CHIEF DEVELOPMENT TENDENCIES, STRUCTURAL CHANGES AND INNOVATIVENESS OF THE INDUSTRIAL AND SERVICE SECTORS IN POLAND

JOANNA DOMINIAK[1], TOMASZ RACHWAŁ[2]

[1] Institute of Socio-Economic Geography and Spatial Management, Adam Mickiewicz University in Poznań, Poland

[2] Department of Entrepreneurship and Spatial Management, Institute of Geography, Pedagogical University of Cracow, Poland

Manuscript received: May 18, 2016
Revised version: September 27, 2016

DOMINIAK J., RACHWAŁ T., 2016. Chief development tendencies, structural changes and innovativeness of the industrial and service sectors in Poland. *Quaestiones Geographicae* 35(4), Bogucki Wydawnictwo Naukowe, Poznań, pp. 49–69, 4 tables, 5 figs.

ABSTRACT: The goal of this article is to determine regularities concerning structural changes in the industrial and service sectors in Poland in the light of trends observable in the development of the world and national economies. The analysis embraces Poland in the years of the socio-economic transformation, but because of access to comparable data it focuses mainly on the years 2000–2014. Use is made of measures commonly applied in economic geography (employment, gross value added) and indicators based on them (mainly the structure and dynamics of change). First, the change in the role of the industrial and service sectors in the Polish economy as compared with other EU states is analysed in the light of the theoretical conceptions presented in the literature. Examined next are changes in the internal structure of the sectors and in the level of their innovativeness. The research showed there to be only slight changes in the role of the two sectors over the study period. Changes in the structure of the industrial sector tend towards its modernisation, which can signal steps taken for re-industrialisation.

KEY WORDS: economy, Poland, industry, services, innovativeness

Corresponding author: Joanna Dominiak, Institute of Socio-Economic Geography and Spatial Management, Adam Mickiewicz University in Poznań, ul. Krygowskiego 27, 61-680 Poznań, Poland; e-mail: dominiak@amu.edu.pl

Introduction

Three basic stages can be distinguished in civilisational development: pre-industrial, in which the dominant role in the economy was played by the primary sector, or agriculture; industrial, in which the economic base was mainly manufacturing; and post-industrial, connected with the processes of tertiarisation. To those three classical stages of development distinguished on the basis of the theory worked out by Fisher (1939), Clark (1940) and Fourastié (1949), in the recent years researchers have added a fourth, information stage, associated with the advancing globalisation of the world economy and the construction of a knowledge-based economy in which the functions of an economic base have been taken over by science as a result of the growing significance of communication techniques and information services as well as research and development

doi: 10.1515/quageo-2016-0034
ISSN 0137-477X

(R&D) activity (termed the fourth sector of the economy, cf. Kenessey 1987) in social, cultural and economic development. Thus, in most advanced countries of the world, including Poland, the first decades of the 20th century were a period of the industrial stage. Post-industrialisation, or the diminishing of the share of manufacturing in the world economy in favour of services as one of the three post-Fordist development tendencies, started already in the 1970s (Chojnicki 1999). This process affected the development of services in two ways: on the one hand, by shifting the labour force so far directly involved in production to all kinds of service activities, and on the other, by boosting the demand for services so far provided within manufacturing enterprises, like services for producers and business (Werwicki 1998). The process of establishing services outside firms, known as outsourcing, is regarded as one of the most important causes of the growing role of the service sector in the economy (Fixler, Siegel 1999). Great significance is also ascribed to an increase in the wealth of societies, which is connected with a growing demand for consumer services (Nowosielska 1994, Werwicki 1998, Guzik et al. 2001). The stage of civilisation based on services is termed tertiarisation in the literature. It means not only an increase in the significance of services in the economy, but also, or perhaps primarily, the penetration of service activities into the industrial sector.

It should be emphasised that the model of the economy implemented in Poland after the Second World War, as in other countries of Eastern Europe, was that of a centrally planned socialist economy, also called a command or redistributive economy, which assumed a dominant role of the state in setting the directions of socio-economic development. Economic growth was thought to be founded on large industrial investments that were chief elements determining the structure not only of industry, but of the entire economy. In turn, individual activities in the service sector were much neglected. As a result, in the 1980s the share of employment in services in Poland was much lower than in advanced European countries. It was only political, social and economic changes initiated in Poland in 1989 that provided a basis for a more dynamic development of this sector. Thus, the 1990s were characterised by a rapid increase in employment in services accompanied by a drop in industrial employment and big changes in the structure of manufacturing connected with the breaking of production links with the former states of the so-called Eastern bloc (Rachwał 2011, 2015). The later period was one of a relative stabilisation of the structure of the national economy and changes in the structure and organisation of both, service and industrial activity.

A widely discussed question connected with structural changes in the economy is that of re-industrialisation, not only of Poland, but also of other European states. The economic crisis of the first and second decades of the 21st c. demonstrated that this was necessary to boost innovativeness and make economic development more dynamic, also to reduce the unemployment rate. A dozen or so years ago re-industrialisation was not seen to be necessary because the basic role in the transition from the post-industrial to the information stage was believed to be played by the service sector. It turned out, however, that countries which gradually gave up industry in favour of services did not always do well in the conditions of the present-day economy, especially during a crisis in the world economy (as indicated, e.g. by Christopherson et al. 2014). Hence re-industrialisation resting on modern, innovative, knowledge-intensive measures implemented in industry seems necessary. This follows not only from the experience of Poland, but also of other countries of Central and Eastern (CE) Europe that kept or even increased their industrial potential in the second stage of the transformation period, which translated into good results of the entire economy. It is worth noting that the re-industrialisation policy figures as one of the goals of the industrial policy of the European Union described in its strategy of development until 2020 (Gawlikowska-Hueckel 2014; Heymann, Vetter 2013). This change in the strategy of economic development in Poland and other European states with reference to industry can significantly affect, and has already started to affect, the rate and scope of change in the structure of industry and services.

The goal and scope of the research

This article seeks to identify regularities in structural changes that have taken place in the industrial and service sectors in Poland in the light of development trends in the world and national economies. Changes in the Polish economy are analysed in terms of external (global) determinants connected mainly with civilisational development, i.e. the transition from the post-industrial to the information stage of development, and internal determinants connected mainly with the socio-economic transformation, i.e. the transition from a centrally planned economy to one operating on market principles. The analysis conducted was intended to find answers to the following cognitive questions:

1. What changes have occurred in the structure of the Polish economy in the light of basic economic measures when compared with other EU states?
2. What have been the basic directions of structural changes in the industrial and service sectors in Poland after 2000?
3. How has the level of innovativeness – an important aspect of change in a modern economy – changed in those sectors?

The inclusion of innovativeness in the analysis is connected with the fact that innovations can influence not only the development of individual economic sectors, but also structural changes taking place in them. A high level of innovativeness is one of the conditions of structural changes in the industrial and service sectors towards a more knowledge-intensive activities which determine the transition of the economy from industrial through post-industrial to one based on knowledge and information.

The scope of the analysis embraces Poland in the years of the socio-economic transformation, but because of limited access to comparable data it focuses mainly on the years 2000–2014. In some cases earlier data are available, e.g. on employment, but an attempt was made to preserve comparability also in relation to other measures. Use was made of measures commonly applied in economic geography (employment, gross value added) and indices based on them (mainly the structure and dynamics of change). The data came from Eurostat, a local data bank, yearbooks, and other publication of the Central Statistical Office. In the first part of the analysis, the change in the role of the industrial and service sectors in the Polish economy as compared with other EU states is examined in the light of theoretical conceptions discussed in the literature on the subject. Analysed next are changes in the internal structure of individual sectors and their level of innovativeness. Because of changes in the European, and hence also Polish, Classification of Economic Activities (the transition from PKD 2004 to PKD 2007, i.e. from NACE Rev. 1.1 to NACE Rev. 2.0), the analysis of structural changes in industry and services will be conducted in two subperiods: the years 2000–2008 (according to PKD 2004) and 2008–2014 (according to PKD 2007). The industrial sector embraces sections C, D and E according to PKD 2004/NACE 1.1 as well as B, C, D, and E according to PKD2007/NACE 2.0, i.e. mining, manufacturing, electricity and water supply, as well as section F, construction, which statistics and analyses treat together with them because of the nature of this activity. The other sections examined, starting with section G, embrace services (the exact names of the sections, different for the two analysed periods, will be given in the further part of the article).

Theoretical conceptions of structural changes and innovativeness in the economy

One of the first and most important conceptions associated with the structure of the economy is that of its three sectors, also called a three-sector theory of change in the economic structure. The scholar regarded as a forerunner of the three-sector conception of the economy is Friedrich List[1], who distinguished five development stages: savage, pastoral, agricultural, agricultural-manufacturing, and agricultural-manufacturing-commercial (Daszkowska 1998). The last of those stages means an increase in the importance of services, mainly trade, but also education and science. An upsurge of interest in regularities in the development of individual sectors of the economy goes back to the 1930s. It

[1] The opinion predominating among scholars (e.g. Kwiatkowski 1980) is that the genesis of the three-sector theory should be sought in the views of mercantilists.

was then that Fisher (1939) formulated his conception of three economic sectors, later developed by Clark (1940) and Fourastié (1949), which became an important theory explaining the causes of and changes in the economic structure of a state. In spite of differences in their approaches, those scholars shared the opinion that with advancing economic development there appeared a tendency for the role of agriculture to diminish, for the significance of industry to grow, stabilise and then decline, and for a steady rise in the importance of the service sector. The reasons for this state of affairs were sought in changes in the structure of consumption and demand (Fisher), the productivity of labour (Clark), or the effect of technological progress (Fourastié) (Kłosowski 2006). The criticism of the three-sector conception of the economy primarily concerned the criteria of the division and range of the individual sectors (e.g. Kwiatkowski 1980, Rogoziński 1993).

An object of much controversy is the heterogeneity of the third sector, the result being attempts at its further division (e.g. Katouzian 1970, Kabaj 1972, Menz 1965, Daszkowska 1998, Kłosowski 2006). Some services were observed to lose importance, while other ones showed highly dynamic growth, which was put down to differences in the demand for individual kinds of services (Baumol 1967).

Another problem besides the heterogeneity of the service sector is that of the blurring of inter-sectoral differences. Owing to the development of modern technologies, differences between material products and services tend to get blurred (the augmented product conception), especially in the case of the so-called information sector (IT). Besides, some service activities, mainly repair and energy supply, were, and as a rule still are, included in statistics in the industrial sector. Also, industry is very often treated jointly with construction. In addition, critics of the theory of three economic sectors quoted examples of states (the Middle East or small countries, e.g. Pacific island states based on the development of tourism) where a high level of the development of services was not preceded by a stage of industrial development. Still, despite the above criticism, this theory occupies an important place among the theoretical conceptions connected with changes in industrial and service activity.

The sectoral approaches presented by the creators and propagators of the three-sector conception of the economy, and especially its criticism, also provided a point of departure for reflections on Giarini's (1986) conception of a service economy. In this conception the sectoral approach is replaced by a functional one in which we deal with services as a whole, irrespective of their inclusion in individual sectors of the economy (Kłosowski 2006, Nowosielska 1994). Thus, we pass from a vertical orientation in which socio-economic development meant a transition from the domination of the agricultural sector to that of the industrial sector and then of services, to a horizontal orientation in which the economic sectors are closely connected and in which service activity tends to infiltrate into the production sectors: manufacturing and agriculture. In this conception the reason for this process is the development of services for enterprises and business; they increasingly become an integral part of the manufacturing process and they are the main factor responsible for the intermingling of the production and service sectors (Kłosowski 2006).

According to Giarini (1986), service functions (not the service sector any more) have become a key economic tool in each production system. They have dominated all production forms, both in industry and agriculture, having led to a situation where there is no product the manufacture and life cycle of which would not depend on services: starting with the conceptual stage at which R&D and financial services play a key role, via the production stage (where quality control and financing are significant), distribution (logistics, sale, marketing), use (leasing), to recycling. According to Giarini, services have stopped being an economic sector and turned into functions dominating in many production activities. In Giarini's service economy, the fact that the service sector represents two-thirds of the national economy, according to various measures, is not the most significant. What is significant is that services are increasingly present in all sectors of the economy (Dominiak 2015).

Giarini identified the so-called new economy with a service economy, also termed a service-based or service-oriented economy in the literature on the subject. The service economy does not mean a simple expansion of the service sector, but an increase and domination of service

functions in all kinds of activity and the creation of wealth. This is a modern way of creating wealth in which the whole economic system is involved rather than individual sectors separately.

The significance of this conception, the core of which is a functional approach, has been growing in the face of the constant intermingling of production activity and services that we observe in modern economies. According to many scholars (Kłosowski 2006; Nowosielska, Ilnicki 2009), the functional approach is a considerable advance in comparison with the sectoral one, but because of limitations of statistics it is very hard to adopt in empirical research. That is why the analysis offered in the next part of this article rests on the sectoral approach.

In traditional models adopting this approach, an increase in employment in services at the cost of that in industry and agriculture followed from a growing demand for services and limited growth of labour productivity in services. However, it was already Fuchs (1968) who noted that an increase in demand alone was not enough to account for the development of services. With reference to the conception of a three-sector economy, there was also a discussion in the literature about the role of technological progress in social and economic changes.

One of the most important here is Bell's (1973) conception of post-industrial society. He distinguished three stages of social development: a pre-industrial society with the domination of agriculture, an industrial society with the domination of industry, and a post-industrial society with the domination of services. The transition from the industrial to the post-industrial society was possible, in Bell's opinion, because of long-term processes connected primarily with technological progress. This was then a conception of fast growth based on the development of science and information technology (Dobrowolski 2005). In a post-industrial society (on the basis of which the conception of information society developed later) the strategic resources are knowledge and information, which push out labour and capital that dominated previously. According to Bell, changes in the structure of employment in the economic sectors are also accompanied by changes in the structure of services. In the first stage, of a pre-industrial society, personal services predominated; in that of an industrial society services for producers and for business developed, and in the last, post-industrial stage the chief role is played by specialised, technical and intelligent services connected with scientific research, education, health care, and broadly understood management (Kłosowski 2006, after Bell 1973). A similar approach to Bell's was presented by Toffler (1985).

Another conception was developed in opposition to that of a post-industrial society that also concerned the impact of technological progress – the conception of a neo-industrial society. Here Gershuny (1978) formulated a model of a self-service society. Together with Miles, Gershuny is thought to be one of the forerunners of the New Service Economy, a stream emphasising the significance of innovation (especially in the field of ICT) in the development of services and the entire economy[2]. The essence of this conception is highlighting the evolution of the treatment of services, often described as 'laggards of the economy', from activities that were additions to farming and industry to an important economic sector with highly qualified staff and decisive for technological progress.

As a consequence, innovativeness in industry and services has become an important stream in the literature on the subject. One can mention here such authors as Pavitt (1979, 1980), Schroeder, Scudder and Dawn (1989), Faulkner (1994), Gallouj and Weinstein (1997), Hauknes (1998), Sirilli and Rinaldo (1998), Coombs and Miles (2000), Acs and Varga (2002), Gallouj (2002), Drejer (2003), Howells and Tether (2004), Hipp and Groupp (2005), Miles (2005), Tether (2005), Prajogo (2006), and others (cf. the analyses of studies on innovation offered by Fagerberg and Verspagen 2009 as well as by Becheikh et al. 2006). In the Polish literature, worth noting are such positions as Rogoziński (2004), Niedzielski and Rychlik (2007), Niedzielski et al. (2008), Borowiec et al. (2009), Gierańczyk (2009), Gierańczyk and Rachwał (2012), Golejewska

[2] Connected with Gershuny's idea of a self-service society is also Galbraith's (1967) conception of a neo-industrial society. According to this theory, the economy does not evolve towards a service economy, but towards re-industrialisation based not on traditional industries but high-tech ones. Galbraith focused on large corporations because of their possibilities of introducing technological progress to manufacturing.

Table 1. Differences between innovation in services and industry.

Source	Differences between innovation in services and industry
E. Brouwer (1997)	Service innovations do not require as much R&D as industry Service firms tend to invest less in fixed assets to support innovations Service firms spend less money on buying patents and licences
K. Atuahene-Gima (1996)	Service innovations are more easy to imitate Explicit human-resources strategy has greater influence on success of new services than on new manufactured products
R.G. Cooper and U. Brentani (1991)	Technology is less important for new service development
G. Sirilli and R. Ewangelista (1998)	Lack of well-educated co-workers is the main barrier to innovation in service firms more often than in industry Organisational aspects play a key role
OECD 2000	Service innovation is not limited to changes in the characteristics of a product. It usually involves changes in the delivery process and client interface as well

Source: prepared on the basis of De Jong et al. (2003: 16–17).

(2012), Nowak (2012), Zioło (2012), Gajda (2015), Kosała (2015), and Świadek (2015).

Initially the theory of innovativeness referred only to manufacturing. Services were degraded to the role of a passive recipient of technological innovations worked out in the industrial sector (Niedzielski et al. 2008). This was the conception presented by Barras (1986), who emphasised the dependence of innovations in services on those introduced by manufacturing enterprises which initiate the innovative process in service firms. However, one can hardly accept a conception in which the service sector is treated only as a consumer of innovation and a passive element in the innovative system (Niedzielski et al. 2008).

The perception of service innovations started to evolve in the 1990s, and today most researchers agree that the service sector not only makes an increasing use of scientific-technological achievements, but also participates in their creation. This is due to the growing role of services in the economy and to a shift in innovative activity from strictly technological fields towards 'softer' ones, like marketing or organisation and management. According to Tokarz (2009), the fundamental difference in the innovation process between industrial and service enterprises is its length and complexity. Industry usually absorbs new technological thought by introducing new technologies into production. A change in the service sector usually does not end with the introduction of a new technology and goes on in the form of constant transformations, perfection and adjustment to customers' needs.

In service enterprises a key role in innovative processes is played by human resources. De Jong et al. (2003: 17) consider three most important differences between innovation in services and in manufacturing: (1) the object of innovation, (2) the degree of novelty, and (3) the dimension of newness. As to the object of innovation in manufacturing, there is usually talk of product and process innovation[3]. In services this distinction tends to be blurred: product and process innovations are very often simultaneous because new services often go together with new patterns of distribution, quality control, contacts with the customer, etc. With reference to the degree of novelty, innovations predominating in the service sector show a lower degree of novelty: new features are only added or replaced without altering the essence of a service. The dimension of novelty can mean innovation understood as a new service offered by a firm; this process usually occurs through an adaptation of services already present on the market or the introduction of a totally new service. In the service sector the two dimensions of novelty often occur together (de Jong et al. 2003; Table 1).

Irrespective of differences between innovation in services and industry, in both sectors it is an important factor of development, of structural changes desirable from the perspective of building a knowledge-based economy, and a basis of re-industrialisation processes.

[3] Such dimensions of innovation have been considered in earlier studies of innovation in industry and service enterprises in Poland; today also examined are organisational and marketing innovations – see the further part of the article.

Changes in the role of the industrial and service sectors in Poland as compared with other EU states

A change in the role of individual sectors of the economy can be considered in terms of a variety of measures, employment being traditionally the most important one, but also gross value added (GVA) as a measure better reflecting the economic aspect of the role of a sector. A change in this role can be examined in terms of changes in the share of individual sectors in the structure of employment and in total GVA. Those changes, in turn, result from the dynamics of change in those measures.

In the years 2000–2014 the dynamics of employment in Poland, and in a decided majority of the other analysed European states, was positive. Exceptions were Lithuania, Latvia, Greece, Portugal and Romania. Romania was the only country registering a systematic drop in the employment figure over the entire study period (the steepest one recorded in 2002). In the case of the other states this was an effect of the economic crisis that started in 2008. The dynamics index in the study period ranged from 150% in Luxembourg to 80% in Romania, with the average for the EU states of 105.5%. In Poland the index exceeded this average and equalled 108.4%. At the start of the analysed period, in the years 2000–2003, a drop in employment was registered here, from 14.5 to 13.6 million. The later economic revival boosted this figure to as much as 15.8 million in 2009. A year later there was a slight decline caused by the crisis, but the next years brought another slight increase and stabilisation at the level of 15.5 million.

The highest mean annual increments in employment were recorded in Luxembourg (3.1%) and Malta (1.6%). Those states felt the effects of the economic crisis to a much smaller extent; it caused a drop in their employment dynamics only in 2009. The later upturn brought about high employment dynamics, especially since 2011. Apart from those two states, relatively high mean annual increments in employment were also noted in Ireland, Cyprus and Spain (1.1–1.0%). In those countries, high employment increments occurred in the first half of the analysed period, i.e. in the years 2000–2007. In Poland the mean annual rise in employment was then 0.45%, slightly higher than the EU average (0.38%).

Increments in employment differed in the two sectors of national economies: industry and services. In the former, a decided majority of most EU states (besides Luxembourg and Poland) registered a negative mean annual increase in employment over the analysed period. In Poland this index was 0.5%, and in the other states it varied from –0.05% in Austria to 5.1% in Malta. The greatest falls in employment in the industrial sector (besides Malta) were noted in the south European countries hit the hardest by the crisis: Greece, Spain and Portugal. Increments in employment were decidedly higher in the service sector. Unlike in industry, in most of those states they were positive and ranged from –1.5% to 3.6%. Only two states had a negative mean annual increment in service employment: Cyprus and Croatia. In this sector the highest mean annual increments were recorded in Luxembourg and Malta as well as in Ireland and Spain. Those states owed their high position in total employment dynamics precisely to the service sector. In Poland the mean annual rise in service employment was then 1.5%, higher than the EU average of 1.1%. Both in Poland and the other states, the dynamics of employment increment in this sector was higher than in industry.

Changes in employment dynamics by economic sector were accompanied by changes in the shares of those sectors in the structure of employment in the analysed states. In 2014 in the 28 EU states this structure looked as follows: the industrial sector accounted for 21.9% of total employment, and the service sector, for 73.1%. The dominance of services was even more marked in the countries of the 'old' EU-15; in their case the share of this sector in the structure of employment was 77.1%, and of industry, 20.0%. In the entire EU it grew in services from 66.1% in 2000 to 73.1%, i.e. by 7 percentage points (henceforth abbreviated to p.p.). By contrast, the share of industry in total employment declined in the EU states from 26.2% to 21.9%.

The largest share of the service sector in employment characterises Great Britain and the Netherlands – 83% (Fig. 1). In 2014 employment in the service sector exceeded 80% also in Belgium and Denmark. This sector had the smallest share in the economic structure in Romania (42%).

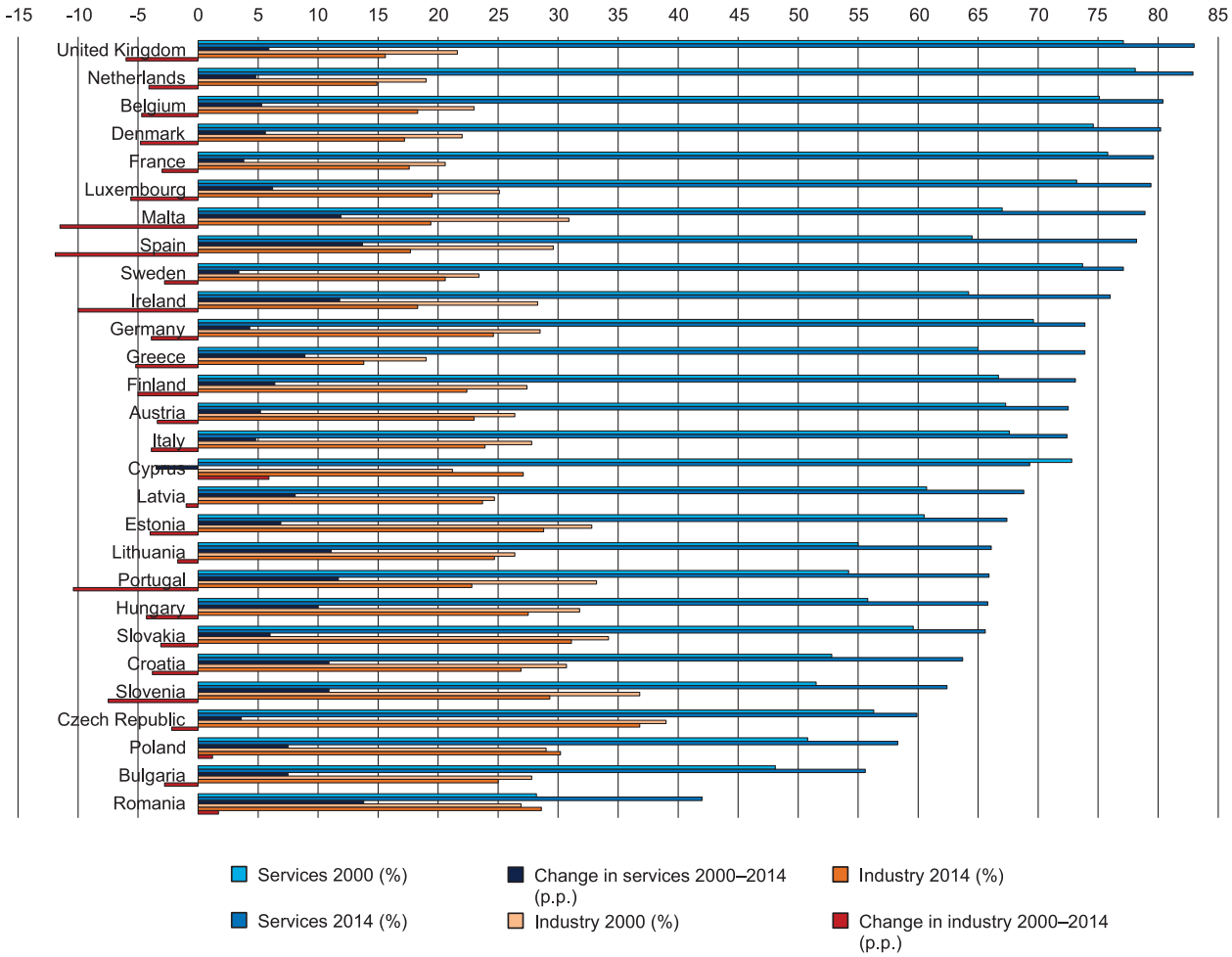

Fig. 1. Changes in the share of industrial and service sectors in employment in the EU states, 2000–2014. Source: own compilation on the basis of Eurostat data.

Poland (together with Bulgaria) belongs to states with this sector contributing a small proportion to employment in the EU. In 2014 employment in services accounted in Poland for 58.3%, 7.5 percentage points higher than at the start of the analysed period (2000). This increase, although big, was not the highest one recorded in the EU states: the highest increments were noted in Romania (13.8 p.p.) and Spain (13.7 p.p.).

In 2014 industry had the largest share in total employment in the Czech Republic (36.8%). It was also large in Slovakia and Poland (over 30%). This was a consequence of the preservation of the high potential of industry developed before 1989 in the conditions of a centrally planned economy, mostly as a result of foreign capital investments in this sector during the post-1989 economic transformation. The smallest share of the industrial sector characterised Greece (13.8%), the Netherlands (14.9), and Great Britain (15.6%). In the years 2000–2014 there were changes in the economic structure of the EU states as measured by employment. The biggest drops in the share of industry, over 10 p.p., were recorded in Spain, Malta, Portugal and Ireland. Poland (together with Cyprus and Romania) was among those few states that registered an increase in the share of this sector. However, it was very small, at 1 p.p.

The service sector also plays the most important role in creating gross value added. Its average share in GVA in the EU states was 72.3% in 2014, up by 2.4 p.p. from 2000 (Fig. 2). The states with the largest contribution of services to GVA include Luxembourg (88%) and Cyprus (87%). In almost all countries (apart from the Czech Republic) the share of this sector in creating GVA increased. The highest increase took place in Malta (15 p.p.), Ireland (11 p.p.) as well

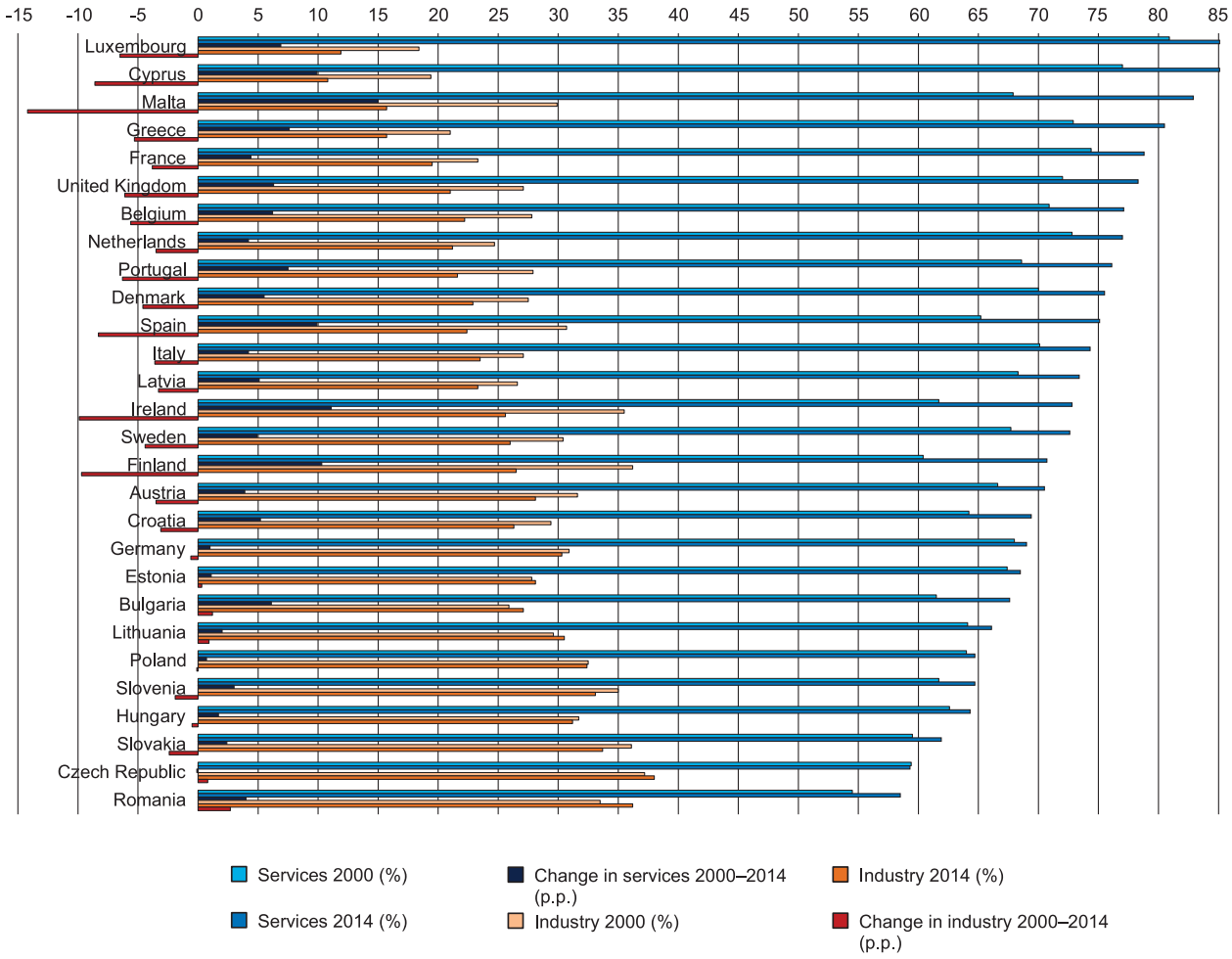

Fig. 2. Changes in the share of the industrial and service sectors in GVA creation in the EU states, 2000–2014. Source: own compilation on the basis of Eurostat data.

as Finland, Spain and Cyprus (10 p.p.). In Poland the rise in the contribution of the service sector to GVA was one of the lowest, a mere 0.7 p.p.

The EU countries where the industrial sector had the greatest share in GVA creation in 2014 were the Czech Republic (38.0%) and Romania (36.2%), followed by Slovakia and Slovenia. Poland with its 32.4% came fifth, the EU average being 25.2%. The lowest share of industry in GVA creation characterised typically service-oriented economies: Cyprus (10.8%), Luxembourg (11.9%) as well as Malta and Greece (15.7%). As to the dynamics of change in the share of this sector in GVA creation, between 2000 and 2014 its contribution declined from 29.1% to 25.2%. The drop was the steepest in Malta (14.2 p.p.), Ireland (9.9 p.p.) and Finland (9.7 p.p.). In Poland it was very small, 0.1 p.p., and in some countries – Estonia, the Czech Republic, Lithuania, Bulgaria and Romania – there was even a slight increase in the share of the industrial sector, which may be indicative of re-industrialisation processes occurring in those countries after the drop in the share of industry at the start of the economic transformation.

Structural changes in the industrial and service sectors in terms of employment

As has already been mentioned, because of changes in the European and Polish Classification of Economic Activities the analysis of structural changes in industry (together with construction) and services will be conducted in two subperiods: the years 2000–2008 and 2008–2014 on the background of general pre-2000 tendencies of change.

Poland's current economic structure is primarily a consequence of the political and economic

conditions that have obtained there over the last decades. In the period of the centrally planned economy, the country's socio-economic policy was geared towards the development of industry, mainly based on cooperation within the socialist bloc. Therefore, as many authors observe, e.g. Osiński (2004), until 1989 employment in Polish industry was excessive, hence in the early 1990s there was a steep drop in it following from the limitation of production and the collapse of many manufacturing plants, especially those strongly or even exclusively linked with cooperators or markets in the former CMEA countries (Council for Mutual Economic Assistance). This brought about structural changes involving a decline in the significance of mining and the traditional branches, like metallurgy or the manufacture of textiles and clothing, as well as the electronic, electromechanical and car industries, which were unable to compete with those in the highly advanced countries as a result of the shock-therapy path of the transformation. The gradual reconstruction of those branches, mainly with the help of foreign investors, took place only in later years, mostly at the close of the 20th and the beginning of the 21st centuries. As a result of the policy of giving preference to the development of industry at the expense of services under the centrally planned economy, the share of employment in services in Poland in the 1980s was much lower than in the advanced European countries. It was only the political, social and economic changes initiated in 1989 that had created foundations for a more dynamic development of this sector here. The 1990s were characterised by a fast growth in employment in services. It was also a period of important structural changes in this sector involving mostly the dynamic development of services for producers and business.

1st period: the years 2000–2008

Generally, in those years there was a slight drop in employment in industry (dynamics index 99.9%, where 2000 = 100) and a substantial rise in employment in services (115.2%). Both sectors increased their shares in its structure: industry by about 2 p.p. (from 26.1% to 28.1%) and services by as much as 11.1 p.p. (from 45.6% to 57.9%). Those changes also followed from a significant decline in agricultural employment, by more than 50%, which meant a drop in its contribution from 28.4% to 15.2%, i.e. by 13.2 p.p.

Worth noting in the structure of industry by section is a drop in employment in Mining (section C) as well as Electricity, gas and water supply (section E) – their dynamics indices were 82.7% and 90.3%, respectively (where 2000 = 100), while a slight increase could be observed in Manufacturing (section D) and Construction (section F), to 101.1% and 103.1%, respectively (Table 2). As a result, the role of those sections in the structure of economic activity as a whole grew slightly, in the case of Manufacturing from 17.6% to 19.3%, and in Construction from 5.4% to 6.0%. The remaining sections are of marginal significance in the structure of employment. It should be kept in mind that in the 1990s, as earlier studies have shown, there were large drops in employment in all industrial sections that followed mainly from its restructuring or the liquidation of many unprofitable state-owned enterprises, generally overmanned at the close of the period of the centrally managed economy. An analysis of structural changes by division shows there to be a large increase in and contribution to employment of more modern branches, like Manufacture of office machinery and computers (dynamics index 173.3%), Manufacture of metal products (150.5%), Recycling (158.9%), and Manufacture of motor vehicles, trailers and semi-trailers (143.0%), the last being mainly connected with foreign investments of the motor industry in Poland and the development of a network of Polish cooperating firms. Generally, those branches have a small share in the structure of employment, both in the economy as a whole and in industry. The share is slightly greater in the case of Manufacture of metal products, which grew from 1.4% to 2.2% over the study period (with reference to total employment in the economy). Manufacture of food products and beverages kept its greatest share (3.2%), even though employment declined slightly in it. The steepest drops in employment were observed in Manufacture of wearing apparel and furriery (60.6%), Processing of leather and manufacture of leather products (59.3%), and Manufacture of basic metals (73.5%), all of them of little significance in the structure of employment. Those changes are indicative of the modernisation of the structure of Polish industry.

For the purposes of further analysis, the service sector was divided into traditional market services (sections G–I), business services (sections J–K) and public services (sections L–O). In the structure of employment (Table 2) in the service sector the most important role is played by section G embracing mainly trade (Wholesale and retail trade; repair of motor vehicles). From the start of the analysed period (and older data show that this process has been going on since the early 1990s) a systematic rise can be observed in the significance of those services in the structure of employment. The share of section G in total employment grew from 13.7% in 2000 (12.5% in 1992) to 16.2% in 2008. The dynamics index of the growth in employment in this section was 109.4% (where 2000 = 100). The dynamics was slightly higher in section H (Hotels and restaurants). Its contribution to total employment is small, less than 2% in 2008, but its employment dynamics index was high in the years 2000–2008, at 122%. In the group of market services the lowest dynamics of employment growth marked services of section I (Transport, storage and communication).

Table 2. Changes in employment in Poland by section and division of NACE Rev. 1 in the years 2000–2008.

Sections/selected divisions	Employment in thous.		Dynamics 2000 = 100	Share %	
	2000	2008		2000	2008
TOTAL	**15,159.2**	**14,037.0**	**92.6**	**100.00**	**100.00**
A-B. Agriculture, hunting and forestry; fishing	**4,304.6**	**2,138.4**	**49.7**	**28.40**	**15.23**
C. Mining	**223.2**	**184.6**	**82.7**	**1.47**	**1.32**
D. Manufacturing	**2,674.7**	**2,705.1**	**101.1**	**17.64**	**19.27**
Manufacture of food products and beverages	491.7	458.6	93.3	3.24	3.27
Manufacture of tobacco products	8.5	6.8	80.5	0.06	0.05
Manufacture of textiles	101.7	80.6	79.2	0.67	0.57
Manufacture of wearing apparel and furriery	237.7	144.1	60.6	1.57	1.03
Publishing, printing and reproduction of recorded media	95.7	100.4	104.9	0.63	0.71
Manufacture of coke and refined petroleum products	18.2	15.7	86.3	0.12	0.11
Manufacture of chemicals and chemical products	109.6	108.3	98.8	0.72	0.77
Manufacture of rubber and plastic products	122.6	173.8	141.8	0.81	1.24
Manufacture of basic metals	97.2	71.4	73.5	0.64	0.51
Manufacture of metal products	207.2	311.9	150.5	1.37	2.22
Manufacture of office machinery and computers	5.8	10.1	173.3	0.04	0.07
Manufacture of electrical machinery and apparatus n.e.c.	95.4	111.3	116.6	0.63	0.79
Manufacture of radio, television and communication equipment and apparatus	34.8	39.3	112.9	0.23	0.28
Manufacture of medical, precision and optical instruments, watches and clocks	45.7	49.0	107.2	0.30	0.35
Manufacture of motor vehicles, trailers and semi-trailers	97.2	139.0	143.0	0.64	0.99
E. Electricity, gas and water supply	**236.5**	**213.6**	**90.3**	**1.56**	**1.52**
F. Construction	**814.6**	**839.9**	**103.1**	**5.37**	**5.98**
G. Trade and repair	**2,074.6**	**2,268.8**	**109.4**	**13.69**	**16.16**
H. Hotels and restaurants	**225.7**	**275.9**	**122.2**	**1.49**	**1.97**
I. Transport, storage and communication	**779.3**	**809.1**	**103.8**	**5.14**	**5.76**
J. Financial intermediation	**298.6**	**356.8**	**119.5**	**1.97**	**2.54**
K. Real estate, renting and business activities	**822.6**	**1,132.6**	**137.7**	**5.43**	**8.07**
Computer and related activities	50.5	102.5	203.0	0.33	0.73
L. Public administration and defence; compulsory social security	**492.6**	**919.4**	**186.6**	**3.25**	**6.55**
M. Education	**902.8**	**1,038.5**	**115.0**	**5.96**	**7.40**
O. Human health and social work	**908.2**	**747.6**	**82.3**	**5.99**	**5.33**
Recreational, cultural, and sporting activities	152.7	174.5	114.2	1.01	1.24

Source: own compilation on the basis of the Statistical Labour Yearbooks of the Central Statistical Office.

Its share in total employment rose from 5.1% to 5.7%, the dynamics index being 104%. However, there were wide differences within the section. Water transport showed the lowest dynamics, that of land transport and transport via pipelines being decidedly higher, at 140%.

An increasingly important role in the structure of employment is played by business services represented by sections K (Real estate, renting and business activities) and J (Financial intermediation). The share of those services in employment in the years 2000–2008 grew in Poland from 5.4% to 8.1% (section K) and from 1.9% to 2.5% (section J). The employment dynamics index in section K was 138%, and in section J, 120%. Among business-related services, dynamics was the highest (203%) in Computer and related activities (division 72).

The differences in employment dynamics among public services are wide. The highest dynamics is shown by section L (Public administration and defence). In the years 2000–2008 its share in total employment rose from 3.3% to 6.6%, and the very high employment dynamics index in that period, 187%, was a result of an administrative reform involving the introduction of the intermediate poviat level, and hence the expansion of local-government administration. In the case of educational services, the share of section M (Education) in total employment grew from 6% to 7.4%, its dynamics index amounting to 115%. The only service section that recorded a drop in employment was section N (Health and social work), accompanied by a drop in the share in total employment from 6% to 5.3%. In the years 2000–2008 the employment dynamics index in health-related services was 82.3%. This is an effect of the insufficient funding of health care and the resultant economic migration of Polish health-care workers to other EU countries. It is an alarming tendency, especially in view of the advancing ageing of society.

2nd period: the years 2009–2014

In the second, shorter period – the years 2009–2014 – the industrial sector included 5 sections, from B to F, which followed from the division of the old section E (Electricity, gas supply and water supply) into two sections. In that period we observe a further drop in employment (Table 3) in section B – Mining and quarrying (to 87.3%, with 2009 = 100), section D – Electricity, gas, steam and air conditioning supply (86.3%), and section F – Construction (92.9%). There was an increase in sections C – Manufacturing (104.0%) and E – Water supply; sewerage, waste management and remediation activities (107.8%). The increase in Manufacturing is a consequence of the fact that in the 21st century Poland has become a centre of production of sub-assemblies and final products for global corporations, especially in the car industry or the manufacture of radio and TV equipment as well as household goods, being still, even in the period of the economic crisis, an important country in CE Europe attracting the inflow of foreign investment to industry. This is due to favourable conditions for investors, e.g. production costs still lower than in the advanced West European states, a well-developed infrastructure, and resources of skilled labour. Those changes were accompanied by slight drops in the shares of four sections in the structure of employment (though not significant, never exceeding 0.3 p.p.), the only exception being section E, where a minimum increase was recorded (0.02 p.p.). The divisions developing the fastest in that period were Printing and reproduction of recorded media (155.5%) and – as in the previous period – Manufacture of motor vehicles, trailers and semi-trailers (127.5%). Those that declined were traditional labour-intensive industries, like Manufacture of wearing apparel (72.6%) and Manufacture of beverages (82.4%). We can therefore speak of industry keeping its share in employment and a tendency of change in its structure indicative of re-industrialisation processes leading to an increase in the share of industries more advanced technologically. However, it should be observed that in the most advanced ones, like Manufacture of computer, electronic and optical products, there was stagnation in employment, or even a slight drop in the case of Manufacture of pharmaceutical products. This resembles the tendency of change in the other countries of CE Europe, e.g. the Czech Republic and Hungary (Rachwał 2011).

In that second period (2009–2014) the analysis of the service sector embraced the following:

Table 3. Changes in employment in Poland by section and division of NACE Rev. 2 in the years 2009–2014.

Sections/selected divisions	Employment		Dynamics 2009=100	Share %	
	2009	2014		2009	2014
TOTAL	**13,782,250**	**14,563,387**	**105.7**	**100.00**	**100.00**
A. Agriculture, forestry and fishing	**2,124,945**	**2,384,893**	**112.2**	**15.42**	**16.38**
B. Mining and quarrying	**183,429**	**160,235**	**87.4**	**1.33**	**1.10**
C. Manufacturing	**2,420,538**	**2,517,785**	**104.0**	**17.56**	**17.29**
Manufacture of food products	416,328	415,088	99.7	3.02	2.85
Manufacture of beverages	29,843	24,593	82.4	0.22	0.17
Manufacture of tobacco products	6,367	5,899	92.6	0.05	0.04
Manufacture of textiles	53,991	53,532	99.1	0.39	0.37
Manufacture of wearing apparel	137,191	99,558	72.6	1.00	0.68
Manufacture of leather and related products	28,107	27,761	98.8	0.20	0.19
Printing and reproduction of recorded media	31,820	49,471	155.5	0.23	0.34
Manufacture of coke and refined petroleum products	15,770	13,136	83.3	0.11	0.09
Manufacture of chemicals and chemical products	72,167	77,052	106.8	0.52	0.53
Manufacture of pharmaceutical products	24,620	21,923	89.0	0.18	0.15
Manufacture of rubber and plastic products	162,956	190,034	116.6	1.18	1.30
Manufacture of basic metals	59,036	62,218	105.4	0.43	0.43
Manufacture of metal products	263,237	310,931	118.1	1.91	2.14
Manufacture of computer, electronic and optical products	60,642	60,206	99.3	0.44	0.41
Manufacture of electrical equipment	92,419	102,350	110.7	0.67	0.70
Manufacture of motor vehicles, trailers and semi-trailers	136,022	173,420	127.5	0.99	1.19
D. Electricity, gas, steam and air conditioning supply	**151,291**	**130,516**	**86.3**	**1.10**	**0.90**
E. Water supply; sewerage, waste management and remediation activities	**136,545**	**147,151**	**107.8**	**0.99**	**1.01**
F. Construction	**882,759**	**819,997**	**92.9**	**6.41**	**5.63**
G. Trade; repair of motor vehicles	**2,179,549**	**2,176,576**	**99.9**	**15.81**	**14.95**
H. Transportation and storage	**693,652**	**743,736**	**107.2**	**5.03**	**5.11**
I. Accommodation and catering	**252,527**	**248,683**	**98.5**	**1.83**	**1.71**
J. Information and communication	**239,593**	**292,117**	**121.9**	**1.74**	**2.01**
Programming and broadcasting activities	16,593	15,633	94.2	0.12	0.11
Computer programming and consultancy activities	74,026	132,550	179.1	0.54	0.91
Information service activities	21,572	34,832	161.5	0.16	0.24
K. Financial and insurance activities	**333,889**	**356,762**	**106.9**	**2.42**	**2.45**
L. Real estate activities	**193,035**	**203,912**	**105.6**	**1.40**	**1.40**
M. Professional, scientific and technical activities	**480,231**	**588,690**	**122.6**	**3.48**	**4.04**
Legal and accounting activities	133,640	190,515	142.6	0.97	1.31
Activities of head offices; management consultancy activities	70,462	98,789	140.2	0.51	0.68
Architectural and engineering activities; technical testing and analysis	110,904	126,214	113.8	0.80	0.87
Advertising and market research	61,578	62,634	101.7	0.45	0.43
N. Administrative and support service activities	**375,660**	**464,826**	**123.7**	**2.73**	**3.19**
O. Public administration and defence; compulsory social security	**964,536**	**971,147**	**100.7**	**7.00**	**6.67**
P. Education	**1,071,870**	**1,124,156**	**104.9**	**7.78**	**7.72**
Q. Human health and social work activities	**747,508**	**827,259**	**110.7**	**5.42**	**5.68**
R. Arts, entertainment and recreation	**146,326**	**144,920**	**99.0**	**1.06**	**1.00**
S. Other service activities	**204,367**	**260,026**	**127.2**	**1.48**	**1.79**

Source: own compilation on the basis of the Statistical Labour Yearbooks of the Central Statistical Office.

traditional market services (sections G to I[4]), business services (sections J to N), and public services (sections O to S).

There was stabilisation in traditional market services, or even a slight drop in employment in trade services (section G). The contribution of this section fell from 15.8% to 15%. Similar changes took place in the other traditional market services – section I, Accommodation and food service activities (a drop from 1.8% to 1.7%). In both sections the employment dynamics index in the years 2009–2014 was 99%. This figure was higher – 107% – in transport services (section H).

A decidedly higher employment dynamics was recorded – as in the previous period – in business services. The highest employment dynamics index in the years 2009–2014 was noted in section J – Information and communication. For the entire section it was 122%, but the indices were decidedly higher in divisions 62 – Computer programming, consultancy and related activities (180%), and 63 – Information service activities (162%). A dynamics index similar to that of section J (122%) was also recorded in section M – Professional, scientific and technical services. Here the employment dynamics was the highest (over 140%) in Legal and accounting activities (division 69) as well as Activities of head offices and management consultancy activities (division 70). Also the next section N – Administrative and support service activities, showed high employment dynamics, at 124%. In this section its index assumed especially high values in divisions 78 – Employment activities (236%) and 82 – Office administrative, office support and other business support activities (196%). The other, less significant sections involving business services, namely K – Financial and insurance activities and L – Real estate activities, showed employment dynamics at 107% and 106%, respectively.

In public services, the following trends in employment dynamics were observed. Employment stabilised in section O – Public administration and defence; here the index was 100.7%. In Education (section P) the trend of a rise in employment continued from the previous subperiod (a dynamics index of 105%). Significant changes took place in Human health and social work activities (section Q). In the years 2009–2014 the employment in this section grew, the dynamics index amounting to 106%.

The processes occurring in the structure of the service sector in Poland are characteristic of most states of CE Europe. Here the sector of trade services has a relatively greater share in employment and higher growth dynamics. Those services account for a decidedly smaller share of employment in Western and Northern Europe, where it has kept the same or declined over the last dozen or so years. Business services belong to those with the highest growth dynamics. This is a general European trend resulting from the growing significance of knowledge-based services, from the support of economic activity at the time of development of a modern economy. Still, the share of those services in total employment in Poland (and other states of CE Europe) is decidedly lower than in the more advanced states of NW Europe, and the high development dynamics of business services in this part of Europe is evidence of closing the gap between them and the better developed countries of NE Europe. In countries at a higher level of socio-economic development, the increase in the share of employment in business services have occurred mainly at the expense of trade, transport, hotelling and food services. In CE European states trade services still have a relatively large share in the structure of employment, and the growth in importance of business services over the last decade or so has resulted primarily from a drop in employment in public services (Dominiak, Hauke 2015).

Structural changes in the industrial and service sectors in terms of gross value added

Because of the availability of data, an analysis of structural changes in industry and services using gross value added as the measure is only possible at the section level, but it embraces comparable data by PKD 2007 section (NACE Rev. 2.0) for the years 2000–2013. Generally, all sections in both industry and services recorded an increase in GVA (at current prices), the highest dynamics characterising sections D (Electricity, gas, steam and air conditioning supply) and N (Administrative and support service activities);

[4] Full names of the service sections can be found in Table 3.

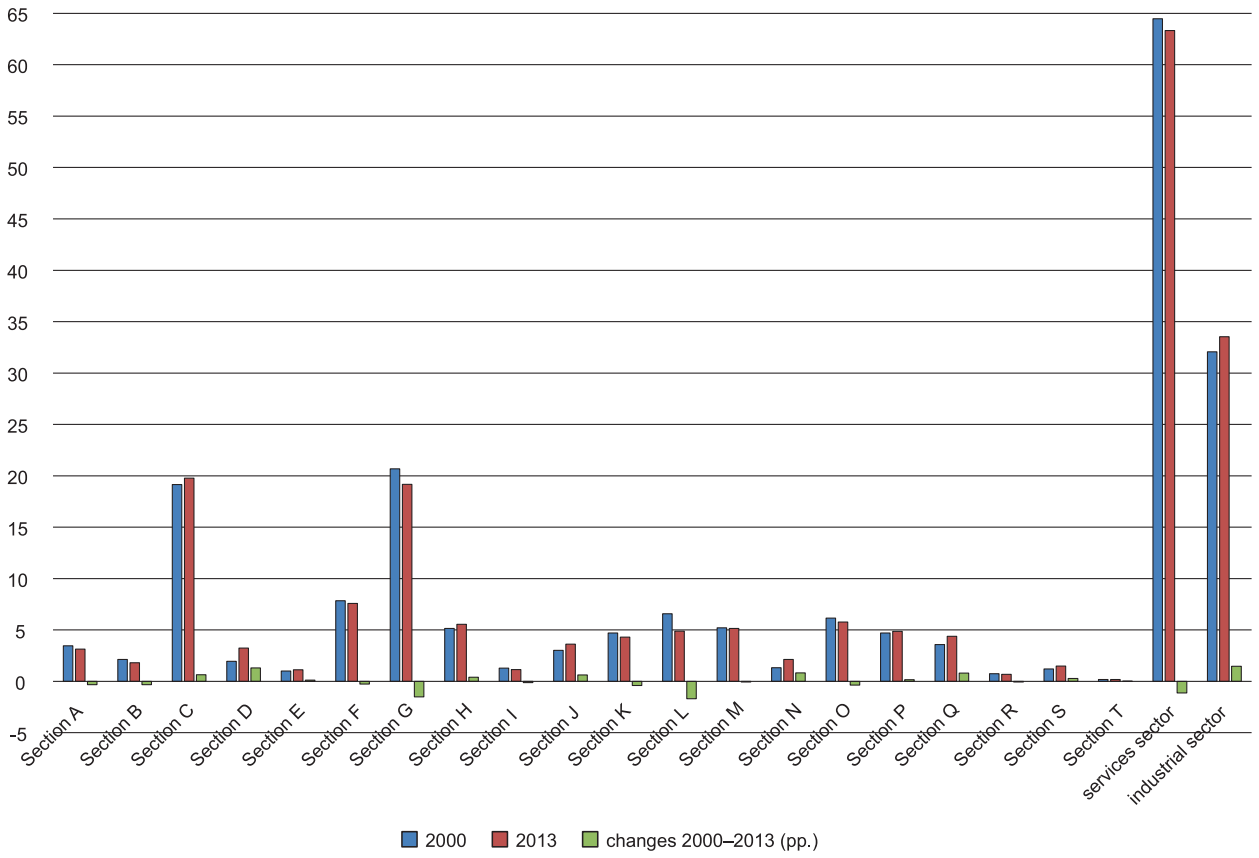

Fig. 3. Changes in the share of industrial and service sections in gross value added in the years 2000–2013. Source: own compilation on the basis of Central Statistical Office data.

their indices were 370.6% and 350.2%, respectively (where 2000 = 100). The lowest increase was recorded in sections B (Mining and quarrying) – 188.5%, and L (Real estate activities) – 164.8%.

The individual sections developed fairly evenly, hence changes in their share in the structure of GVA are slight (Fig. 3). However, one can observe a small rise in the share of total industry (with construction) from 32.1% to 33.5%, i.e. by 1.5 p.p., and a drop in the share of services from 64.4% to 63.3%, i.e. by 1.1 p.p. It should be emphasised that those figures fluctuated annually in the analysed period 2000–2013 (services from 62.3 to 67.2%, and industry from 29.8% to 34.6%). It might be noted that in the light of Eurostat data for the years 2000–2014 in the ISIC Rev. 3.0/4.0 classification, quoted in the first part of the analysis, there was a slight drop in the share of industry in the years 2000–2014 (by –0.1 p.p.), and an increase in that of services (by 0.7 p.p.). Although some discrepancies in the classifications and time intervals do not allow precise direct comparisons, since 2000 one can observe a tendency for services and industry to keep their shares in the structure of GVA, those shares being slightly greater than their shares in employment.

Thus, changes in the share of individual sections over the years 2000–2013 were slight. The highest increases were recorded in sections D (Electricity), from 1.9% to 3.1%, i.e. by 1.3 p.p.; N (Administrative and support service activities), from 1.3% to 2.1%, by 0.8 p.p.; Q (Human health and social work activities), from 3.6% to 4.4%, by 0.8 p.p.; as well as C (Manufacturing) and J (Information and communication), by 0.6 p.p. The steepest drops occurred in sections L (Real estate activities), from 6.6% to 4.9%, i.e. by -0.5 p.p., and G (Wholesale and retail trade), from 20.7% to 19.2, i.e. by –1.5 p.p. In the remaining 8 sections that recorded a decline the changes were slight and did not exceed 0.4 p.p. We can therefore speak of a stabilisation of this structure.

Innovativeness of industrial and service enterprises

A key role in structural changes in industry and services intended to modernise their structure to enable them to face challenges connected with the development of information society, the building of a knowledge-based economy and re-industrialisation is played by the question of innovativeness of enterprises treated as basic elements of the economic structure. Detailed studies of the innovativeness of industrial enterprises (without construction) and service firms have been carried out by the Central Statistical Office since 2009 with reference to process and product innovations, but data concerning all basic kinds of innovation, hence also organisational and marketing innovations the significance of which keeps growing, are only available from 2012. The analysis conducted involved a comparison of the level of innovativeness of enterprises in the two sectors in terms of their innovative activity (the introduction of various types of innovation) and outlays on innovations (by kind and source). It showed that in the years 2012–2014 11.7% of the industrial enterprises examined introduced product innovations, and 12.9%, process innovations (Table 4). Those indices are decidedly higher than in the case of service enterprises (6.8% and 8.4%, respectively), which follows partly from the specific nature of those sectors. As to organisational and marketing innovations, the indices were slightly higher in the case of service enterprises than industrial ones, but they did not exceed 10%, which means that a decided majority did not introduce any innovation.

Table 4. Enterprises that introduced innovations in the years 2012–2014 (as % of all enterprises).

Sector	New or significantly improved products	New or significantly improved processes	Organisational innovations	Marketing innovations
Industry*	11.7	12.9	8.4	7.6
Services	6.8	8.4	9.7	7.9

*Data do not embrace section F, Construction, because the study was not conducted in construction enterprises.
Source: own compilation on the basis of Central Statistical Office data.

Detailed data concerning the innovativeness of enterprises in individual sections and divisions show that firms most innovative in terms of products are those in the manufacturing divisions: Manufacture of pharmaceutical products (41.9%), Manufacture of chemical products (32.1%) and Manufacture of electrical equipment (30.5), and in the service division of Insurance, reinsurance and pension funding (42.3%). The other service divisions, with the exception of R&D, have low indices, under 20%, and often under 10%. As to process innovations, the highest indices can be found in Manufacture of coke and refined petroleum products (33.3%) and Manufacture of pharmaceutical products (27.9%), and again in the service division of Insurance, reinsurance and pension funding (56.3%). In the case of organisational innovations, the highest indices appear in Manufacture of tobacco products (33.3%) and again in Insurance (36.6%), and in the case of marketing innovations, Manufacture of beverages (26.7%) and Insurance (46.5%). The lowest innovativeness in all kinds of innovation is displayed by traditional manufacturing branches: Textiles, clothes, leather and leather products, and in services, by Land transport and transport via pipelines.

An important factor decisive for the effects of innovative activity is outlays earmarked for it. In the years 2006–2014 those outlays grew from 17.2 to 24.6 billion zlotys, i.e. to 142.7% (with 2006 = 100) in industry, and from 8.2 to 13.0 billion zlotys, i.e. to 157.4%, in services (Fig. 4). Predominating in the structure of outlays are those for fixed assets, mainly machines and equipment, both in industry and in services. Of relatively slight significance are important outlays for R&D, even though in both sectors they roughly tripled. Outlays for marketing and personnel training connected with innovations are of marginal significance.

Outlays for innovations are financed mainly from enterprises' own funds; in both sectors they account for more than 2/3 of their expenses (Fig. 5). However, notable in the years 2006–2014 was a declining contribution of the firms' own resources to the structure of outlays, by more than 20 p.p. in services and by less than 10 p.p. in industry. In turn, there was an increase in the share of means obtained from abroad. In services bank credits play an ever more important role,

while in industry there is a visible drop in their share. Budgetary means are of little significance in financing innovations.

An analysis of data on the cooperation of enterprises in the field of innovation reveals an unfavourable downward trend in the proportion of cooperating firms – in the case of industry, from 24.5% in 2005 to 5.6% in 2014, or by –18.9 p.p., and in the case of services, from 6.7% in 2008 to 3.0 in 2014, i.e. by –3.7 p.p. This tendency concerns primarily large and medium-sized enterprises.

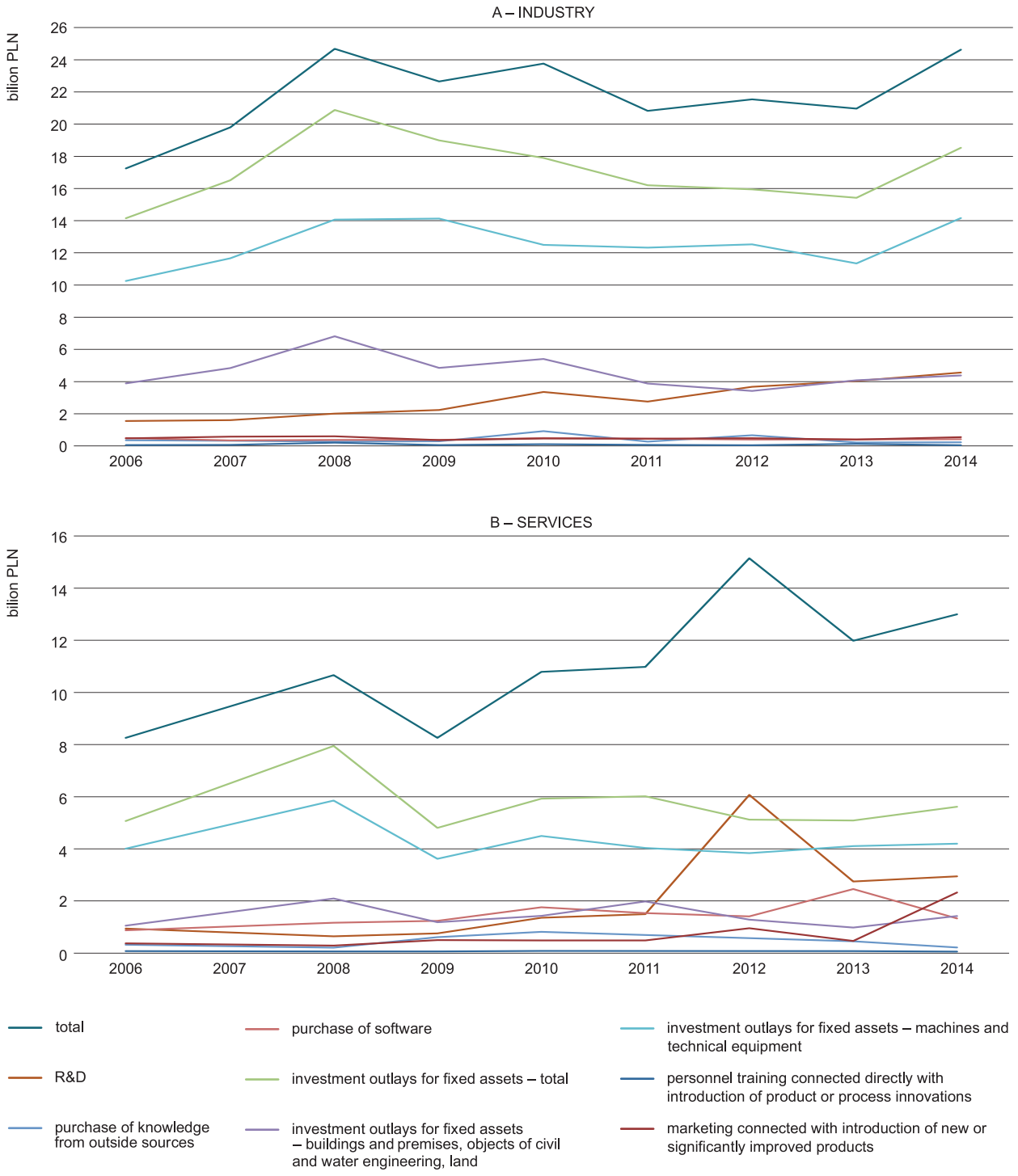

Fig. 4. Outlays for innovative activity in enterprises by kind of activity in the years 2006–2014 in billion zlotys (A – industry, B – services).
Source: own compilation on the basis of Central Statistical Office data.

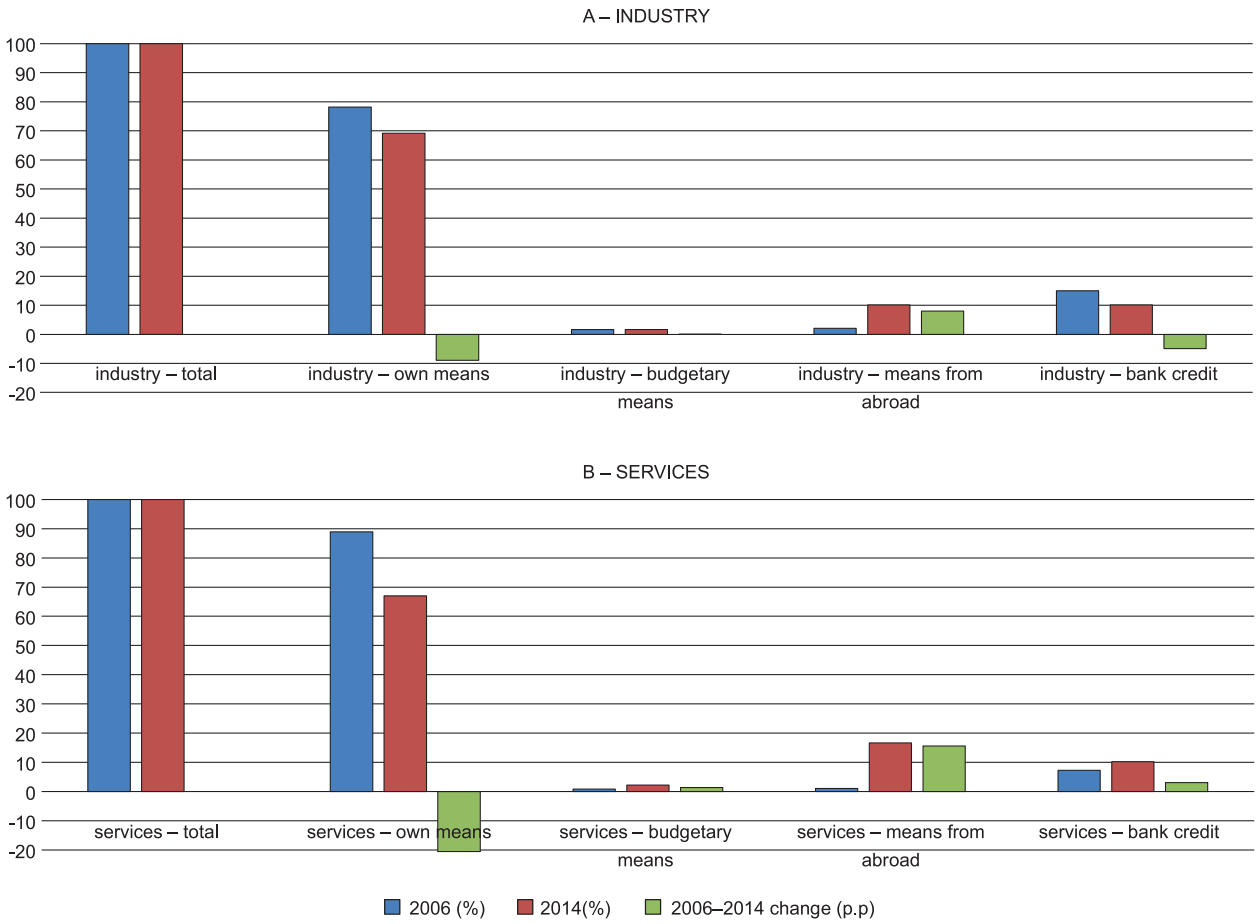

Fig. 5. Outlays for innovative activity in enterprises by source of financing in the years 2006–2014.
Source: own compilation on the basis of Central Statistical Office data.

Conclusions

To sum up the analysis, changes in the role of the industrial and service sectors in the economy were relatively slight and followed a general trend in civilisational development towards an increase in the share of services in employment and in their contribution to gross value added. Still, worth noting is the relatively large share of industry in Poland, also characteristic of other countries of CE Europe, and its relative stabilisation, unlike in West European states where the share of industry keeps declining, as also pointed out in earlier works (Rachwał 2011). Changes in the branch structures of industry and services over the analysed period were slight, with a faint upward tendency in the share of more modern branches, especially in manufacturing, at the cost of traditional ones. Such changes in its structure may be indicative of re-industrialisation processes taking place here, especially when there is an increase in its contribution to the structure of gross value added. In the service sector, there is an increase in the share of business services, but with a still large proportion of employment in traditional services, primarily trade (in contrast to West European countries). A low share of business services and other knowledge-based services, both in employment and in creating gross value added, is characteristic of states at a lower level of economic development.

The analysis of innovative activity showed innovation indices in industry to be slightly higher than in services. While there is a clear tendency towards stagnation in outlays on innovative activity in the period of the crisis (since 2009), generally we can speak of an upward trend in those outlays. They mainly come from firms' own funds, although in the recent years increasingly significant has been outsourcing, mostly funds

from abroad. A negative development has been a decline in the cooperation of enterprises within the framework of innovative activity. The presented results and earlier studies of those two sectors in the 1990s show that the greatest change in their role and structure occurred at the start of the systemic transformation, in the period of the so-called strategic shock, while the 21st century shows a stability in this structure, which also follows from the inertia of the industrial sector resulting from a long and costly innovative process and its relatively great role in the economy. This means that economic development in the transformation period was based not only on the dynamic development of services, but also to a considerable extent on industrial activity. The presented results also demonstrate the need for a further in-depth research because since 2009 it was conducted in the conditions of a world-wide economic crisis, which could significantly affect slight fluctuations and the maintenance of the old structure. Therefore it seems necessary to observe events in the post-crisis period. It would also be good to analyse how far the large share of industry in the Polish economy is beneficial to its development, especially in view of general re-industrialisation possible in the entire European Union.

References

Acs Z.J., Varga A., 2002. Geography, endogenous growth, and innovation. *International Regional Science Review* 25: 132–148.

Atuahene-Gima K., 1996. Differential potency of factors affecting innovation performance in manufacturing and service firms in Australia. *Journal of Product Innovation Management* 13: 35–52.

Barras R., 1986. Towards a theory of innovation in services. *Research Policy* 15: 161–173.

Baumol W.J., 1968. Macroceonomics of unbalanced growth: Comment. *American Economic Review* 58(4): 896–897.

Becheikh N., Landry R., Amara N., 2006. Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993–2003. *Technovation* 26(5-6): 644–664; http:// dx.doi.org/ 10.1016/ j.technovation.2005.06.016.

Bell D., 1973. *The coming of post-industrial society: A venture in social forecasting*. Basic Books, New York.

Brouwer E., 1997. *Into innovation: Determinants and indicators*. University of Amsterdam, Drukkerij Elinkwijk b.v., Utrecht.

Borowiec M., Dorocki S., Jenner, B., 2009. Wpływ zasobów kapitału ludzkiego na kształtowanie społeczeństwa informacyjnego i innowacyjności struktur przemysłowych (Effect of human capital resources on the formation of information society and innovativeness of industrial structures). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 13: 95–109.

Chojnicki Z., 1999. Region w ujęciu geograficzno-systemowym (The region in a geographical-systemic approach). In: Chojnicki Z. (ed.), *Podstawy metodologiczne i teoretyczne geografii*. Bogucki Wydawnictwo Naukowe, Poznań: 327–353.

Christopherson S., Martin R., Sunley P., Tyler P., 2014. Reindustrialising regions: rebuilding the manufacturing economy? *Cambridge Journal of Regions, Economy and Society* 7 (3): 351–358.

Clark C., 1940. *The conditions of economic progress*. Macmillan, London.

Coombs R., Miles I., 2000. Innovation, measurement and services: The new problematique. In Metcalfe J.S., Miles I. (eds), *Innovation systems in the service economy, measurement and case study analysis*. Kluwer Academic Publishers, Boston: 85–103.

Cooper R.G., de Brentani U., 1991. New industrial financial services: what distinguishes the winners. *Journal of Product Innovation Management* 8(2): 75–90.

Daszkowska M., 1998. *Usługi. Produkcja, rynek, marketing* (Services. Production, market, marketing). Wydawnictwo Naukowe PWN, Warszawa.

De Jong J.P.J., Bruins A., Dolfsma W., Meijaard J., 2003. *Innovation in service firms explored: what, how and why?* EIM Business & Policy Research Zoetermeer.

Dobrowolski Z.,2005. Koncepcja społeczeństwa informacyjnego Daniela Bella (Daniel Bell's conception of information society). In: Sosińska-Kalata B., Przastek-Samokowa M. (eds), *Od informacji naukowej do technologii społeczeństwa wiedzy*. Wydawnictwo SBP, Warszawa.

Dominiak J., 2015. Zmiany struktury sektora usług w Polsce w latach 1995–2012 (Changes in the structure of the service sector in Poland in the years 1995–2012). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 29(2): 79–93.

Dominiak J., Hauke J., 2015. The changes of the service sector in Poland and other EU countries. In: Churski P., Kopczewska K. (eds), *Studia Regionalia* 41–42: 37–50.

Drejer I., 2003. Identifying innovation in surveys of services: a Schumpeterian perspective. *Research Policy* 33(3): 551–562.

Fagerberg J., Verspagen B., 2009. Innovation studies: The emerging structure of a new scientific field. *Research Policy* 38 (2): 218–233, http://dx.doi.org/10.1016/j.respol.2008.12.006

Faulkner W., 1994. Conceptualizing knowledge used in innovation: A second look at the science-technology distinction and industrial innovation. *Science, Technology & Human Values* 19: 425–458.

Fisher A., 1939. Production, primary, secondary and tertiary. *Economic Record* 15(1): 24–38.

Fisher A.G.B., 1935. *The clash of progress and security*. Macmillan, London.

Fixler D.J., Siegel D., 1999. Outsourcing and productivity growth in services. *Structural change and economic dynamics* 10(2): 177–194.

Fourastié J., 1949. *Le grand espoir du XXe siecle. Progress technique, progress economique, progress social*. Presses Universitaires de France, Paris.

Fuchs V.R. (assisted by Irving Leveson), 1968. *The service economy*. National Bureau of Economic Research, New York.

Gajda W., 2015. Innowacyjność polskiego przemysłu na tle przemysłu światowego (Innovativeness of Polish in-

dustry as compared with world industry). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 29(1): 42–55.
Galbraith J.K., 1967. *The new industrial state*. Houghton Mifflin, Boston.
Gallouj F., 2002. *Innovation in the service economy*. Edward Elgar, Cheltenham, UK.
Gallouj F., Weinstein O., 1997. Innovation in services. *Research Policy* 26(4–5): 537–556.
Gawlikowska-Heuckel K., 2014. Polityka przemysłowa i spójności wobec planów reindustrializacji Unii Europejskiej. Wnioski dla Polski (Industrial and cohesion policies in the light of EU reindustrialisation plans. Conclusions for Poland). *Gospodarka Narodowa* 5(273): 53–80.
Gershuny J., 1978. *After industrial society? The emerging self-service economy*. MacMillan Press, London and Basingstoke.
Giarini O., 1986. Coming of the service economy. *Science and Public Policy* 13(4): 209–215.
Gierańczyk W., 2009. Innowacyjność jako główny filar społeczeństwa informacyjnego Europy (Innovativeness as the chief pillar of Europe's information society). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 13: 82–94.
Gierańczyk W., Rachwał T., 2012. Structural changes in the industry of Poland against the background of eastern European Union states. *Quaestiones Geographicae* 31(2): 83–93.
Golejewska A., 2012. Innowacyjność a konkurencyjność regionalna krajów Grupy Wyszehradzkiej w latach 1999–2008 (Innovativeness and regional competitiveness of Visegrad Group states in the years 1999–2008). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 19: 93–115.
Guzik R., Gwosdz K., Sobala-Gwosdz A., 2001. Regionalne zróżnicowanie usług dla biznesu w województwie małopolskim (Regional differences in business services in Małopolska). *Folia Geographica, Series Oeconomica*, XXXI-XXXII: 161–177.
Hauknes J., 1998. *Services in innovation, innovation in services*. SI4S Final Report, STEP Group, Oslo.
Heymann E., Vetter S., 2013. *Europe's re-industrialisation: The gulf between aspiration and reality*. Deutsche Bank Research EU Monitor – European integration. Frankfurt am Main: Deutsche Bank AG.
Hipp Ch., Grupp H., 2005. Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies. *Research Policy* 34(4): 517–535.
Howells J., Tether B., 2004. *Innovation in services: Issues at stake and trends. INNOStudies 2001*: ESRC Centre for Research on Innovation and Competition (CRIC), Institute of Innovation Research. Manchester, UK.
Ilnicki D., 2009. *Przestrzenne zróżnicowanie poziomu rozwoju usług w Polsce. Teoretyczne i praktyczne uwarunkowania badań* (Spatial differences in the level of service development in Poland. Theoretical and practical determinants of research). Rozprawy Naukowe Instytutu Geografii i Rozwoju Regionalnego Uniwersytetu Wrocławskiego 11.
Kabaj M., 1972. *Elementy pełnego racjonalnego zatrudnienia w gospodarce socjalistycznej* (Elements of full rational employment in a socialist economy). KIW, Warszawa.
Katouzian M.A., 1970. The development of the service sector: A new approach. *Oxford Economic Papers* 22: 362–382.
Kenessey Z., 1987. The primary, secondary, tertiary and quaternary sectors of the economy. *Review of Income and Wealth* 33: 359–385.
Kłosowski F., 2006. *Sektor usług w gospodarce regionu tradycyjnego w warunkach transformacji i restrukturyzacji. Przykład konurbacji katowickiej.* (The service sector in the economy of a traditional region in the conditions of transformation and restructuring. An example of the Katowice conurbation). Uniwersytet Śląski, Katowice.
Kosała M., 2015. Innovation processes as a stimulant of internationalisation process of firms. *Entrepreneurial Business and Economics Review* 3(2): 65–84.
Kwiatkowski E., 1980. *Teoria trzech sektorów gospodarki. Prezentacja i próba oceny* (The theory of three economic sectors. Presentation and an assessment). PWN, Warszawa.
Müller K., Rammer Ch., Trüby J., 2009. The role of creative industries in industrial innovation. *Innovation: Management, Policy & Practice* 11(2): 148–168.
Menz L., 1965. *Der tertiare Sektor*. Polygraphischer, Zurich.
Miles I., 2000. Services innovation: coming of age in the knowledge-based economy. *International Journal of Innovation Management* 4(4): 371–389.
Miles I., 2005. Innovation in services. In: Fagerberg J., Mowery R., Nelson R. (eds), *The Oxford Handbook of Innovation*. Oxford University Press, Oxford: 433–458.
Niedzielski P., Rychlik K., 2007. Innowacje w sektorze produkcyjnym i usługowym – odmienność czy podobieństwo? (Innovation in the manufacturing and service sectors – differences or similarities?) *Zeszyty Naukowe Uniwersytetu Szczecińskiego* 356, *Ekonomiczne Problemy Usług* 7, Szczecin.
Niedzielski P., Rychlik K., Markiewicz J., 2008. Innowacyjność przedsiębiorstw sektora usług – nowe ścieżki rozwoju (Innovativeness of enterprises in the service sector: new development paths). *Materiały IV Konferencji Naukowej z cyklu: Wiedza i Innowacje, Fundusze Unijne w rozwoju nauki i gospodarki.* Uniwersytet Jagielloński, Kraków, http://www.instytut.info/IVkonf/referaty/Niedzielski.pdf.
Nowak P., 2012. Poziom innowacyjności polskiej gospodarki na tle krajów UE (Level of innovativeness of the Polish economy as compared with the EU states). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 19: 142–152.
Nowosielska E., 1994. *Sfera usług w badaniach geograficznych: główne tendencje rozwojowe ostatniego dwudziestolecia i aktualne problemy badawcze* (Services in geographical studies. Main trends in their development in the last two decades and current research problems). Zeszyty IGiPZ PAN 22.
Osiński S., 2004. Changes in Poland's industry after 1989. *Miscellanea Geographica* 249–261.
Pavitt K., 1979. Technical innovation and industrial development: 1. The new causality. *Futures* 11(6): 458–470.
Pavitt K., 1980. Technical innovation and industrial development: 2. The dangers of divergence. *Futures* 12(1): 35–44.
Podręcznik Oslo. Zasady gromadzenia i interpretacji danych dotyczących innowacji. 2008. Warszawa (translation of *Oslo Manual* 2005, OECD, Eurostat).
Prajogo D.I., 2006. The relationship between innovation and business performance – a comparative study between manufacturing and service firms. *Knowledge and Process Management* 13: 218–225.
Rachwał T., 2011. Transformations of the employment structure as an expression of the transformation of the Polish

industry against the background of the European Union. *Bulletin of Geography, Socio-economic series* 15: 5–25.

Rachwał T., 2013. Rola przedsiębiorstw przemysłowych w rozwoju gospodarki opartej na wiedzy (Role of industrial enterprises in the development of a knowledge-based economy). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 21: 189–211.

Rachwał T., 2015. Structural changes in Polish industry after 1989. *Geographia Polonica* 88(4), 575–605.

Rogoziński K., 1993. *Usługi rynkowe* (Market services). Wydawnictwo Akademii Ekonomicznej, Poznań.

Rogoziński K., 2004. Innowacyjnośc i nowa taksonomia usług (Innovativeness and a new taxonomy of services). *Wiadomości statystyczne* 4: 43–55.

Schroeder R.G., Scudder G.D., Dawn R.E., 1989. Innovation in manufacturing. *Journal of Operations Management* 8(1): 1–15.

Sirilli G., Evangelista R., 1998. Technological innovation in services and manufacturing: Results from Italian surveys. *Research Policy* 27(9): 881–899.

Świadek A., 2015. Technologie a innowacje w polskim systemie przemysłowym (Technologies and innovations in the Polish manufacturing system). *Studia Ekonomiczne PAN* 3 (86): 345–365.

Tether B., 2005. Do services innovate (differently)? Insights from the European Innobarometer Survey. *Industry and Innovation* 12: 153–184.

Toffler A., 1985. *Trzecia fala* (The third wave). PIW, Warszawa.

Tokarz A., 2009. Zasoby ludzkie jako determinanta innowacyjności przedsiębiorstw usługowych (Human resources as a determinant of the innovativeness of service enterprises). *Materiały konferencji Zarządzanie organizacjami usługowymi*, Poznań, http://www.uslugi.ue.poznan.pl/file/129_462938426.doc

Werwicki A., 1998. Zmiany paradygmatu geografii usług (Changes in the paradigm of the geography of services). *Przegląd Geograficzny* 70 3–4.

Zioło Z., 2012. Miejsce innowacyjności w kształtowaniu procesów rozwoju gospodarczego układów przestrzennych (Place of innovativeness in the economic development of spatial systems). *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 20: 9–32.