PRACE GEOGRAFICZNE, zeszyt 114

Instytut Geografii i Gospodarki Przestrzennej UJ
Kraków 2004

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THE RELATIONSHIP BETWEEN LABOUR PRODUCTIVITY IN MANUFACTURING AND ENERGY SECTORS AND THE GDP PER CAPITA IN INTERNATIONAL BENCHMARKING

Abstract: Starting with the assumption, that rising per capita income, the *sine qua non* condition of economic development, comes primarily from industry, the paper deals with benchmarking countries on labour productivity measured in domains of industrial activity offering the best available comparability of physical output i.e. electricity. Productivity then is related to standard of living measured by the GDP per capita. The study focuses on the relation observed among the Central and Eastern European countries during their transformation towards market economy

Key words: Productivity, labour productivity, benchmarking, statistical databases, availability of data, standard of living, transformation.

"Industrial performance is the outcome of many social, political and economic factors interacting in complex and dynamic ways. These interactions are often specific to each country, reflecting its history, culture, legal system, legal and institutional framework, social capital, political and social conditions and ways of doing business. Industrial performance also reflects macroeconomic policies as well as policies relating to technology and education. These factors need not be only national: the outside world can strongly affect industrial activity and performance. With globalization, the role of external factors and rules is growing rapidly. It is not possible to benchmark countries on all these factors.

The purpose here is more modest: to benchmark countries on their key structural variables – referred to here as drivers – using available data" (*Industrial Development Report 2002/2003*).

"It is true that the industrial nations with highest income per capita are those which have Western-style political democracy and basically free markets for labor, food and commodities. But it is also clear that rising per capita income, the *sine qua non* of economic development, comes primarily from industry, *however organized*." (Hughes 1968).

"Industry has long been the main source, user and diffuser of technical progress and associated skills and attitudes. No other productive activity comes close. Industry's special role can be understood only in a world of dynamic learning and technical change, where large enterprises strive to increase their size and capabilities to realize economies of scale and societies constantly transform their structures and habits. In this world the manufacturing industry is not just an ingredient of development – it is the essential ingredient." (*Industrial Development Report 2002/2003*)

This relates in particular to the transforming economies, as it is mostly these countries in which the role of industry for the growth of life standard continues to be of particular importance, and to a much higher extent than in developed economies. This is because these economies are encumbered with a high (even dominant) past role of industry. Furthermore, this industry was organised for the purposes other than market ones, while efficiency was not among the key principles of centrally planed economy. It is therefore interesting to study how the productivity of labour in countries undergoing transformation towards market economy changes in comparison to other countries, including developed ones.

"Benchmarks are needed because it is difficult to assess national industrial performance on the basis of a priori norms. For many facets of performance there are no norms in economic theory. Are manufacturing production, exports and employment growing fast enough, given a country's resources, industrial structure and level of technology? Are domestic enterprises sufficiently innovative, or workers sufficiently skilled? Is the industrial infrastructure coping adequately with the needs of the new economy? Is the economy participating fully in international knowledge flows? These and many similar questions cannot be addressed using only theoretical parameters" (*Industrial Development Report 2002/2003*).

In the Central and Eastern European countries, which have been experiencing transition towards market economy, these interactions are particularly important and worth studying by multidirectional benchmarking.

In our case, the issue in question is the relationship between labour productivity and the value of GDP per capita, understood as an indicator of living standards and as an expected effect of the economic transformation. In market economies, labour productivity is usually considered in money value terms, i.e. by referring the output value (or even better, the added value) to the number of employees in the relevant sectors of manufacturing.

"When the data are severely limited (which is often the case), output can be compared simply with the average number of persons engaged in production. The productivity ratio would then be simply "output per man". Change in output per man combines the effect of change in (1) efficiency and (2) total resources per manhour, and (3) average hours worked per man" (Fabricant 1968).

In benchmarking labour productivity in economic systems with different organization patterns (where money value comparisons may fail), it is sometimes useful to refer the output expressed in physical units to the number of employees engaged in the relevant sector of manufacturing. The problem that arises is that of comparability of the final product manufactured in various places of the World.

The most uniform product of industrial activity is electricity. In the ratio specifying physical productivity of labour in the energy sector of various countries, the volume of electricity generated is the numerator, whereas the denominator is the number of employees in this sector of economy. The second element of the studied relation is the GDP per capita in the countries in question. Putting aside the issue of GDP measurements and comparability, the relevant GDP values quoted by yearbooks and databases will be treated simply as a desired effect of the economic growth.

The availability of data on electricity output poses no major problems, but a more thorough analysis is required on what we put in the denominator of the labour productivity expression. The rule for constructing this ratio implies that the denominator should be the number of employees engaged in generation of electricity. Here is where we face the obstacle of the available data structure. The best that the international industry statistics can offer is the data on employment in the ISIC 4101 sector (electricity), which are aggregate data comprising production, transmission, and distribution of electricity (*Energy Statistics Yearbook 1999*, 2002).

Hence, data comparability depends on the relationships between the employment share attributable to these areas of activity. These relations, in turn, depend on the method of electricity generation, as well as the organisational and ownership structures of the production sector. For example, in Poland, electricity generation accounts for ca. 45% of employment, with 55% of the employees being engaged in transmission, distribution and trade, whereas in Spain, the relevant proportion is 30% to 70%.

The organisational structure and ownership structure clearly influence the level of employment in electricity sector. In countries where electricity engineering has been dominated by one vertically integrated state-owned corporation, the actions aiming at an employment reduction face resistance from both the management and strong trade unions with demand-type attitude, as is the case in France, Italy, or Portugal.

In the cases of private or municipal ownership, the level of employment depends on the size structure of production enterprises and the number and organisation of distribution companies. In Germany, for instance, consolidation of electricity producers (with number of companies dropping from eight to four) resulted in a reduction of employment in the sector, while the distribution segment remained fragmented, with diverse ownership structure maintained (Werner 1997).

The level of employment in the sector of electricity generation is strongly influenced by technical concentration of capacity as well as by the kind of energy carriers being used. The greater the capacity of a power generator (500, 800, 1000 MW) the smaller the required number of staff per unit of capacity. Hard coal or lignite power plants with the same installed capacity need more workers than nuclear facilities or power plants using hydrocarbons. Hydropower plants have the lowest level of employment per unit of installed capacity at ca. 4 times less than in nuclear plants and ca. 6 times less than in coal power stations. This presents an advantage for countries with high proportion of hydropower, such as Scandinavian or Alpine countries.

Another important factor is the time of utilization of the installed capacity. This is determined both by physical principles of operation of generating utilities and the relation to the demand on electricity. The longest utilization (in hours per year) is a result of technical conditions and is characteristic for flow hydropower plants and for nuclear power plants. The shorter the time of utilization of installed capacity, the greater the staffing surplus in comparison to output.

These relationships in the case of nuclear electricity engineering are illustrated in Fig.1, where the share of nuclear utilities in electricity generation is marked on the horizontal axis, and the time of utilisation of their capacity is marked on the vertical axis. It turns out that irrespective of the share in electricity production, in most of the countries, the utilisation times in this type of power plants are close to the maximum (more than 7,000h per year), which is a result of the physical and technical principles of nuclear reactor operation. This is particularly true in highly developed countries. France is an exception, which is due to a specific nuclear monoculture, resulting in a considerable surplus of potential supply to the real demand, even though electricity exports are high. The shorter utilisation time in other countries is caused by inferior technology, which affects the frequency of equipment failures. There have been positive developments in countries like Slovenia, the Czech Republic and Hungary where nuclear power plants were equipped with modern safety and control systems of Western production (Patterson 1999).

These considerations should be taken into account while analysing the labour productivity in electricity with the use of data on employment level in the ISIC 4101 sector. In reality, however, the situation is more complicated, for two reasons. Firstly,

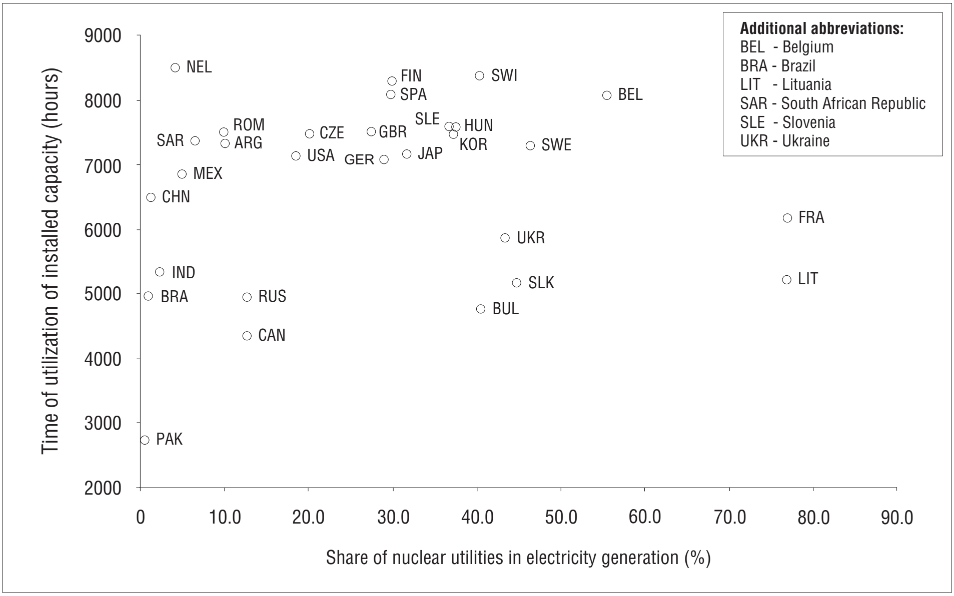

Fig. 1. Share of nuclear utilities in electricity generation and utilization of installed capacity in 1998

Rys. 1. Udział energetyki jądrowej w produkcji energii elektrycznej a czas wykorzystania mocy elektrowni jądrowych w 1998 r.

Source: Author's research based on the Energy Statistics Yearbook 1999, 2002, Table 2.

not all countries quote their data at the sector aggregate level; secondly, in the early 1990's, certain ISIC classification principles were changed following the introduction of Version 3 of the classification. In Version 2, it was possible to separately disclose employment in sector 4101 (Tab. 1), but not in all of the countries. Usually the quoted data referred to branch 410, including also gas and heat/steam supply. After the introduction of Version 3 of the ISIC classification, the only data available in the yearbooks relate to the entire group of branches 4, i.e. combined with water supply, with the aggregate data not being broken by sectors. This means that, for instance, the reference level for transforming countries became approximately twice as high as than in the previous version of the classification, with the same level being maintained for the highly developed European countries. This also implies a lack of temporal comparability, which makes the assessment of transformation results more difficult.

Tab. 1. Availability of employment data in the energy sector of selected countries

Tab. 1. Dostępność danych o zatrudnieniu w energetyce dla wybranych krajów

	Emploees (thousand) in the year			1988	1993
ISICode	410	4101	420	4	4
Country	Electricity, gas, steam	Electricity	Water works and supply	(410+420)	(410+420)
Austria	36	31	2	38	36
Bulgaria	35	35	...	35	55
Canada	85	72	8	93	142
China	1187	...	194	1381	...
Czechosovakia/Czech Rep.	75	68	...	75	99
Egypt	...	66	...	...	147
Finland	25	24	2	27	23
France	...	...	...	167	...
Great Britain	223	145	43	266	295
Hungary	55	42	...	55	96
India	820	817	13	833	...
Italy	150	127	14	164	204
Japan	...	139	80	...	350
Netherlands	38	27	8	46	42
Norway	20	20	...	20	22
Pakistan	...	125	...	...	258
Philippines	40	39	12	52	106
POLAND	135	...	...	135	266
South Korea	...	...	...	...	65
Spain	62	57	22	84	87
USSR/Russia	771	...	98	869	1066
West Germany/Germany	264	237	18	282	393

Source: Industrial Statistics Yearbook 1989, 1991; Statistical Yearbook 1998, 2001.

Given the above, does the choice of electricity as a product for international benchmarking meet the expectations formulated at the beginning of this study?

One can seek an answer by considering an analogy to industrial products where more revealing data regarding the number of employed in production is available. An overview of international employment statistics suggests the selection of cement production, since we have available data on the employment level in sector 2694 (ISIC Ver. 3), including cement and lime production. However, such data is only available for few countries from among those quoting data on employment in branch 269 (non -metal products) as a whole. The situation is similar in the case of crude steel production (sector 2710, a part of the branch 271 – iron and steel metallurgy). Despite this, the comparison of labour productivity in these two areas yields a symptomatic picture (Fig. 2). In this correlation graph the distribution of countries shows a significant similarity of technical, economic and organisational conditions influencing the labour productivity in the two sectors in question. It seems justified to assume that the same conditions also apply to other areas of industrial activity. If the comparison of labour productivity in cement industry and in the energy sector (Fig. 3) shows a similar layout of the studied countries, one can assume that the labour productivity calculated by referring the volume of electricity production to the number of employees in the entire group of branches 4

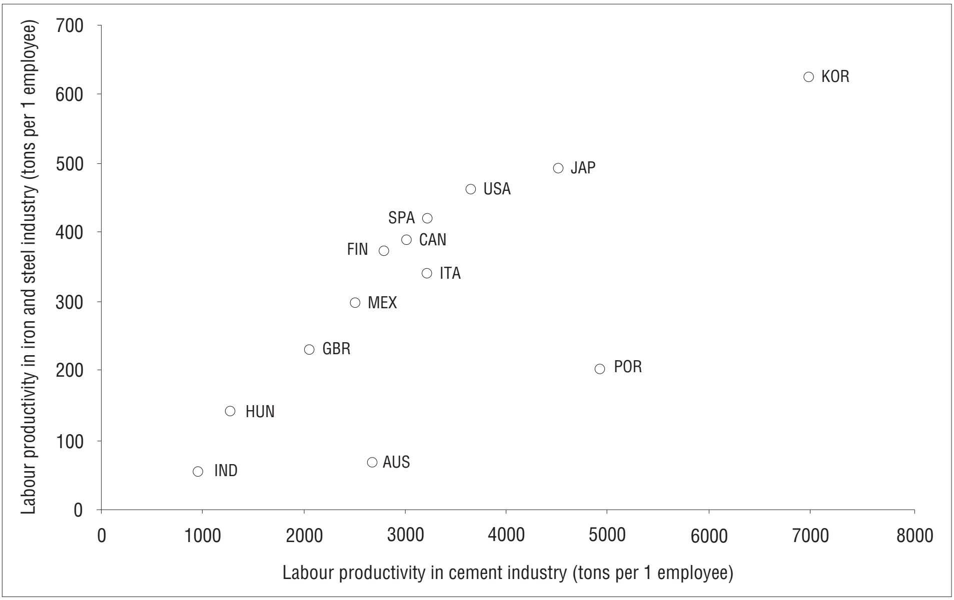

Fig. 2. Labour productivity in the cement industry and in the iron and steel industry in 1998r.

Rys. 2. Wydajność pracy w przemyśle cementowym a wydajność pracy w hutnictwie żelaza i stali w 1998 r.

Source: Author's research based on the International Yearbook of Industrial Statistics 2002, 2002.

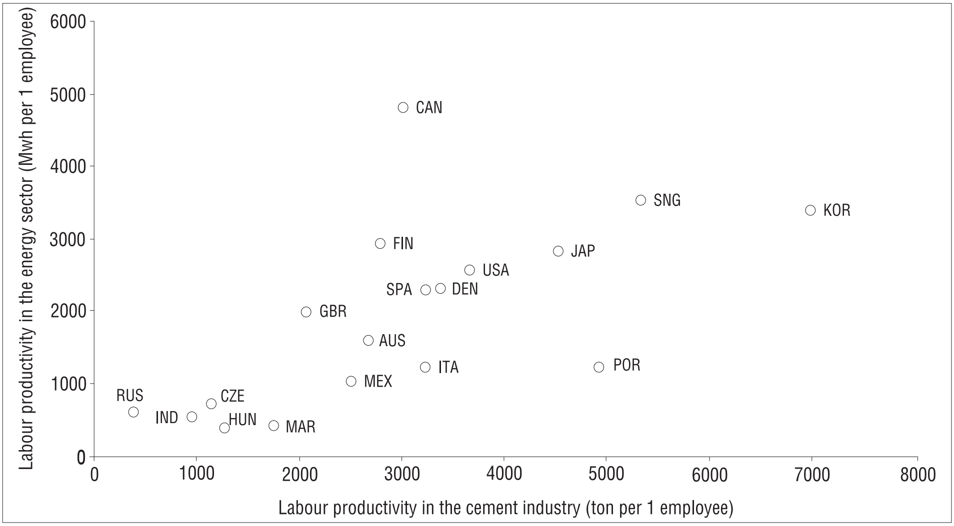

Fig. 3. Labour productivity in the cement industry and in the energy sector in 1998

Rys. 3. Wydajność pracy w przemyśle cementowym a wydajność pracy w energetyce w 1998 r.

Source: Author's research based on the International Yearbook of Industrial Statistics 2002, 2002; and the UN Statisitcal Yearbook 1998, 2001.

(Tab. 2) meets our expectations to a significant extent (despite the systematic error resulting from using an aggregate sum including the employment in water supply in addition to the employment in electricity, heat, and gas supply). Because of this aggregation, one can expect the former socialist countries to be lower down due to a high proportion of central heat supply in the energy sector, typical for these countries.

If the labour productivity in energy sector, calculated in relation to the employment in the entire group of branches No. 4, has similar features in the group of studied countries (i.e. it generates similar country distribution patterns), as the analogous indicators calculated in relation to employment in the sectors 2694 and 2710, then referring of thus calculated labour productivity in energy sector to the GDP per capita may also be considered justified (Tab. 2). Given this, the observation of changes occurring in the country distribution patterns in the correlation graph field (ratio of labour productivity to GDP per capita) may be useful to formulate conclusions on the role of labour productivity in shaping the standards of living (Fig. 4). The pattern and grouping of countries do not differ significantly from our expectations and comply with the general rule that the higher the labour productivity in the energy sector, the higher the GDP per capita. The scatter of positions of highly developed countries results from the way labour productivity is influenced, as discussed above, by the utilisation structure of primary energy carriers, the type and advancement of the technologies applied, ownership and organisational structure of the energy sector, and generally by the impact

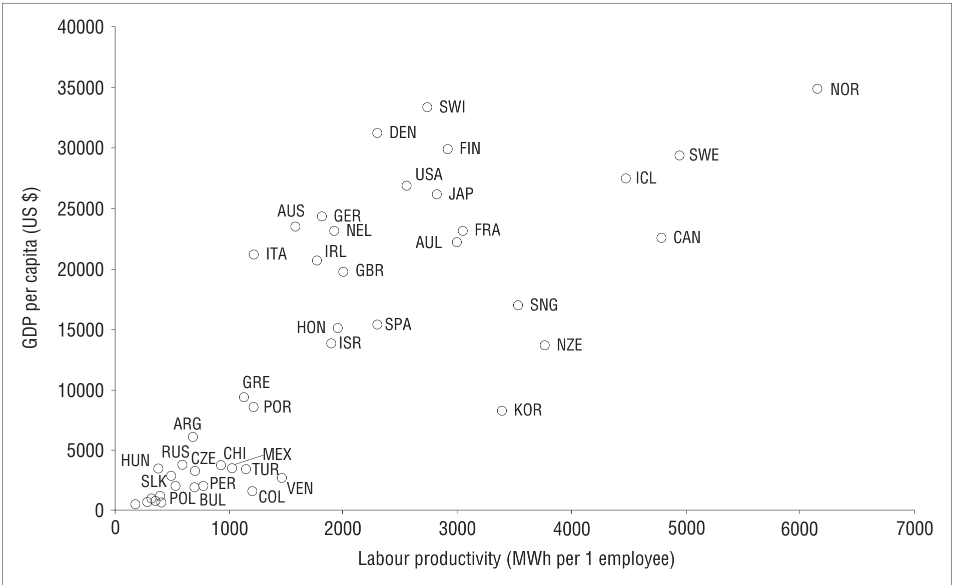

Fig. 4. Labour productivity in the energy sector and the GDP per capita in 1998

Rys. 4. Wydajność pracy w energetyce a poziom PKB per capita w 1998 r.

Source: Table 2.

of manufacturing on economic efficiency. The position of the former socialist countries is remarkably low, often lower than that of the developing countries, despite the formerly dominant role of industry in centrally planned economies.

Figures 5 A and B are blown-up portions of the bottom left-hand portion of Fig. 4, aiming to present more clearly the distribution pattern of transforming countries and their "surroundings". Using constant 1990 prices to establish the GDP per capita allows us to observe the changes in the studied relation in the initial period of transformation of the former socialist countries, and to compare with changes occurring in other countries. (The extent to which the used data are up-to-date depends on the availability of statistical sources in Poland in 2003). It turns out that, despite a highly diverse structure of energy carriers used, the Central and Eastern European countries are characterised by a very similar level of low labour productivity. Any growth of that productivity, even if it occurs (in Russia a decline was observed instead), is slower not only in comparison with such countries as Portugal or Greece, but also with some of the developing countries (e.g. Turkey, Chile, Mexico). This is a proof that the labour productivity is predominantly affected by the quality of technical equipment and the systems of organization of production inherited from the centrally planned economies. Another influential factor was the violent social processes accompanying the abandonment of rules and practice of the former economic system. As S. Fabricant (1968) remarked: "the effects on labor productivity of wars, revolutions and other serious disturbances

Tab. 2. Volume of electricity generated per 1 employee in the energy sector (EE/1 empl.) and the GDP per capita in selected countries in 1998

Tab. 2. Produkcja energii elektrycznej na 1 zatrudnionego w energetyce (EE/1 empl.) oraz poziom PKB na 1 mieszkanca (GDP per capita) w wybranych krajach w 1998 r.

Country	Abbr.	EE/1 empl. MWh	GDP per capita US$	Country	Abbr.	EE/1 empl. MWh	GDP per capita US$
Argentine	ARG	699	6110	Israel	ISR	1898	13882
Australia	AUL	2997	22240	Italy	ITA	1228	21233
Austria	AUS	1595	23405	Japan	JAP	2828	26132
Bolivia	BOL	371	855	Mexico	MEX	1027	3480
Bulgaria	BUL	719	1920	Morocco	MOR	407	1137
Canada	CAN	4802	22486	Netherlands	NEL	1934	23154
Chile	CHI	934	3708	New Zealand	NZE	3757	13716
China	CHN	417	699	Norway	NOR	6160	34879
Colombia	COL	1210	1678	Pakistan	PAK	186	490
Czech Republic	CZE	708	3285	Peru	PER	774	2087
Denmark	DEN	2305	31113	Philippines	PHI	588	727
Egypt	EGY	672	1015	Poland	POL	539	2021
Finland	FIN	2924	29803	Portugal	POR	1218	8563
France	FRA	3058	23150	Russia	RUS	599	3808
Germany	GER	1824	24223	Singapore	SIN	3535	17101
Great Britain	GBR	2004	19702	Slovakia	SLK	499	2930
Greece	GRE	1131	9326	South Korea	KOR	3389	8227
Hong Kong	HON	1963	15089	Spain	SPA	2297	15403
Hungary	HUN	387	3522	Sweden	SWE	4946	29354
Iceland	ICL	4486	27456	Switherland	SWI	2735	33316
India	IND	526	490	Turkey	TUR	1156	3410
Indonesia	INS	386	802	USA	USA	2563	26827
Ireland	IRL	1782	20692	Venezuela	VEN	1471	2799

Source: Author's calculations based on:
a) volume of electricity generated (UN Industrial Statistics Database, 2001, ISIC 410101),
b) employment in the energy sector (UN Statistical Yearbook 1998, 2001; tab. 25),
c) GDP in constant price of 1990 (UN Statistical Yearbook 1998, 2001; tab. 18),
d) population of examined countries (UN Statistical Yearbook 1998, 2001; tab. 8).

have been less frequent but usually more violent and prolonged than those of crop cycles or business cycles. Disorganization, undermaintanance and destruction of plant and equipment, and the loss or diversion of trained personnel have sometimes caused labor productivity to fall drastically. During recovery, labor productivity has often risen for some time at exceptionally rapid pace, but these high rates have not always continued long enough to erase the effects of the catastrophe from the long-term trend".

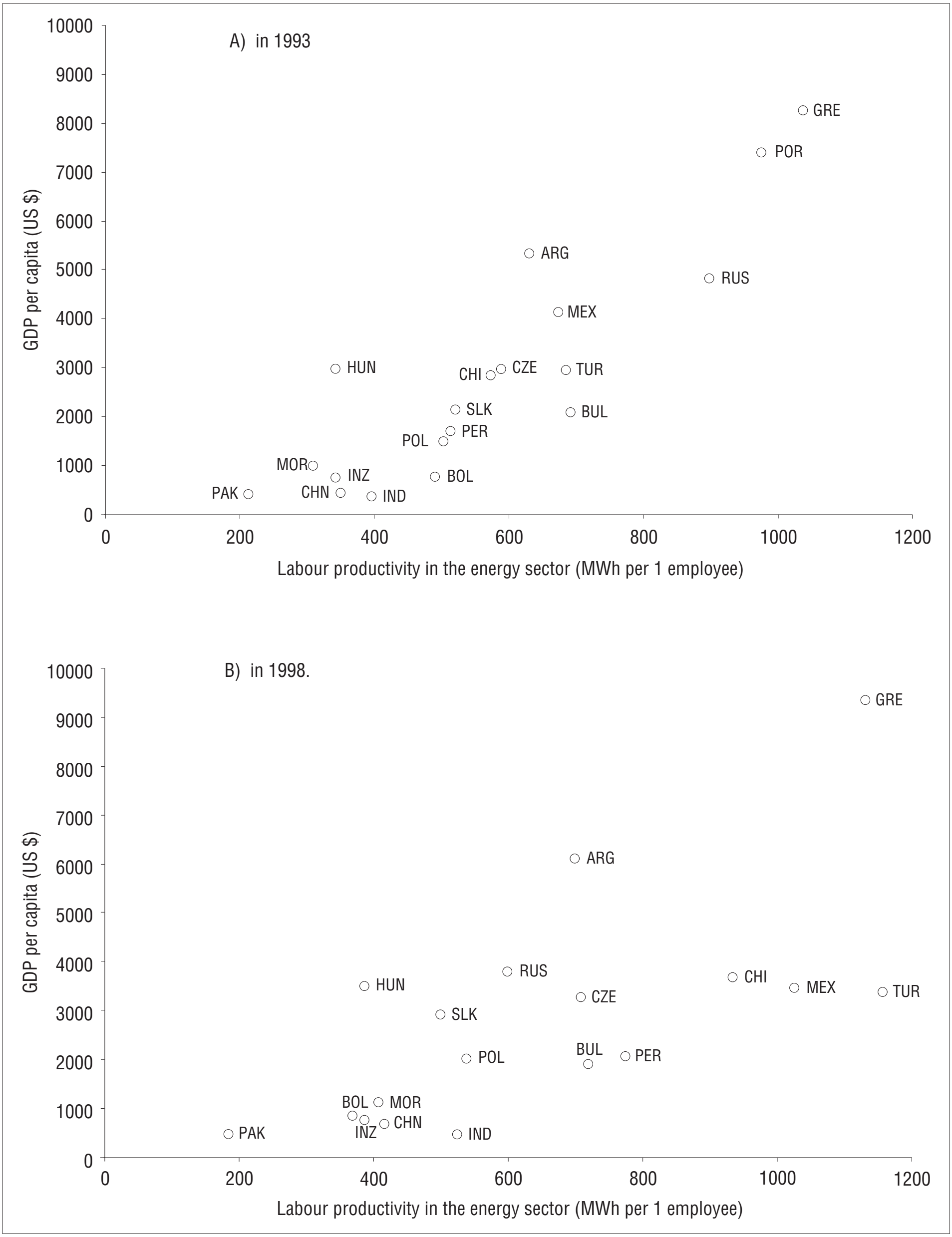

Fig. 5. Labour productivity in the energy sector and the GDP per capita: A) in 1993, B) in 1998
Rys. 5. Wydajność pracy w energetyce a poziom PKB per capita: A) w 1993 r., B) w 1998 r.

Source: Listed in the Table 2.

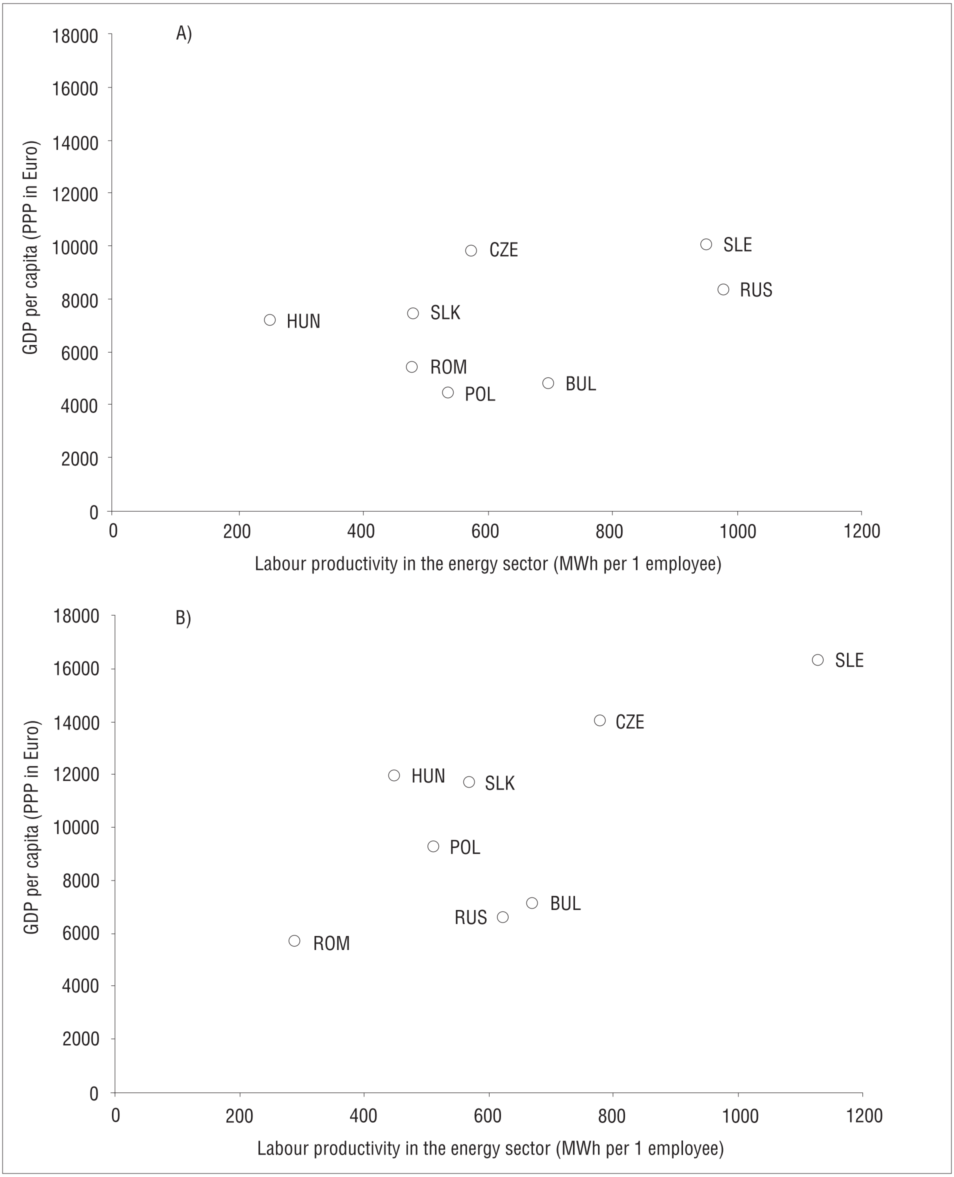

Fig. 6. Labour productivity in the energy sector and the GDP per capita of transforming countries: A) in 1990, B) in 2001

Rys. 6. Wydajność pracy w energetyce a poziom PKB per capita w krajach transformujących się: A) w 1990 r., B) w 2001 r.

Source: After Table 3.

In order to observe the more detailed changes of labour productivity in relation to GDP per capita in the Central and Eastern European countries, we had to use the data from the yearbook *Countries in Transition 2002. WIIW Handbook of Statistics (2002)*, specialised in statistical publication on changes in the region (Tab. 3). These figures allowed us to refer the labour productivity in the energy sector to the domestic product measured according to purchasing power parity (PPP) in four time sections: 1990, 1993, 1998, and 2001. Figures 6 A and B present the distribution pattern of the studied countries in the initial and final time sections. What is noticeable is a high position of Russia in 1990 and outstanding position of Slovenia in 2001. In order to better visualise the changes of the studied relation in Fig. 7, the positions of each country in successive years were graphically connected to form "paths" of changes.

In the group of the eight countries, at least three different shapes of the paths of changes can be distinguished. Three countries: Hungary, the Czech Republic, and particularly Slovenia, owe their growth and relatively high GDP per capita values to a noticeable increase in labour productivity, among other factors. The other extreme is represented by Russia and Romania, where a decrease of the GDP per capita with a simultaneous rapid decline of labour productivity were observed in 1990-98. The changes in Poland, Slovakia, and Bulgaria are of intermediate nature; the growth of income per capita was due to reasons different than the increase of labour productivity in state-owned energy sector. This is largely related to differences in employment policy, resulting from the persistence of state-owned structures in the economy.

While the highest developed economies have been abandoning the production of numerous products typical for the earlier phases of their development, certain countries,

Tab. 3. Labour productivity in the energy sector and the GDP per capita in the transforming countries

Tab. 3. Wydajność pracy w energetyce a poziom PKB per capita w krajach transformujących się

		1990	1993	1998	2001	1990	1993	1998	2001
	Abbr.	Productivity (MWh per 1 employee)				GDP per capita at PPP (euro)			
Bulgaria	BUL	702	668	719	671	4860	4460	5720	7010
Czech Rep.	CZE	614	595	708	782	10040	9800	12220	13950
Hungary	HUN	254	305	387	451	7210	7370	9890	11880
Poland	POL	540	549	539	508	4580	4960	7790	9060
Romania	ROM	483	370	291	291	5340	4850	4970	5660
Russia	RUS	984	897	599	626	8440	6890	5000	6530
Slovakia	SLK	482	508	499	570	7490	9330	10160	11580
Slovenia	SLE	954	869	1142	1125	10110	9930	13550	16250

Source: The author's research based on the WIIW Handbook of Statistics, 2002
PPP - purchasing power parity.

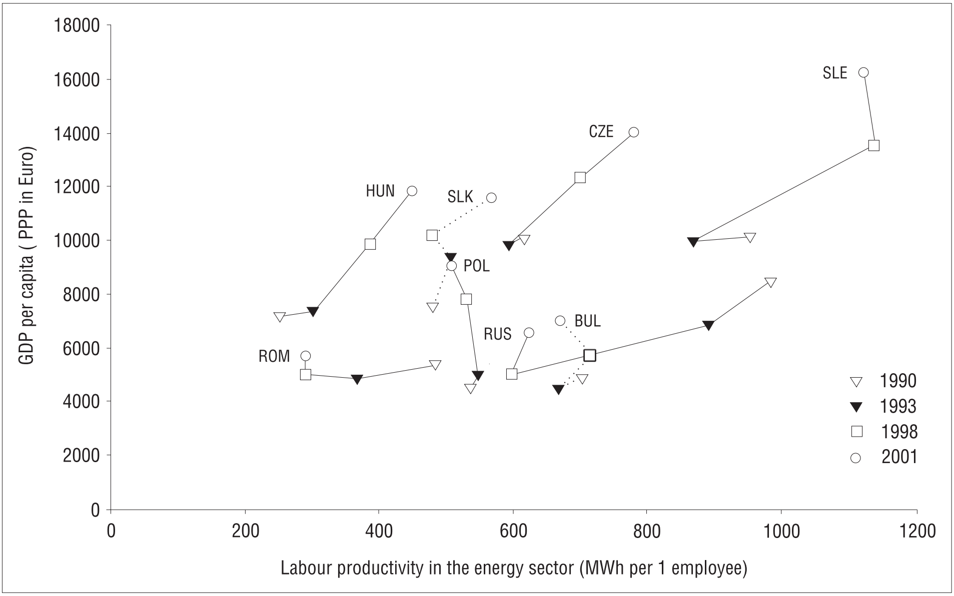

Fig. 7. Change in labour productivity in the energy sector and the GDP per capita of transforming countries in the period of 1990 – 2001

Rys. 7. Zmiany wydajności pracy w energetyce i poziomu PKB per capita w krajach transformujących się

Source: Author's research based on Table 3.

like Portugal or Turkey, achieved a much higher level of productivity (e.g. in the cement industry) than most of the highly developed countries, which is an evidence of a quicker technical and organisational modernisation of these production domains in countries where industrial development started later. An example of a particularly rapid increase of labour productivity is South Korea, which achieved the productivity level exceeding that of many earlier and higher developed countries.

Whilst in the highest developed countries the industrial labour productivity is no longer the most decisive factor of economic growth, the countries with transforming economies must follow the path of, for instance, South Korea, by making a significant effort to increase the quality of their manufacturing facilities and labour organisation systems. This is not to be easily accomplished, as employment streamlining encounters numerous social and political obstacles at the time of high unemployment.

For the transforming economies, this implies that a choice has to be made of those production domains which are to be rapidly developed in order to achieve an advantageous specialisation on the international scale. It also means that those production areas which are to continue operating need to be modernised quickly, as the level of labour productivity in industry remains to be of importance in shaping the living standards in those countries.

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Relacja między wydajnością pracy w przemyśle i energetyce a poziomem PKB per capita w porównaniach międzynarodowych

Streszczenie

Malejąca rola produkcji materialnej w kształtowaniu poziomu życia we współczesnym świecie zmierzającym do epoki postindustrialnej nie oznacza, że przemysł przestał być istotną składową rozwoju gospodarczego. Najwyżej rozwinięte kraje rozpoczęły tę epokę właśnie dzięki temu, że osiągnęły wcześniej w przemyśle wysoki poziom wydajności pracy, który miał największy udział we wzroście poziomu dochodu na jednego mieszkańca. Co więcej, „wzrost dochodu na 1 mieszkańca, warunek *sine qua non* rozwoju gospodarczego pochodzi pierwotnie z przemysłu jakkolwiek zorganizowanego" (Hughes 1968).

W szczególny sposób dotyczy to krajów transformujących gospodarkę, jako że do nich przede wszystkim odnosi się pytanie: w gospodarce których krajów rola przemysłu jest jeszcze istotna dla wzrostu poziomu życia? Interesujące jest zatem zbadanie jak zmienia się relacja wydajności pracy w przemyśle krajów przeżywających transformację w odniesieniu do osiągniętego przez nie poziomu PKB na 1 mieszkańca.

Do badań należało wybrać produkty przemysłowe, które odznaczają się możliwie największą jednorodnością asortymentową, w tym sensie najbardziej jednorodnym produktem jest energia elektryczna. Odniesienie wielkości produkcji wyrażonej w jednostkach fizycznych do liczby zatrudnionych przy jej wytwarzaniu daje najprostszy

wskaźnik wydajności pracy. W przypadku energii elektrycznej taki wskaźnik dawałby bezpośrednią porównywalność wydajności w różnych krajach. W przypadku energetyki ważna jest możliwość operowania liczbą zatrudnionych w samej elektroenergetyce, choć nie do pominięcia są różnice wynikające z zależności tej liczby od agregacji zatrudnienia w generacji i dystrybucji energii, także od struktury własnościowej systemów elektroenergetycznych, struktury mocy zainstalowanej według nośników energii, struktury wielkościowej i czasu wykorzystania turbozespołów (interesującym przykładem jest zróżnicowanie tego czasu w przypadku elektrowni jądrowych – Rys. 1), itd. Analiza danych międzynarodowej statystyki zatrudnienia wskazuje jednak na inny istotny problem. Otóż o ile dostępność danych z różnych krajów o liczbie zatrudnionych na poziomie gałęzi jest zadowalająca, o tyle na poziomie branż, które lepiej odzwierciedlają liczbę pracowników faktycznie zaangażowanych przy wytwarzaniu danego wyrobu, jest ograniczona do znacznie węższej grupy krajów. Tak jest np. w przypadku przemysłu cementowego, będącego branżą przemysłu mineralnego, czy też stalowniczego jako branży całego hutnictwa żelaza i stali.

Analiza materiału empirycznego (przekroje czasowe: 1993 i 1998 dla wszystkich badanych krajów, a dla krajów transformujących się ponadto 1990 i 2001) pozwala stwierdzić silną zależność poziomu rozwoju gospodarczego badanych krajów od osiągniętej wydajności pracy.

Największą wydajność pracy w energetyce osiągnęły kraje najwyżej rozwinięte (w tym te o najwyższym udziale hydroenergetyki) natomiast kraje transformujące się tworzą zwartą grupę w otoczeniu krajów rozwijających się (Rys. 4). Podobieństwo pozycji byłych krajów socjalistycznych, mimo znacznego zróżnicowania struktury mocy według nośników energii, wskazuje na wspólne cechy ich systemów elektroenergetycznych, wśród których najistotniejsze dla wydajności były formy ich organizacji. Bardziej szczegółowa analiza danych dla europejskich krajów transformujących się ujawnia okresy spadku wydajności dla niektórych z tych krajów (Rumunia, Rosja) odzwierciedlające się także spadkiem PKB per capita (Rys. 7). W pozostałych krajach tej grupy od 1993 roku PKB per capita wzrasta, choć często przy stosunkowo niewielkim postępie w wydajności pracy.

Gospodarki najwyżej rozwinięte wycofują się z intensywnej produkcji wielu wyrobów charakterystycznych dla wcześniejszych faz rozwoju. Dla krajów transformujących gospodarkę oznacza to konieczność dokonania wyboru, które dziedziny produkcji należy intensywnie rozwijać aby osiągnąć korzystną specjalizację w skali międzynarodowej, a także konieczność szybkiej modernizacji technologicznej tych dziedzin wytwarzania, które nadal będą funkcjonować, bowiem dla tych krajów poziom wydajności pracy w przemyśle ma wciąż istotne znaczenie dla kształtowania poziomu życia.

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