered an avalanche of both product and production innovations carving out entire innovative sections and divisions of the industry sector that were previously unknown (Ślusarczyk, 2018).

The structure of demand volume was calculated on the basis of real volumes, i.e. at constant prices. Relative price changes between the production of sectors and sections of the economy mean that changes in the share of individual sectors in demand or total production in current prices differ substantially from changes in real (physical) quantities. In contrast, absolute price changes cause real changes in the volume of demand or production expressed in nominal terms (in current prices). Employment is calculated by the size (number) of persons employed according to sections and divisions of the classification of activities – PKD (Polish Classification of Activities) (as at 31 December each year) on the basis of data from the Statistics Poland, Eurostat.

The source of statistical verification is statistical data provided by the Statistics Poland and the WTO, as well as the OECD and EURO-STAT harmonised into time series after adjusting for changes in the number of employees as a result of the 1995, 1996, 2002 agricultural censuses, and after taking into account changes in the classification of activities (PKD) from 1997, 2000, 2004 and 2007.

Statistical verification of the model of structural changes for Poland in the analysed period was performed for the constructed layout of the economy's structure on the basis of the research methodology analysed in the literature presented above. After unifying and ranking a comparable set of data for the years 1995–2018, a division of the economy into sectors and sections was adopted in this research on the basis of the PKD 2007 classification code, and the adopted criterion for separating elements of the structure, which will allow

statistical verification of the deindustrialisation pattern taking place. Thus, in order to analyse changes in the economic structure and its determinants, the following constellation of the structure of the Polish economy was singled out.

Layout of the structure of the economy:

- A – Agriculture, forestry, hunting and fishing.
- B – Mining and quarrying.
- C – Manufacturing.
- D – Electricity, gas, steam, hot water and air conditioning supply. – Water supply; sewerage and waste management and remediation activities.
- E – Construction.
- F – Wholesale and retail trade; repair of motor vehicles, including motorbikes.
- G – Transport and storage. – Information and communication.
- H – Accommodation and food service activities.
- I – Financial and insurance activities.
- J – Real estate activities. – Professional, scientific and technical activities. – Administrative and support service activities.
- K – Public administration and defence; compulsory social security. – Education. – Health care and social work activities – Arts, entertainment and recreation. – Other service activities.

The research methodology used in this study consists of two successive stages.

Statistical analysis of changes in the structure of demand, and the structure of employment for the developed constellation of the structure of the economy will serve to verify the course of the processes taking place in changes to the structure of the Polish economy.

Next, a multivariate econometric analysis will be carried out with the aim of explaining whether product and technological innovations in the manufacturing sector determined its share in total employment (in 1995–2018) and, at the same time, the processes of change in the real structure of the Polish economy subjected to trade liberalisation in the analysed period. It will also serve to verify the hypothesis that the low level of innovation in the manufacturing sector is a key determinant of the decline in its share in total employment, and the dichotomy of the deindustrialisation process in the Polish economy in the period 1995–2018.

For its implementation, by means of regression analysis of models of changes in the share of manufacturing (C) in total employment, its main factors were identified (such as GDP per capita, imports of goods and services, value added index, domestic demand index, exports of goods and services), and the degree of their impact. Using regression analysis of the constructed models, the cause of the phenomenon of dichotomy of deindustrialisation processes in changes in the structure of the Polish economy in the studied period was verified. For the regression analysis a power model was used, also called double logarithmic, whereby the parameters ( $X_1 - X_n$ ) of the explanatory variables / determinants (identified factors) are the elasticity (Y) of changes in the share of manufacturing in total employment (C).

## RESULTS

The analysis of the course of processes occurring in changes in the structure of the Polish economy in 1995–2018 begins with an examination of changes in the structure of the volume of demand for selected sectors and sections of the economy.

Table 1 shows the structure of demand volumes for sectors and sections of the Polish economy in the period 1995–2018.

Table 1. Structure of demand volume in 1995 constant prices of the Polish economy (in the period 1995–2018).

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	8,84	3,06	32,37	3,93	7,57	15,42	6,12	0,91	1,81	7,85	12,12
1996	100,00	8,32	2,91	32,88	3,65	7,56	15,78	6,07	1,02	2,42	7,44	11,96
1997	100,00	7,53	2,69	34,14	3,45	7,64	15,75	6,06	1,03	3,06	7,55	10,99
1998	100,00	7,45	2,19	33,97	3,23	8,16	15,57	6,22	1,06	3,05	7,72	10,85
1999	100,00	6,88	2,02	33,10	3,21	8,12	16,31	6,47	1,17	4,29	7,56	10,29
2000	100,00	6,07	1,88	34,01	3,26	7,95	16,26	6,35	1,19	4,45	7,65	9,96
2001	100,00	6,31	1,79	32,91	3,60	7,82	16,34	6,61	1,14	3,97	8,13	10,02
2002	100,00	6,14	1,72	32,83	3,59	7,18	16,89	7,05	1,07	3,75	8,17	10,16
2003	100,00	5,89	1,60	34,69	3,49	6,62	15,70	7,16	1,02	3,89	8,45	10,23
2004	100,00	5,81	1,50	37,10	3,23	6,47	15,29	7,25	1,01	3,92	8,07	9,72
2005	100,00	5,52	1,43	37,06	3,26	7,02	14,99	7,28	1,03	4,01	8,07	9,66

## Employment growth and innovation in the economy Poland

2006	100,00	5,09	1,30	38,33	3,03	7,41	14,22	7,60	0,98	4,21	8,11	9,31
2007	100,00	4,72	1,20	39,20	2,87	7,82	13,99	7,49	0,97	4,60	8,02	9,02
2008	100,00	4,53	1,20	38,98	2,82	8,42	13,74	7,35	0,99	4,89	7,89	9,07
2009	100,00	4,79	1,11	36,45	3,25	9,05	14,33	9,17	1,02	4,23	7,47	8,54
2010	100,00	3,86	1,01	37,44	3,13	9,97	13,80	9,08	1,04	4,12	7,40	8,60
2011	100,00	3,84	1,01	38,98	3,07	10,31	12,78	9,20	1,08	4,12	7,41	8,11
2012	100,00	3,75	1,03	39,00	3,05	9,76	12,92	9,72	1,10	3,92	7,37	8,23
2013	100,00	3,82	0,98	39,63	3,09	9,44	12,79	9,76	1,15	4,16	7,16	8,14
2014	100,00	3,94	0,94	39,82	2,82	9,54	12,23	9,97	1,09	4,39	7,35	8,22
2015	100,00	3,70	0,93	41,75	2,99	9,92	12,77	10,38	1,08	4,64	7,78	8,30
2016	100,00	3,64	0,87	41,69	2,96	9,73	12,96	10,62	1,08	4,71	7,85	8,19
2017	100,00	3,58	0,80	42,55	2,71	9,45	12,90	10,93	1,01	4,45	7,98	7,99
2018	100,00	3,24	0,76	42,05	2,76	9,65	12,89	11,35	1,17	4,61	8,06	7,92

Source: own calculations based on CSO; Eurostat.

The findings presented in Table 1 can be boiled down to the following.

- The largest increase in the share of volume (as well as the largest absolute increase in volume) in total demand and, at the same time, in the volume of total output during the period under review was recorded in manufacturing (C). Then, for the sections of the market services sector, the analysis showed a very clear increase in the share of volume in total demand, and thus sizeable increases in the volume of total output were recorded in the sections of: Financial and insurance activities (I), transport and storage, and information and communication (G), accommodation and food service activities (H), construction (E), real estate activities, professional, scientific and technical activities, administrative and support service activities (J). In contrast, a decrease in the share in the volume of total demand, and therefore in the volume of total output for market services, the research carried out showed only in the section wholesale and retail trade, repair of motor vehicles (F);
- On the other hand, the share of non-market services (K) in the volume of total demand and, at the same time, in total output, was declining, which ultimately indicates that their production was not a constant part of total demand in the Polish economy

as well as of total output. However, we must bear in mind that in most cases the volume of demand and thus the output of non-market services is determined by policy decisions taken by state and local government units;

- The share of agriculture (A), as well as the mining industry (B) and, to a lesser extent, the energy, gas, steam and water supply industry (D) in total demand and total output fell almost equally. Except that, the largest decrease in share was recorded in agriculture (A).

Conclusions from the results of the analysis (Table 1) allow us to conclude that changes in the share of individual sectors and sections of the economy in the total demand volume, and at the same time in the total volume of output, unambiguously speak for the occurrence in the Polish economy of features characteristic for industrialisation processes. Hence, we may conclude that in the Polish economy in the analysed period we are dealing in terms of demand structure (its changes) with a process of industrialisation. Assuming that, the structure of the volume of output is directly shaped/determined by the structure of the volume of demand, we may assume that the increase in total output in the period concerned was caused mainly by the increase in the volume of output of manufacturing, which correlated positively with the increase in market services. The increase in output of non-market services was much smaller than the increase in total output. In contrast, the real output volume of agriculture and the mining industry remained almost unchanged throughout the period under study. It is most significant that studies of the change in the share of total demand volume of sectors and sections of the economy further confirm the fact, that the growth of total output volume depends primarily on the growth of output volume in manufacturing (Lipowski, 2000, pp. 239–274; Rodrik, 2016, pp. 27–30; Dosi, 2020, pp. 23–27). The growth in manufacturing output with demand growing so strongly should be much higher. However, the lack of product and technological innovations resulted in low market competitiveness of the production of the industrial sector in Poland in relation to foreign production. Hence, domestic production had to surrender to foreign production a large share of the most strongly growing demand for industry sector output in the whole Polish economy (Lipowski, 2000).



We then move on to analyse the structural changes in the economic system in terms of the employment structure.

Table 2. Employment structure of the Polish economy in 1995–2018 (total economy = 100).

Years	Total	A	B	C	D	E	F	G	H	I	J	K
1995	100,00	15,61	2,67	23,21	2,01	6,19	14,24	6,27	1,39	2,01	4,15	22,24
1996	100,00	16,84	2,54	23,63	1,94	6,50	14,22	6,23	1,41	2,14	4,45	20,12
1997	100,00	16,33	2,36	22,99	1,87	6,86	14,91	6,26	1,46	2,21	4,98	19,78
1998	100,00	16,20	2,15	22,46	1,83	6,80	15,26	6,22	1,61	2,37	5,45	19,64
1999	100,00	16,31	1,89	21,54	1,82	6,74	15,43	6,18	1,59	2,86	5,72	19,92
2000	100,00	16,42	1,67	20,01	1,77	6,09	15,52	5,83	1,69	2,23	6,15	22,62
2001	100,00	16,90	1,68	19,43	1,91	5,72	15,29	5,55	1,69	2,23	6,54	23,06
2002	100,00	16,93	1,63	19,06	1,86	5,29	15,61	5,66	1,65	2,27	7,01	23,05
2003	100,00	16,97	1,58	19,30	1,84	4,88	15,85	5,58	1,69	2,06	7,33	22,91
2004	100,00	16,86	1,49	19,77	1,77	4,63	15,59	5,54	1,70	2,16	7,39	23,08
2005	100,00	16,63	1,44	19,46	1,69	4,83	15,97	5,43	1,70	2,29	7,37	23,18
2006	100,00	16,23	1,37	19,71	1,64	5,23	15,76	5,59	1,73	2,33	7,60	22,83
2007	100,00	15,61	1,31	19,95	1,56	5,67	15,93	5,61	1,74	2,38	7,93	22,31
2008	100,00	15,26	1,32	19,27	1,52	5,98	16,16	5,76	1,97	2,47	8,07	22,22
2009	100,00	15,42	1,33	17,56	2,09	6,40	15,81	6,77	1,83	2,42	7,61	22,74
2010	100,00	16,84	1,23	17,27	2,13	6,13	15,52	6,66	1,68	2,40	7,72	22,43
2011	100,00	16,70	1,23	17,17	2,08	6,39	15,17	6,87	1,67	2,43	7,94	22,35
2012	100,00	16,78	1,23	16,98	2,02	6,12	14,98	6,98	1,74	2,47	8,13	22,58
2013	100,00	16,70	1,18	17,00	1,98	5,69	14,90	7,03	1,72	2,47	8,39	22,94
2014	100,00	16,38	1,10	17,26	1,91	5,63	14,95	7,11	1,71	2,45	8,64	22,86
2015	100,00	16,08	1,00	17,41	1,85	5,66	14,98	7,32	1,70	2,36	8,91	22,72
2016	100,00	15,60	0,91	17,53	1,80	5,75	14,98	7,59	1,77	2,31	9,28	22,49
2017	100,00	15,19	0,88	17,65	1,76	5,82	14,94	7,90	1,85	2,25	9,51	22,25
2018	100,00	14,94	0,87	17,63	1,78	6,06	14,80	8,04	1,86	2,22	9,45	22,36

Source: own calculations based on CSO; Eurostat.

The results of the research contained in Table 2 indicated that throughout the analysed period decreases in the share of employment in the total economy (total = 100%) occurred in the mining sector qualified in the literature as traditional industries for most of its sections (B – from 2.67% to 0.87% i.e. 1.8%), and in the manufacturing

sector (C – from 23.21% to 17.63%). The decrease in the share of the manufacturing industry sector (C – by 5.58%) in total employment clearly indicates that deindustrialisation processes are taking place in the structure of the economy in the employment category. A small decrease in the share in total employment also occurred in the industrial sector for the section of manufacturing and supply of electricity, gas and water and steam (D – from 2.01% to 1.78%) This may indicate a small increase in industrial production on the one hand, and an increase in productivity in this section as well as a decrease in energy intensity in the total economy on the other. On the other hand, the share of non-market services (K – around 22%) in total employment remained stable throughout the period under review. An increase in the share of total employment was found for the market services sector. However, only the following sections showed a significant increase: real estate activities, professional, scientific and technical activities, administrative and support services (J – from 4.15% to 9.45% or 5.3%) and transport, storage and information and communication (G – from 6.27% to 8.04% or 1.77%). The share of agriculture in total employment (A – about 16%) was consistently very high, which may indicate over-employment in this sector. The presented results of the analysis of changes in the share of total employment in sectors and sections of the economy indicate a clear deindustrialisation process in the employment category.

### Conclusions from the results of the statistical analysis of changes in the demand structure, and the employment structure

The analysis carried out so far unambiguously indicates that in the analysed period (1995–2018) in the Polish economy we are dealing with the phenomenon of dualism of deindustrialisation processes. Since relating its results to the basic model of deindustrialisation adopted in the literature on the basis of Rowthorn and Ramaswamy's (1997) research, changes in the employment structure in Poland in the analysed period were clearly characterised by deindustrialisation processes, while changes in the demand structure were still strongly influenced by the process of industrialisation. The result is a decline in

employment in manufacturing, which results in excessive employment in agriculture, as the service sector is unable to absorb more labour. The industrial sector then fails to fulfil its most important role in changing the structure of the economy, which, according to the basic model, is the transfer of labour from the agricultural sector to the service sector. The consequence of this will be a very high unemployment rate and economic emigration. The different patterns of deindustrialisation taking place today are also indicated by recent research by Dosi et al (2020, pp. 23–27). Hence, the discussion of the conclusions of the analysis made above authorises and points to a further direction of research, namely the analysis of the key determinants (main factors) of the occurrence of this phenomenon. For this purpose, a multivariate econometric analysis will be carried out. It uses regression analysis of models of changes in the share of manufacturing (C) in total employment, for selected and methodically developed key meso-economic and macro-economic factors that may play the role of main determinants.

## RESULTS

The parameters (explanatory variables) in the presented (Table 3) model were selected substantively on the basis of basic deindustrialisation models, and empirically on the basis of: once presented statistical research, and two conducted analyses of regression models of changes in the share of manufacturing in total employment for the combination / selection of many other parameters (factors) indicated as significant in the literature. For the purpose of this study, only one model was selected and presented, whose both the number of parameters and their statistical significance were the highest. This model describes/explains 94% of the changes in the employment share of manufacturing (C). The coefficient of determination  $R^2 = 0.94$ . All explanatory variables are strongly statistically significant and its value is generally greater than the critical value. The regression analysis of the presented model showed that a 1% increase in GDP per capita (parameter X 1) most determined the increase in the share of manufacturing (C) in total employment, causing it to increase by 4.33 percentage points, which indicates that the demand/for demand for manufacturing production in this economy is still far from saturation, which clearly speaks for

the industrialisation phase of the process in changes in the demand/for demand structure. However, despite the steadily growing GDP per capita as presented above / shown by the statistical analysis of changes in the employment structure, there was a decrease in the share of manufacturing in total employment in the economy, which indicates, in view of the presented results of studies on changes in the structure of the economy in the employment category, that deindustrialisation processes are taking place. This confirms that we are dealing with a dual process of structural change (evolution of the economy), i.e. a dichotomy of the deindustrialisation process.

Table 3. Regression analysis of the model changes in the share of total manufacturing employment (C).  
 Estimation method: CMSS  
 Observations used 1995–2018  
 Dependent variable: Y (ln) share of total manufacturing employment (C)

REGRESSION STATISTICS								
Multiple R	0,974377							
R square	0,949411							
Matched R square	0,935359							
Standard error	0,027014							
Observations	24							
VARIANCE ANALYSIS								
	df	SS	MS	F	Significance F			
Regression	5	0,246524	0,049305	67,56227	4,99E-11			
Residual	18	0,013136	0,00073					
Time	23	0,259659						
	Factors	Standard error	t Stat	Value-p	Lower 95%	Top 95%	Lower 95.0%	Top 95.0%
Intersection	-16,3142	5,562733	-2,93277	0,008892	-28,0011	-4,62733	-28,0011	-4,62733
Variable X 1	4,332434	1,324236	3,271649	0,004238	1,550318	7,114549	1,550318	7,114549
Variable X 2	0,913685	0,26477	3,450867	0,002851	0,357425	1,469946	0,357425	1,469946
Variable X 3	-2,33338	0,861785	-2,70761	0,014417	-4,14392	-0,52283	-4,14392	-0,52283
Variable X 4	-2,50095	0,775164	-3,22635	0,004683	-4,12951	-0,87239	-4,12951	-0,87239
Variable X 5	-0,70429	0,254263	-2,76992	0,012624	-1,23848	-0,1701	-1,23848	-0,1701
Critical value t	2,100922			Significance level	5%			

Source: own calculations based on Statistics Poland; Eurostat; WTO; OECD.

Parameters of the model of changes in the share of industry in total employment (C).

Variable X 1 – GDP per capita (current prices).

Variable X 2 – Imports of goods and services (current prices).

Variable X 3 – Value-added index (current prices).

Variable X 4 – Domestic demand index (current prices).

Variable X 5 – Exports of goods and services (current prices).

All parameters are statistically significant making their interpretations valid.

Explained variable – Share of total employment in manufacturing industry (C)

### Conclusions from multivariate econometric analysis

The lack of product as well as production innovations in manufacturing (as indicated by Statistics Poland, WTO as well as OECD statistics in Poland in 1995–2018) caused domestic production in an economy subjected to trade liberalisation to lose out to foreign production. A 1% increase in domestic demand (parameter X 4) caused the share of manufacturing (C) in total employment to fall by 2.5 percentage points, determining it most strongly just after GDP per capita. Increasing domestic demand was met by product and technological innovation in foreign production. Subsequently, the lack of product, technical and technological innovations in industry led to an increase in the volume of value added in current prices (the price index of industrial value added in the Polish economy grew relatively faster than the price index of value added in economies with which trade liberalisation took place – own calculations based on Statistics Poland; Eurostat; WTO; OECD), hence domestic industrial production was not price competitive. This correlates with the conclusions of the research obtained by Lipowski (2000, pp. 238–274) for changes in the structure of the Polish economy, as well as the conclusions of the analysis of the causes of different deindustrialisation patterns occurring in economies conducted by Dosi et al. (2020, pp. 16–23), and a summary of recent research by Rodrik (2016, pp. 27–30). Following this, as shown by the regression analysis of the model, a 1 per cent increase in the price index of value added at current prices (parameter X 3) resulted in a 2.33 percentage point decrease in the share of manufacturing (C) in total employment. In contrast, a 1% increase in imports of goods and services (parameter X 2) only translated (relatively least to all other model parameters) into an increase in the share of total manufacturing employment (C) by only 0.91 percentage

points. This is due to the fact that most of the domestic production was reduced to the assembly of the final product (which also contributed to the very low added value of Polish imports) from foreign-made finished components (with high added value), which is a direct result of the lack of technological and technical innovation in domestic industrial production processes. It should additionally be noted that in the total output of the manufacturing sector, the share of the production of the machinery and equipment division is marginal (as indicated by the Statistics Poland for 1995–2018), as it has been displaced by foreign competition due to the lack of product innovation, similarly to the division of the production of motor vehicles, trailers and semi-trailers. As a result of the very low level of innovation or even lack thereof in the industrial sector (C) resulting in very low price and quality competitiveness of its production (in the face of trade liberalisation), even with steadily increasing domestic demand, increases in exports of goods and services at current prices of 1% resulted in a 0.70 percentage point decline in the sector's share of total employment.

## CONCLUSIONS

Despite the fact that in the Polish economy increasing demand (the largest increase in the share of volume in total demand was recorded by the processing industry from 32.37% in 1995 to 42.05% in 2018, i.e. by 9.68%) and, above all, GDP per capita most determined the share in total employment of the processing industry and, consequently, its production causing the largest increase in its share in total production in the entire period under review 1995–2018, the very low level of innovation in the processing industry sector resulted in: low-processed or only assembled from finished products with low added value, the domestic production of the processing industry was additionally energy- as well as labour-intensive and, therefore, not price-competitive, was losing out in international trade. Therefore, as shown by the regression analysis of the model of changes in the share of total employment in manufacturing, an increase in domestic demand translated into a decrease in the share of the sector in total employment. In addition, the lack of innovation in the manufacturing

sector resulted in such a relatively low increase in total value added in relation to foreign production that an increase in its index in current prices, as shown by the regression analysis of the model, translated into a decrease in its share in total employment.

With too low a level of GDP per capita, especially when its main growth engine is still industry, and the demand for its goods is still growing strongest, so that the dynamics (growth rate) of its demand is greater than the dynamics of demand in the total economy (the growth of industrial production had the largest share in the growth of GDP per capita, being its most important determinant) the labour force pushed out of it was not able to be absorbed by services, which forced unemployment in the Polish economy in 1995–2015 at an average level of 15% (Statistics Poland and Eurostat data), hidden unemployment (trapped labour force) in agriculture at an average level of 10% (own calculations based on Statistics Poland and Eurostat data) as well as in low-productivity industrial activities in the informal sector, and informal services (employment in the shadow economy in the period under study was beyond calculation possibilities, due to its hidden nature it could only be estimated to a very high degree of approximation, which is already beyond the scope of this paper). Such a high level of both registered and hidden unemployment is due to jobless economic growth, which is a consequence of the decline in the share of total employment in the industrial sector in the pre-early stage of economic development, the main determinant of which, as shown by the research carried out, is the low level of innovation in industry. Hence, the conclusions of the analysis carried out indicate the need for detailed research into the impact and level of innovation in the structure of the industry sector itself on its competitiveness. They make it possible to identify the sections and divisions of industry in which innovation is indispensable or through which it most strongly influences the level of competitiveness of the entire industrial sector. Then, an appropriate economic policy based on them is needed, aimed at reindustrialisation of Polish industry, based on product and technological innovations. Because for the introduction of innovations, and their appropriately high level, and above all product and technological innovations in industry, the role of the state is crucial (Mazzucato, 2016). Innovative product and technological production of the industrial sector with high added

value will become very competitive on the domestic market (where the demand for it is not yet saturated, and its share in total demand is growing most strongly), as well as on foreign markets. The emergence of reindustrialisation processes in the changes to the structure of the Polish economy will eliminate the dualism of the deindustrialisation process. This will result in a combined increase in employment in industry, which – due to the fact that productivity in this sector is the highest and its production most strongly determined the size of GDP in the analysed period – will cause a very significant increase in the level of GDP per capita. With a sufficiently high GDP per capita, the demand for services and therefore for labour in this sector will start to increase strongly (Kuznetz, 1959; Dosi et al., 2020). This will enable / allow the entire service sector to absorb a very high labour force. Sustainable economic growth at full employment will be achieved.

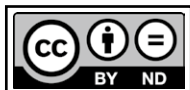
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