ACTA SCIENTIARUM POLONORUM

Czasopismo naukowe założone w 200l roku przez polskie uczelnie rolnicze

Oeconomia

Economics

Ekonomia

12 (1) 2013

Bydgoszcz Kraków Lublin Olsztyn
Poznań Siedlce Szczecin Warszawa Wrocław

ISSN 1644-0757

Wydawnictwo SGGW, ul. Nowoursynowska 166, 02-787 Warszawa
tel. 22 593 55 20 (-22; -25 – sprzedaż), fax 22 593 55 21
e-mail: wydawnictwo@sggw.pl
www.wydawnictwosggw.pl

Print: Agencja Reklamowo-Wydawnicza A. Grzegorczyk, www.grzeg.com.pl

From the Scientific Board

There has been the twelfth year of the Acta Scientiarum Polonorum Oeconomia publishing. The Acta is the periodical including several thematic series with uniform graphics and similar format. The publication was set up by group of enthusiasts – employees of agricultural universities and has been published under the patronage of rectors of these universities. Current involvement of academic society in increasing substantive and editorial level of the series, with efforts of the authors, the Programming Board and the Scientific Boards, has contributed to placing the Acta Scientiarum Polonorum (and our Oeconomia series) on the noticeable position in academic research society. Articles can be prepared in Polish with English titles, abstract and keywords. Moreover, we publish also issues in English only. The Scientific Board of the Oeconomia series, concerning the publication range, focus their attention both on substantive content and precision of the form. The articles are revised in "double-blind review" process. All issues of the Acta Scientiarum Polonorum Oeconomia are available in electronic version on the following website http://acta_oeconomia.sggw.pl and abstracts on http://www.acta.media.pl. We are glad to inform that Acta Scientiarum Polonorum Oeconomia are indexed within the AGRIS-FAO, EBSCO, SIGŻ, Copernicus Index, AGRO. Since 2007 every article published in Acta Sci. Pol. Oeconomia is obtaining 9 points at the Ministry of Science an Higher Education ranking list.

Please send the articles on one of following e-mail addresses:
janina_sawicka@sggw.pl
acta_oeconomia@sggw.pl

While sending a printout, please attach also the electronic version on CD or DVD. Letters including note "the Acta Scientiarum Polonorum Oeconomia" should be sent on the following address:

Prof. dr hab. Janina Sawicka
Department of European Policy, Public Finances and Marketing
Faculty of Economic Sciences
Warsaw University of Life Sciences
Nowoursynowska 166, 02-787 Warsaw, Poland
tel.: (+4822) 593 40 70; fax: (+4822) 593 40 77

Yours sincerely
Janina Sawicka
Chairperson of the Scientific Board of
the Acta Sci. Pol. Oeconomia series

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 5–15*

AN ATTEMPT TO DETERMINE THE FUNCTIONAL AREA OF WARSAW WITH THE USE OF THE MEASURE OF RELATIVE DEVELOPMENT LEVEL AND HELLWIG'S MEASURE

Mariola Chrzanowska, Nina Drejerska, Iwona Pomianek
Warsaw University of Life Sciences – SGGW

Abstract. Mazovian Voivodeship is an area where socio-economic situation is significantly diverse. It is a real challenge for regional development policy which in Poland aims at increasing competitiveness and achieving cohesion by 2020. The use of selected taxonomic measures to compare the development level of selected communes in Mazovia allowed to determine whether the regional policy so far has led to socio-economic growth of all or just some of the investigated communes. Those urban-rural and rural communes of the highest development level in the Mazovia region seem to create a quite coherent area around Warsaw; it was proved by the results of statistical analysis with the use of the relative development level and Hellwig's measure for the years 2002 and 2009.

Key words: regional development, regional policy model, taxonomic measure, Mazovia Voivodeship

INTRODUCTION

The beginning of the twenty-first century was a period of an extensive discussion, both in Poland and other European countries, and also at the level of the European Union on a choice of a model of regional policy. Representatives both of the theoretical sphere as well as practitioners of regional policy took into consideration a compensatory model and polarization-diffusion model.

The first one, the compensatory model, assumes as the main goal to equalize interregional differences and get social, economic and territorial cohesion. It means that funds should be directed to the regions and the people unable to overcome the constraints of development on their own [Drejerska 2010, pp. 45–54]. However, it occurred to be economically inefficient. Such kind of support improved the situation of disadvantaged re-

Corresponding author: Warsaw University of Life Sciences – SGGW, Faculty of Economic Sciences, Nowoursynowska 166, 02-787 Warsaw, Poland, e-mail: mariola_chrzanowska@sggw.pl, nina_drejerska@sggw.pl, iwona_pomianek@sggw.pl

gions, although not through a profound change in their reconstruction. Increasing expenditures for the implementation of this model failed to bridge the gap between the regions of the highest and the lowest development levels. Differences between "the strong" and "the weak" regions did not disappear, even in relatively highly developed countries which were taking fairly intensive efforts to reduce them. It was even concluded that interregional differences are partly 'a product' of history and they result from natural and cultural conditions. Hence it is very difficult to overcome them. We can point to many examples of such inefficiency of the compensatory model; one of them is called "European Triple Mezzogiorno"[1]. This term describes 18 regions of southern Italy, eastern Germany and eastern Poland with 7.5% of the EU area and 42 million people. They are characterized by unsatisfactory macroeconomic indicators, few prospects of development, low birth rate, high dependence on agriculture, underdeveloped industry and services.

To the contrary, the model based on competitiveness (sometimes described as the diffusion and polarization model) assumes dynamic growth in the major urban areas and then by creating appropriate conditions for diffusion, it will have a positive influence on development of the more remote areas. In a long-term perspective, it can have a positive effect on reducing interregional differences, including the basic indicator as the level of GDP *per capita*. However, this kind of approach confirms normal processes of diversification of social and economic development level which take place around the world. On the other hand, its opponents argue that we do not have any reliable mechanisms and instruments for spreading development from its centres to more distant areas so we cannot be sure that this diffusion will really take place in the future.

So far, the Polish regional policy seems to be close to the model based on competitiveness stressed in the Poland 2030 Report, which was created by the Board of Strategic Advisers to the Prime Minister of Poland [Boni 2009, p. 5]. This report uses directly the term of the polarization and diffusion model for the whole economic policy of Poland. However, the National Strategy of Regional Development 2010–2020: Regions, Cities, Rural Areas does not include this term literally (polarization and diffusion); it recalls the model based on competitiveness [National Strategy… 2010, p. 6].

RESEARCH METHOD

The Mazovian Voivodeship is a region of a highly diversified level of socio-economic development. Warsaw and its surroundings stand out both on the background of Mazovia and the entire country, creating a functional area of the capital agglomeration. Research in this field has been carried out by many authors[2]; however, as yet, no widely accepted method has not been adopted (both among academics and practitioners) for determination of functional areas indicating unambiguously legitimate criteria (variables). Therefore,

[1]Potrójne Europejskie Mezzogiorno. Wyzwania dla spójności w Europie. The conference organized by the Ministry of Regional Development, 24–25 September 2009, Warsaw.

[2]For example [Strahl 2006], [Ekspercki Projekt… 2008], [Rosner 2008, pp. 18–30], [Bański 2009, pp. 210–228], [Bański, Komornicki, Kulikowski, Śleszyński, Czapiewski, Mazur 2009], [Pomianek 2010, pp. 227–239], [Wysocki 2010, pp. 305–364], [Heffner 2011, pp. 9–34], [Adamowicz, Janulewicz 2012].

attempts in this area seem to be justified – they may in fact reconcile theory and practice to achieve more optimal solutions in this field. This is particularly significant in the context of the new paradigm of development policy which assumes territorialization of both the EU cohesion policy and other sectoral policies. Greater flexibility in delimitation of cohesion policy areas, not just construction on the basis of administrative boundaries, is postulated in the Fifth Cohesion Report of the European Commission.

The aim of the paper was an attempt of determination of the functional area of Warsaw using the relative development level and the measure of Hellwig. Detailed research objectives also included:

- comparison of the local development level of selected communes in the Mazovia region,
- determination, on the basis of the selected indicators, of characteristics of communes with the highest and the lowest development levels described through the results of selected taxonometric methods,
- analysis of the results obtained in 2009 in comparison with the year 2002.

The analysis took into account the data of the Local Data Bank of the Central Statistical Office for 279 urban and rural-urban communes in the Mazovia region. The paper has been prepared as a part of the project entitled "Economic and social determinants of rural areas development of the Mazovia region in the suburban and external zone of Warsaw", No N N114 145240, financed by National Science Centre (Poland).

The selection of variables was based on their importance for the study of entrepreneurship, demography, infrastructure, social and technical infrastructure. To a large extent it also depended on the availability of data at the local level and in selected years. As a result, the following set of variables was taken into account:

1) demographic dependency ratio (post-working age population per 100 people at working age),
2) percentage of children aged 3–6 years provided with pre-school education,
3) number of foundations per 1,000 people,
4) number of associations and social organizations per 1,000 people,
5) unemployed as a % of the population at working age,
6) number of natural persons conducting economic activity per 1,000 people (private sector),
7) number of commercial companies per 1,000 inhabitants (private sector),
8) number of commercial companies with foreign capital per 1,000 inhabitants (private sector),
9) number of dwellings completed per 10 thousand inhabitants,
10) residents using water supply system as a % of the total population,
11) residents using sewage system as a % of the total population,
12) number of students per 1 computer with Internet access for students' use – primary schools, excluding special schools,
13) number of students per 1 computer with Internet access for use by students – lower secondary schools, excluding special schools.

The research consisted of the following stages:
1) The Hellwig's measure (SMR)[3] was calculated for each researched year. Then the studied objects were assigned to one of three groups:

- Group I (highly developed communes)

$$SMR_i < \overline{SMR} - s_{SMR}$$

- Group II (communes of a medium level of development)

$$\overline{SMR} - s_{SMR} \leq SMR_i \leq \overline{SMR} + s_{SMR}$$

- Group III (low developed communes)

$$SMR_i \geq \overline{SMR} + s_{SMR}$$

where: $\overline{SMR}$ – arithmetic mean of the Hellwig's measure;
S_{SMR} – standard deviation of the Hellwig's measure.

2) At the second stage, the relative level of development (BZW)[4] was set for each year. Similarly to the first stage, the studied objects were assigned to one of three groups on the basis of the calculated values:

- Group I (highly developed communes)

$$BZW_i \geq \overline{BZW} + s_{BZW}$$

- Group II (communes of a medium level of development)

$$\overline{BZW} - s_{BZW} \leq BZW_i \leq \overline{BZW} + s_{BZW}$$

- Group III (low developed communes)

$$BZW_i < \overline{BZW} - s_{BZW}$$

where: $\overline{BZW}$ – arithmetic mean of the BZW measure;
S_{BZW} – standard deviation of the BZW measure.

3) At the end, the results obtained with both measures in both years were compared. In addition, the correlation of coefficients was calculated between individual measurements.

Statistical methods applied to compare objects (in this case rural and urban-rural communes of the Mazovia region) allow studying objects taking into account several factors simultaneously, which increases the efficiency of analyses. These indicators of development can also provide information both on the current state of development as well as on changes in its level with regard to individual communes. The application of statistical

[3]For more information see [Hellwig 1968, pp. 307–327].
[4]For more information see [Łuniewska and Tarczyński 2006].

techniques for modelling the development of Mazovian communes in 2002 and 2009 allowed to determine an area characterized by the highest level of development and a strong relationship with Warsaw – this area can be perceived as the functional area of Warsaw.

RESULTS

The results of the *BZW* measure calculations were used to establish a ranking of rural and urban-rural Mazovian communes in 2002 and 2009. In Table 1, only the beginning and the end of the list are presented because of limited space for the paper.

The Hellwig's measure (*SMR*) was also a base for ranking investigated communes (Table 2).

Table 1. Ranking of communes according to the BZW measure in 2002 and 2009

	2002		2009	
Ranking place	Commune	BZW_i	Commune	BZW_i
1	Raszyn	0.41	Lesznowola	0.64
2	Łomianki	0.38	Raszyn	0.41
3	Lesznowola	0.37	Piaseczno	0.39
4	Michałowice	0.36	Łomianki	0.37
5	Nadarzyn	0.33	Nadarzyn	0.37
6	Konstancin-Jeziorna	0.31	Michałowice	0.37
7	Wyszków	0.31	Konstancin-Jeziorna	0.34
8	Piaseczno	0.29	Grójec	0.34
9	Wieliszew	0.30	Izabelin	0.34
10	Grójec	0.27	Błonie	0.30
…	…	…	…	…
270	Radzanów	0.10	Leoncin	0.12
271	Tczów	0.10	Radzanów	0.12
272	Trojanów	0.09	Łyse	0.12
273	Zbuczyn	0.09	Lelis	0.12
274	Świercze	0.09	Łaskarzew	0.11
275	Dąbrówka	0.08	Szulborze Wielkie	0.11
276	Klembów	0.08	Trojanów	0.10
277	Szulborze Wielkie	0.08	Poświętne	0.10
278	Poświętne	0.08	Czarnia	0.10
279	Strachówka	0.07	Strachówka	0.09

Source: Authors' calculations.

Table 2. Ranking of communes according to the Hellwig's measure in 2002 and 2009

	2002		2009	
Ranking place	Commune	SMR_i	Commune	SMR_i
1	Michałowice	0.67	Lesznowola	0.96
2	Łomianki	0.67	Raszyn	0.77
3	Raszyn	0.66	Nadarzyn	0.70
4	Nadarzyn	0.65	Łomianki	0.67
5	Lesznowola	0.64	Michałowice	0.65
6	Konstancin-Jeziorna	0.60	Piaseczno	0.64
7	Wieliszew	0.60	Konstancin-Jeziorna	0.63
8	Piaseczno	0.59	Izabelin	0.60
9	Jabłonna	0.59	Grójec	0.59
10	Wyszków	0.57	Ożarów Mazowiecki	0.59
…	…		…	…
270	Czarnia	0.44	Radzanów	0.45
271	Osieck	0.44	Szydłowo	0.45
272	Świercze	0.44	Domanice	0.45
273	Poświętne	0.44	Poświętne	0.45
274	Przyłęk	0.44	Lelis	0.45
275	Domanice	0.44	Łaskarzew	0.44
276	Zbuczyn	0.43	Trojanów	0.44
277	Tczów	0.43	Czarnia	0.44
278	Szulborze Wielkie	0.42	Szulborze Wielkie	0.44
279	Strachówka	0.42	Strachówka	0.43

Source: Authors' calculations.

The leading positions of both rankings in both years were occupied by communes which are immediate neighbours of Warsaw, for example Łomianki, Konstancin-Jeziorna, Raszyn, Ożarów Mazowiecki or communes situated relatively close to Warsaw (the second or third line of neighbourhood) and with a good access to Warsaw, mainly through good roads, for example Nadarzyn. In the case of these communes it is even difficult to describe them as urban-rural ones; although they are classified as such according to the formal administrative approach, their social and economic situation makes them closer to real suburbs of Warsaw than areas having something in common with rural issues. Some more distant communes as Błonie or Grójec were also classified in the group of the most developed units; each of them has its own unique potential but they have also something very important in common – very good, as for the Polish conditions, access to transport.

The last positions in the rankings were usually occupied by considerably remote communes; typically this distance was longer than 100 km. However, there are some exceptions like Poświętne or Strachówka. They are quite close to Warsaw in terms of physical

distance but they do not have any good access to transport. Moreover, they can be characterized by considerable afforestation or a low development of the settlement network. It should be also stressed in this place that the interpretation of the results of the conducted statistical analysis is limited because of data accessibility as well as difficulties in measuring of some aspects of life quality. That is why, the results in the investigated communes cannot be widely interpreted, for example in relation to life quality of inhabitants of these units.

The next phase of the research included division of each the rankings into three groups – high, medium and low developed communes. The results of these classifications are presented in the following graphs (Figs 1, 2, 3 and 4).

The figures illustrate quite stable and coherent (especially from the perspective of the Hellwig's measure) area around Warsaw which can be perceived as its functional area. In the case of both indicators – the number of communes in the first group (majority of them are the closest to Warsaw) decreased, which can be a sign of consolidation of the functional area and establishment of relations that connect these communes with the capital city more tightly.

The last phase of the research included calculation of correlation coefficients between individual measurements (Table 3).

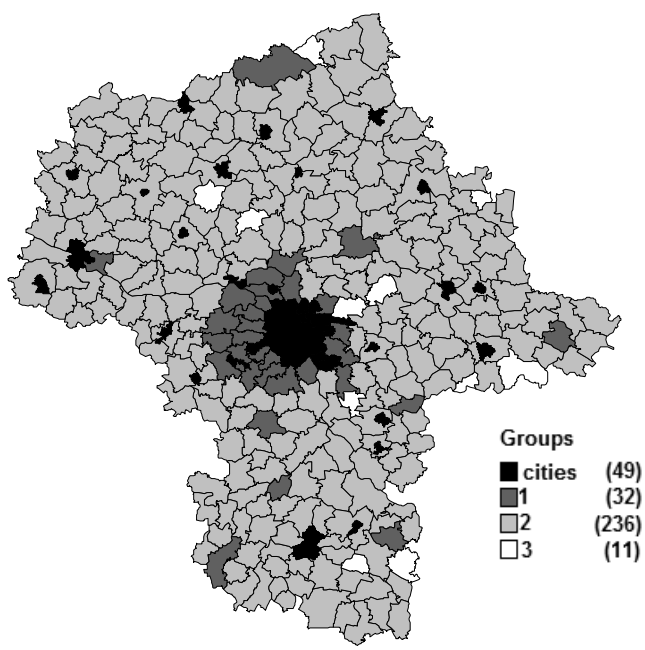


Fig. 1. Urban-rural and rural communes of the Mazovia region according to the Hellwig's measure (*SMR*) in 2002
Source: Authors' elaboration.

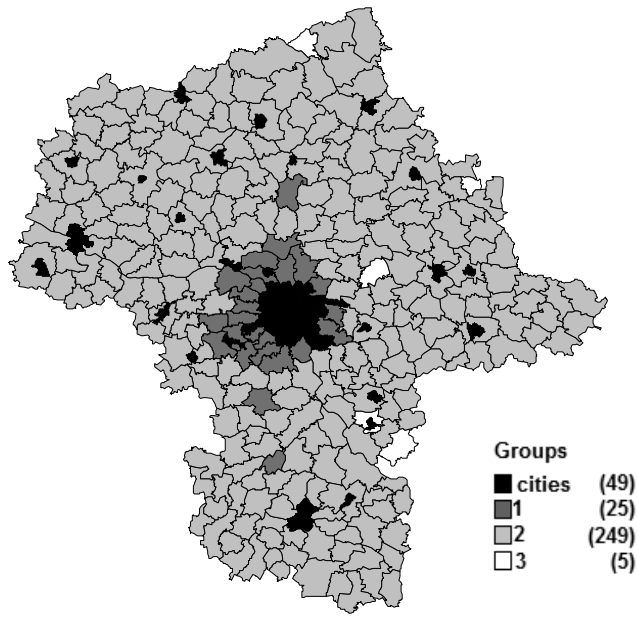


Fig. 2. Urban-rural and rural communes of the Mazovia region according to the Hellwig's measure (*SMR*) in 2009
Source: Authors' elaboration.

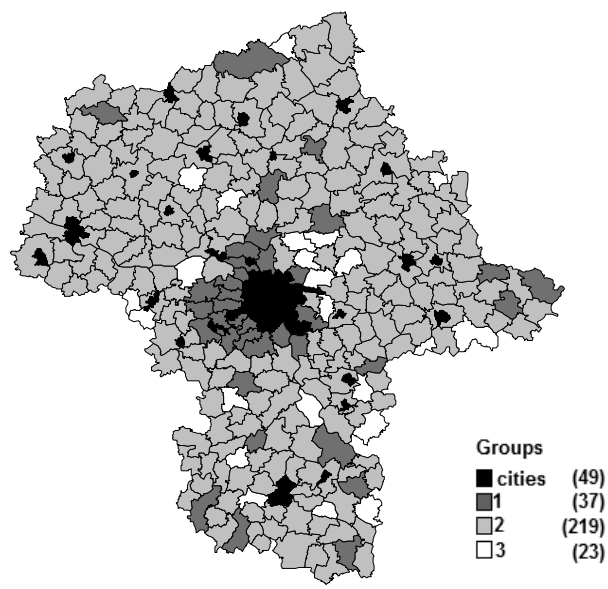


Fig. 3. Urban-rural and rural communes of the Mazovia region according to the *BZW* measure in 2002
Source: Authors' elaboration.

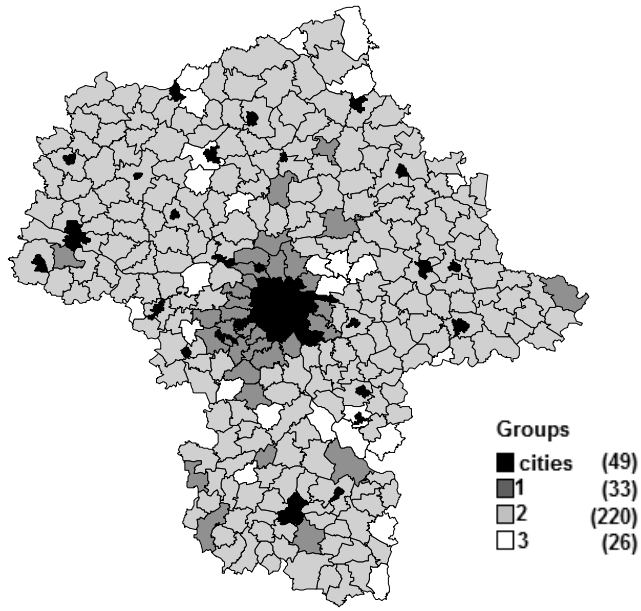


Fig. 4. Urban-rural and rural communes of the Mazovia region according to the *BZW* measure in 2009
Source: Authors' elaboration.

Table 3. Spearman correlation coefficient for rankings

	SMR_i 2002	SMR_i 2009	BZW_i 2002	BZW_i 2009
SMR_i 2002	1	0.83	0.94	×
SMR_i 2009		1	×	0.95
BZW_i 2002			1	0.83
BZW_i 2009				1

Source: Authors' calculations.

Analyzing the correlation between the rankings of the same year, very strong correlation can be noticed. The rankings of communes constructed using the two measures slightly differ. On the other hand, the Spearman correlation coefficient calculated for rankings built on the base of the same measures for different years indicates strong interdependence. In other words, there were no significant changes in the ranking of communes comparing the years 2002 and 2009.

CONCLUSIONS

Development of a commune is largely dependent on processes occurring in the so-called development centres. The centre of the Mazovia region, Warsaw, influences neighbouring communes, and thus accelerates their growth. Therefore, communes with

the highest level of development are located in this area (for example Lesznowola, Łomianki). Communes of the lowest levels of development are peripheral ones (for instance Trojanów), those located in some distance from the main roads (e.g. Łyse, Lelis), but also those which are relatively close to Warsaw (for example Strachówka, Poświętne, Klembów) – communes which are not located directly at major transport routes; they do not use their internal potential and cannot overcome barriers.

The conducted analysis proves that a set of communes closest to Warsaw can be classified in a stable way as the functional area of the city. Moreover, the decrease in the number of communes classified as the most developed ones in the whole Mazovia region seems to be a sign of consolidation of development potential around Warsaw.

REFERENCES

Adamowicz M., Janulewicz P., 2012. Wykorzystanie metod wielowymiarowych w określeniu pozycji konkurencyjnej gminy na przykładzie województwa lubelskiego (The use of multidimension methods to determine the competitive position of a commune on the example of Lubelskie Voivodeship). (in) Metody Ilościowe w Badaniach Ekonomicznych (Quantitive Methods in Economic Research) Vol. XIII, Issue 1 (in Polish).

Bański J., 2009. Odrębność obszaru podmiejskiego w kontinuum miejsko-wiejskim (Separateness of suburban area in urban-rural continuum). Czasopismo Geograficzne 80 (4) (in Polish).

Bański J., Komornicki T., Kulikowski R., Śleszyński P., Czapiewski K., Mazur M., 2009. Analiza zróżnicowania i perspektyw rozwoju obszarów wiejskich w Polsce do 2015 roku według kryterium powiązań z największymi aglomeracjami miejskimi i miastami oraz endogenicznego potencjału (Analysis of variation and perspectives for rural development in Poland by 2015, according to the criterion of relationships with major urban agglomerations and cities and endogenous potential). IGiPZ PAN (Polish Academy of Sciences), Expert report for the Ministry of Agriculture and Rural Development (in Polish).

Boni M. (ed.), 2009. Polska 2030. Wyzwania rozwojowe (Development challenges). Kancelaria Prezesa Rady Ministrów, Warszawa (in Polish).

Drejerska N., 2010. Good governance w polskiej polityce regionalnej (Good governance in Polish regional policy). Zeszyty Naukowe SGGW w Warszawie, Ekonomika i Organizacja Gospodarki Żywnościowej 83 (in Polish).

Ekspercki Projekt Koncepcji Przestrzennego Zagospodarowania Kraju 2008–2033 (Expert project of National Spatial Development Concept). IGiPZ PAN (Polish Academy of Sciences), MRR (Ministry of Regional Development), Warszawa 2008 (in Polish).

Heffner K., 2011. Regionalny wymiar dychotomii rozwoju obszarów wiejskich (Regional dimension of rural development dichotomy). Studia KPZK PAN Vol. CXXXVII, Warszawa (in Polish).

Hellwig Z., 1968. Zastosowanie metody taksonomicznej do typologicznego podziału krajów ze względu na poziom rozwoju oraz zasoby i strukturę wykwalifikowanych kadr (Application of the taxonomic method for typological distribution of countries due to the level of development and the structure of resources and qualified staff). Przegląd Statystyczny 15.4. (in Polish).

Łuniewska M., Tarczyński W., 2006. Metody wielowymiarowej analizy porównawczej na rynku kapitałowym (Methods of multidimensional comparative analysis on the capital market). Wydawnictwo Placet, Warszawa (in Polish).

National Strategy for Regional Development 2020: Regions, Cities, Rural Areas. Ministry of Regional Development, 13 July, Warszawa 2010.

Pomianek I., 2010. Poziom rozwoju społeczno-gospodarczego obszarów wiejskich województwa warmińsko-mazurskiego (Socio-economic development level of rural areas of Warmia and Mazury province). Acta Scientiarum Polonorum, Oeconomia 9 (3), 227–239 (in Polish).

Rosner A., 2008. Zróżnicowanie przestrzenne struktur społeczno-gospodarczych i poziomu rozwoju obszarów wiejskich (Spatial differentiation of socio-economic structures and level of rural development). (in) T. Markowski, Z. Strzelecki (eds.), Obszary urbanizacji i semiurbanizacji wsi polskiej a możliwości ich rozwoju w ramach PROW 2007–2013 (Urbanization and semi-urbanization area of Polish countryside and opportunities for their development within RDP 2007–2013). Studia KPZK PAN (Polish Academy of Sciences) Vol. CXIX, Warszawa (in Polish).

Strahl D., 2006. Metody oceny rozwoju regionalnego (Methods of assessment of regional development). Wyd. AE we Wrocławiu (Wroclaw University of Economics), Wrocław (in Polish).

Wysocki F., 2010. Metody taksonomiczne w rozpoznawaniu typów ekonomicznych rolnictwa i obszarów wiejskich (Taxonomic methods in the diagnosis of economic types of agriculture and rural areas). Uniwersytet Przyrodniczy w Poznaniu (Poznan University of Life Sciences), Poznań (in Polish).

PRÓBA WYZNACZENIA OBSZARU FUNKCJONALNEGO WARSZAWY Z WYKORZYSTANIEM MIERNIKA WZGLĘDNEGO POZIOMU ROZWOJU ORAZ MIARY HELLWIGA

Streszczenie. Województwo mazowieckie jest obszarem o dużym zróżnicowaniu sytuacji społeczno-gospodarczej. Stanowi to ogromne wyzwanie dla polityki rozwoju regionalnego, w której do 2020 roku zaplanowano w Polsce zarówno wzmacnianie konkurencyjności, jak i osiąganie spójności. Zastosowanie wybranych miar taksonomicznych do porównania poziomu rozwoju gmin Mazowsza pozwoliło na próbę wskazania tych gmin wiejskich i miejsko-wiejskich, które składają się na obszar funkcjonalny Warszawy. Ponadto wyniki analiz przy użyciu względnego poziomu rozwoju (*BZW*) oraz miary Hellwiga wskazują na ukształtowanie się relacji stabilnych w czasie, co udowodniło porównanie wyników dla lat 2002 i 2009.

Słowa kluczowe: rozwój regionalny, model polityki regionalnej, miernik taksonomiczny, województwo mazowieckie

Accepted for print – Zaakceptowano do druku: 28.02.2013

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 17–26*

ASSESSMENT OF INVESTING ACTIVITY OF FARMERS USING THE EU FUNDS ON THE EXAMPLE OF LUBELSKIE VOIVODESHIP[1]

Edmund Lorencowicz
University of Life Sciences in Lublin

Michał Cupiał
University of Agriculture in Krakow

Abstract. The paper presents the use of EU funds by farmers on the territory of Lubelskie Voivodeship used for investment activities concerning agricultural technology. Analysis covered pre-accession funds and activities within PROW (the Rural Areas Development Programme). From 2004 to the middle of 2011, 15,410 beneficiaries used over PLN 1.5 mld. Owners of bigger farms of the average area over 40 ha were beneficiaries. The average value of the investment was PLN 238 thousand and was increasing along with the farm area. Average age of beneficiaries was 38 years.

Key words: union funds, farms modernization, agricultural technology, technical investments in agriculture, Lubelskie Voivodeship

INTRODUCTION

Poland's accession to the EU in May 2004 opened new possibilities for farmers concerning support of modernization investments. Before 2004, a program of pre-accession aid SAPARD was available, and then a Sectoral Operational Programme – Restructuring and Modernization of the Food Sector and Rural Areas Development. Improvement of

[1]The study was developed within the field research "Assessment of rationality of machinery and agricultural equipment selection and use in the agricultural holdings in Lublin region in the context of improvement efficiency and competition in the market" carried out within a system project "Regional system of management of economical change", co-financed from the funds of the EU Social Fund and implemented by The Marshall's Office of Lubelskie Voivodeship.

Corresponding authors: Edmund Lorencowicz, University of Life Sciences in Lublin; Faculty of Production Engineering, Głęboka 28, 20-612 Lublin, Poland, e-mail: edmund.lorencowicz@up.lublin.pl;
Michał Cupiał, University of Agriculture in Krakow, Faculty of Production and Power Engineering, Balicka 116 B, 30-149 Kraków, Poland, e-mail: michal.cupial@ur.krakow.pl

competitiveness of agricultural and food economy and sustainable development of rural areas was a strategic aim of the programme [Polska w Unii...]. In the first accession period 2004–2006, technical investments which modernized farms were possible in operations "Investments in agricultural farms" and "Setting up facilitation for young farmers". Within present financial perspective it is an operation "Modernization of agricultural farms" and "Setting up facilitation for young farmers" within "the Rural Development Programme (PROW) 2007–2013" [Raczkowska 2006, Spychalski 2008]. These funds were used in a different degree by farmers and the scope of investments and the size of the obtained aid depended on both particular aid programmes as well as on economical and production conditions of agriculture in a given voivodeship [Rudnicki 2007, Wojtasik 2008, Figurski i Lorencowicz 2009, Bułkowska 2011]. The support was multidimensional, since the Polish agriculture is highly diverse [Rudnicki 2007, Czubak and Kiryluk-Dryjska 2009, Siekierski 2009, Bułkowska 2011]. The level of structure of production is frequently determined also by experience a farmer has and the equipment of a farm with technical means of work [Szeląg-Sikora 2009]. Availability criteria of particular structural funds verify potential of Polish farms and simultaneously indirectly influence the changes. Agricultural structure changes systematically although slowly; number of farms and at the same time their area changes. Moreover, single-production farms are distinguished to a great extent. They are prepared for commodity production which is the sale object. Technical infrastructure gets modernised, which is an effect of ultimate purpose of the obtained subsidy for the purchase of i.a. agricultural machines, or for construction and equipment of inventory facilities [Szeląg-Sikora and Wojciech 2007, Szeląg-Sikora and Kowalski 2010, Kusz 2011].

PURCHASE WITH THE USE OF PUBLIC AID BEFORE ACCESSION TO THE EU

According to the data obtained from Agency for Restructuring and Modernisation of Agriculture in Lublin and the Ministry of Agriculture and Rural Development [Fundusze Unijne...] total sum of EU means between January 2004 – June 2011 allotted for modernisation of farms in the voivodeship was PLN 1,073 mln. Within SAPARD programme on the territory of Lubelskie Voivodeship, farmers benefited in the amount of PLN 357.15 million (Table 1). During realisation of this programme, 2,718 applications were filed, 2,388 applications were signed out of which 2,184 obtained payments after authorization in the amount of PLN 357.15 million. Payment in the amount of PLN 163.5 thousand was an average per one application. In the investment activity usefull for individual farmers – (Investment in agricultural holdings) – number of the realised and authorised applications was 1,448 to the total amount of PLN 61.2 mln which gives PLN 42.2 thousand per one application. Majority of purchase within operation 2 concerned agricultural tractors and machines, similarly as in case of other voivodeships including Małopolskie Voivodeship [Rabsztyn 2007].

Table 1. General characteristic of financial aid obtained by farmers within SAPARD programme in particular activities in Lubelskie Voivodeship

Applications		Agreements		Application of funding after approval	
Number	Amount (ths. PLN)	Number	Amount (ths. PLN)	Number	Amount (ths. PLN)
Improvement of processing and marketing of agricultural and fisheries articles					
100	126,923.2	80	113,038.8	78	110,244.5
Investment in agricultural holdings					
1,678	72,359.2	1,512	65,110.8	1,448	61,217.2
Development and improvement of rural areas infrastructure					
465	206,268.6	465	164,228.0	372	163,329.6
Differentiation of economic activity in rural areas					
475	41,192.9	331	28,118.9	286	22,354.6
Total					
2,718	446,743.9	2,388	370,496.7	2,184	357,145.9

Source: Data from ARiMR in Lublin.

The next EU programme available for farmers in the post-accession period was SPO "Restructuring and Modernisation of Food Sector and Development of Rural Areas 2004–2006". PLN 546.05 mln was directed and 6,097 applications on the average sum of PLN 89.5 thousand were carried out within this programme for farmers of Lubelskie Voivodeship (Table 2).

Table 2. General characteristic of aid granted within SPO "Restructuring and Modernisation of Food Sector and Development of Rural Areas 2004–2006" in Lubelskie Voivodeship

Applications		Agreements		Application of funding after approval	
Number	Amount (ths. PLN)	Number	Amount (ths. PLN)	Number	Amount (ths. PLN)
Investment in agricultural holdings					
4,548	378,622.5	3,070	246,489.9	2,997	233,899.0
Setting up facilitation for young farmers					
2,087	104,350.0	1,547	77,350.0	1,547	77,350.0
Improvement of processing and marketing of agricultural products					
134	280,591.9	113	213,831.0	103	167,019.5
Differentiation of agricultural activity and similar activity in order to provide diversity of activities or alternative income sources					
1,273	82,552.0	859	55,298.9	794	49,521.5
Development and improving of technical infrastructure connected with agriculture					
941	31,131.7	707	21,294.2	656	18,256.8
Total					
8,983	877,248.2	6,296	614,264.0	6,097	546,046.9

Source: Data of ARiMR in Lublin.

The biggest number of applications (2,997) was carried out within operation "Investment in agricultural holdings" and "Setting up facilitation for young farmers" (1,547).

In the financial perspective (years 2007–2013) basic possibilities of increasing the technological level of farms result from the implemented PROW 2007–2013. Within this programme, purchase of modern farm equipment is possible from the means designed in five operations: "Setting up facilitation for young farmers "Modernization of farms", "Restoring the potential of agricultural production destroyed as a result of natural disasters and introduction of proper protective activities", "Diversifying towards non-agricultural activity" and "Formation and development of micro-enterprises". Total amount paid off up to 2011 amounted to PLN 569.8 mln (Table 3). Within PROW 1,571 tractors and 7,230 of other equipment were purchased.

Table 3. General characteristic of aid granted within Rural Areas Development Programme (PROW) 2007–2013 in Lublin region

Specification	Value
Stage of aid decision	
Number of applications	15, 578
Requested aid (ths. PLN)	1,733 203.7
Number of included agreements/decisions	9,657
Amount of agreements/decisions	978,907.5
Stage of payment realization	
Number of applications for payment	7,679
Amount of applications for payment (ths. PLN)	627,638.6
Number of paid applications of payment	7,129
Amount of payment (ths. PLN)	569,814.2
Within the activity "Modernization of agricultural holdings" the following were bought:	
Tractors (pc.)	1,571
Agricultural machinery and tools, equipment and means of transport (pc.)	7,230

Source: Data of ARiMR in Lublin.

CHARACTERISTICS OF THE BENEFICIARIES OF EU PROGRAMMES

Analysis of the use of the EU funds in particular provinces of Lubelskie Voivodeship indicated that farmers from Bialski Province used the highest number of subsidies (PLN 91.1 mln), then Łukowski Province (PLN 83.3 mln) and Lubelski Province (PLN 57.3 mln) (Table 4). The following provinces used the lowest amount of subsidies (without magistrate districts): Lubartowski, Janowski and Krasnostawski. It mainly results from the potential of farming in these areas.

On the example of data concerning the use of funds from PROW 2007–2013 (up to 2011) one may determine general dependencies between the size of farms and the sum of the obtained aid. Average economic size of farms filing an application was 20.92 ESU in Lubelskie Voivodeship at fluctuation from 11.24 ESU (Janowski Province) to 73.04 ESU (Biała Podlaska City Province) (Fig. 1). In the whole population of 2,987 farms, where applications were filed, their economic size was between 4 to 2,412 ESU. Similar diver-

Table 4. Total costs (in millions PLN) of investment for purchase of machinery, equipment and tools for agricultural production (including software) in provinces of Lubelskie Voivodeship in years 2007–2011

Province	2007	2009	2011	Total	Number of applications before 2011
	mln PLN				
Bialski	38.16	42.25	10.68	91.09	408
Biłgorajski	11.59	14.52	3.64	29.75	137
Chełmski	14.25	17.04	4.66	35.96	111
Hrubieszowski	17.42	24.18	6.38	47.98	133
Janowski	5.16	7.10	2.80	15.06	84
Krasnostawski	8.49	6.56	1.82	16.87	87
Kraśnicki	9.54	8.58	2.52	20.65	140
Lubartowski	6.74	5.31	2.22	14.28	72
Lubelski	25.30	25.94	6.08	57.33	281
Łęczyński	4.87	3.62	2.15	10.64	49
Łukowski	31.23	42.36	9.70	83.29	306
Biała Podlaska, city	0.27	0.23	0.00	0.50	2
Lublin, city	0.00	0.86	0.15	1.02	6
Opolski	11.92	13.46	2.07	27.46	237
Parczewski	19.57	29.25	7.21	56.02	176
Puławski	9.60	5.84	3.14	18.57	129
Radzyński	13.40	10.17	4.20	27.76	124
Rycki	8.25	10.38	1.33	19.97	112
Świdnicki	10.55	8.16	0.61	19.31	96
Tomaszowski	8.68	18.05	3.09	29.81	92
Włodawski	14.63	12.47	4.15	31.26	95
Zamojski	7.51	12.27	2.47	22.25	100
Total	277.14	319.07	81.07	676.83	2,977

Source: Own research based on ARiMR data in Lublin.

sity was on account of area (Fig. 2). Average area of farms in particular provinces was 40.74 ha, the smallest in Opolskie Province – 12.37 ha and the biggest in Tomaszowski Province – 120, 45 ha. The area range in the whole population was only 0.4 up to 1,522. 2 ha.

Average sum allotted for the purchase of machines, devices or tools for agricultural production, including software in the province system, amounted to PLN 238.8 thousand per one application and was within PLN 125.4 thousand in Opolskie Province up to PLN 363.5 thousand in Hrubieszowski Province. The total sum of the investment in the whole population was within PLN 1.9 thousand to PLN 1,320.6 thousand. While, average agreed sum amounted to PLN 107 thousand in Opolski Province up to PLN 150.2 thousand in Parczewski Province (Fig. 3).

One may notice that there is a strong relation between AL area of farms filing applications and the amount of the average sum applied for by the owners in a province.

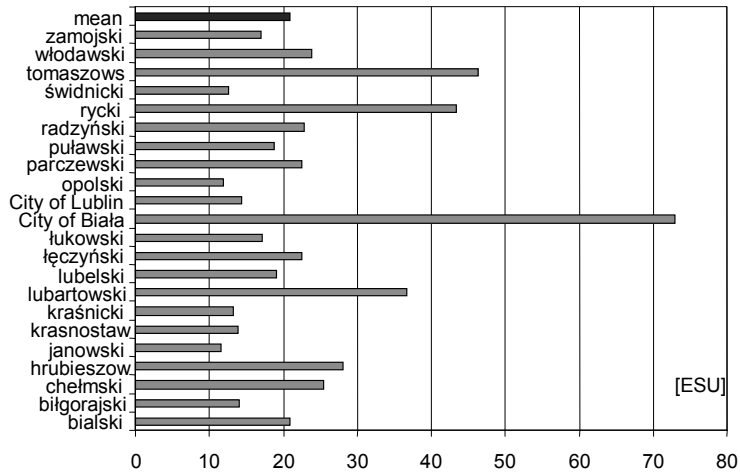


Fig. 1. Average economic size of farms benefiting from PROW by provinces (in ESU)
Source: Own research based on ARiMR data in Lublin.

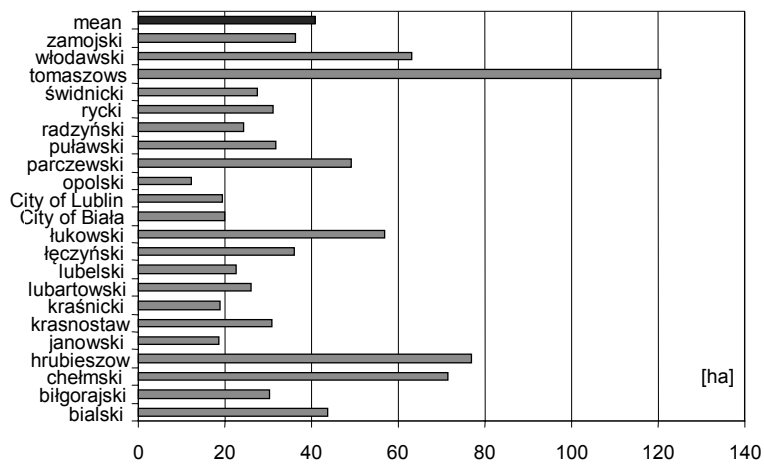


Fig. 2. Average area of farms benefiting from PROW by provinces (in ha)
Source: Own research based on ARiMR data in Lublin.

Higher sums were agreed in bigger farms (Fig. 4). In regard of the amount of money and its relation to the number of the purchased equipment (including software) relation was decreasing which results from the fact that the higher quantity of purchase concerned cheaper products (Fig. 5).

No relation between the size of a farm expressed in ESU and the sum of aid was reported (within the range up to 25 ESU) which may result from the fact that a tractor was the most frequently included in the purchase, the price of which was between approx. 100 to over 300 thousand PLN. As a result farmers from farms of different economic sizes

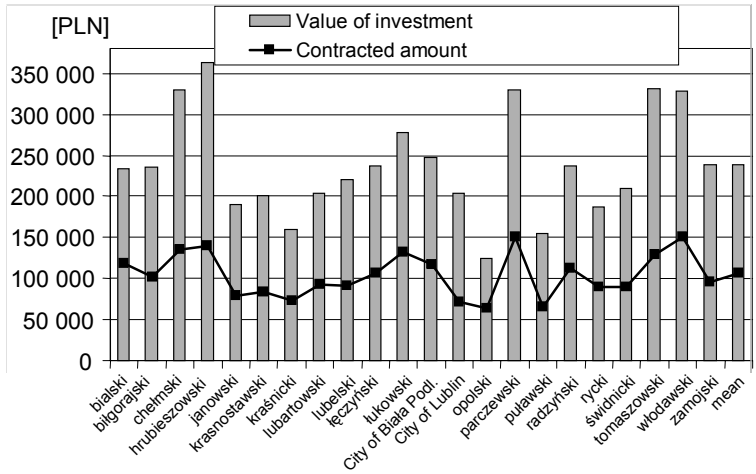


Fig. 3. Average value of the investment in machines and the contracted sum in PROW per one farm by provinces in 2007–2011
Source: Own research based on ARiMR data in Lublin.

often purchased tractors of similar values. It should be emphasised that within PROW in total 1,786 tractors, 9,963 machines, tools and transport means (including software), 1,701 positions from the group "Machines, tools, devices and equipment for animal production" and 7,749 positions described as "Equipment elements, machines, tool parts, additional equipment including software" were purchased. Farmers mainly from farms declaring the production orientation "field crops" (805 applications), "milk production" (720), "horticulture" (383), "pigs" (349), "permanent crops" (313), "mixed production"

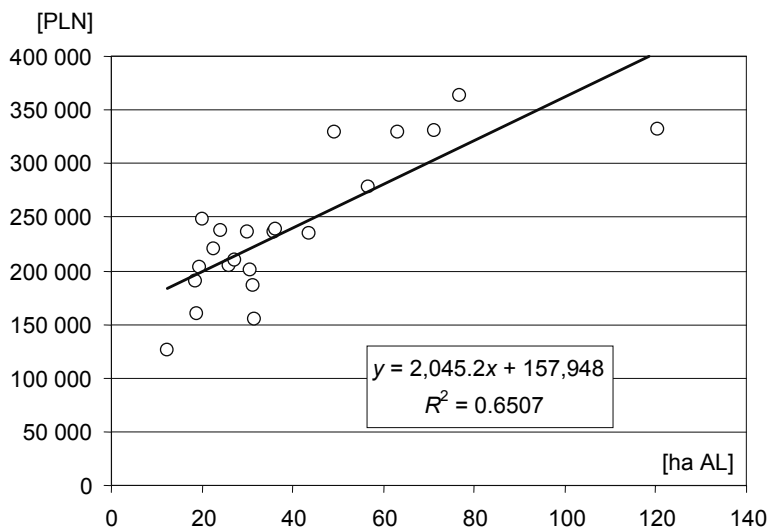


Fig. 4. Area of farms benefiting from PROW and the average value of the investment
Source: Own research based on ARiMR data in Lublin.

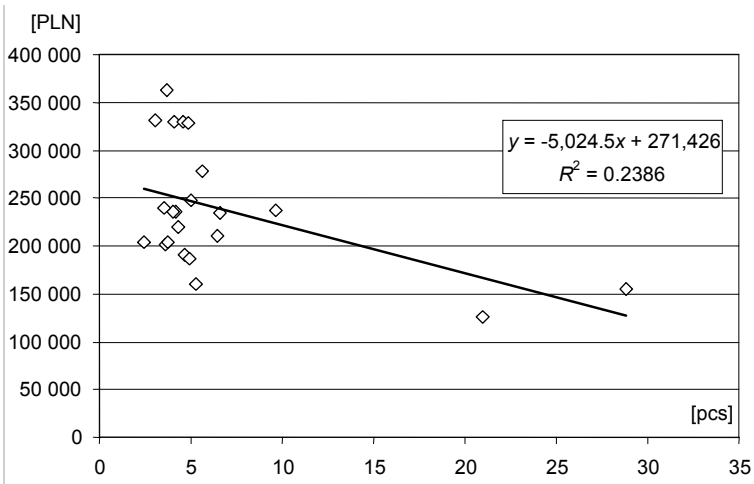


Fig. 5. Number of purchased equipment versus contracted funds in PROW
Source: Own research based on ARiMR data in Lublin.

(296) and less than 50 applications – "meat production" (46), "poultry" (32) and "others" (33) applied for aid.

Farmers investing with the use of PROW means were middle-aged, about 38 years of age (Table 5). The youngest beneficiary was 19 years old and the oldest – 61. Almost half of the beneficiaries (47.9%) had agricultural education background (vocational, high school or university), 22.5% of beneficiaries had higher education or high school education not related to agriculture and at least 3-years of working experience. Almost 1% of beneficiaries used the operation "Setting up facilitation for young farmers" and declared that they would complete qualifications in a specified time.

Table 5. Education and age of farmers benefiting from PROW

Specification	Average age [yrs]	Share in the number of beneficiaries [%]
Average age	37.9	100.0
Including: agricultural vocational, high or higher education	36.7	47.9
Education different than agricultural and minimum 3 years practice in agriculture or higher education other than agricultural and post diploma studies in agriculture, or high non-agricultural education and minimum 3 years practice in agriculture	37.1	22.5
Professional title similar to agiculture and minimum 3 years of practice in agriculture	45.1	5.6
Operation realized by a beneficiary in the activity "Setting up facilitation for young farmers", who will complete qualifications pursuant to provisons on special conditions and the mode of granting aid	22.5	0.8
Grammar, secondary or vocational education other than agricultural and minimum 5 years practice in agriculture	40.0	23.2

Source: Own research based on ARiMR data in Lublin.

Beneficiaries of the operation "Setting up facilitiation for young farmers" were the youngest, which results from the aim of this operation. It may be found that older farmers, about 45 years old, had higher complimentary education (e.g. qualifying title), while younger – about 37 years old – were beneficiaries with agricultural education on the level at least vocational or with higher education other than agricultural.

CONCLUSIONS

According to the analysis carried out in particular years, the use of the EU funds increased. It proves the growth of awareness of farmers from the voivodeship and probably greater motivation to modernize their farms. When analysing data according to provinces, strong diversity of aid funds allotted for the investment in technical means of production was reported. It is caused by considerable differences in the potential of farmers living in particular provinces. As it results from the research, farmers who possessed bigger farms carried out investments of higher value, which results on one hand from their bigger investment potential, and on the other proves the stronger motivation to modernize their production technology. Simultaneously, there is a necessity to purchase bigger and more expensive machines in bigger farms. The fact that investments were carried out not only by young farmers, but also by older ones, should be emphasised. Farmers of a varied level of education were beneficiaries. No relation between the level of education and efficiency of obtaining means was reported. One may guess that farmers with better education are more active since their participation in the group of beneficiaries is higher in the whole population of farmers from Lubelskie Voivodeship. Although, the analysis which was carried out above concerning the investments costs proves the increase of farmers activity, it is necessary to simplify procedures and changes in a further, effective use of funds, which are indicated by other authors [Błażejewska 2006, Sawicka 2009].

REFERENCES

Błażejewska M., 2006. Uwarunkowania absorpcji środków unijnych na obszarach wiejskich. Roczniki Naukowe SERiA Vol. VIII, Issue 4, 51–53.

Bułkowska M., 2011. Regionalne zróżnicowanie wykorzystania funduszy unijnych przez gospodarstwa rolne w Polsce. Roczniki Naukowe SERiA Vol. XIII, Issue 3, 51–56.

Czubak W., Kiryluk-Dryjska E., 2009. Regionalne zróżnicowanie aktywności rolników w ubieganiu się o środki strukturalne UE przeznaczone na rozwój rolnictwa w Polsce w latach 2004–2006. Acta Scientiarum Polonorum, Oeconomia 8 (3), 13–24.

Figurski J., Lorencowicz E., 2009. Ocena wykorzystania środków z funduszy unijnych w wybranych gospodarstwach rolnych w Polsce w latach 2005–2007. Acta Scientiarum Polonorum, Oeconomia, 8 (1), 17–24.

Fundusze unijne dla województwa lubelskiego w latach 2007–2015, 2008. http://www.funduszestrukturalne.gov.pl/NR/rdonlyres/DCBBF578-8E58-471B-A00D-D54B609FAC09/39051/Woj_Lubelskie1.pdf, accessed 17.09.2008.

Kusz D., 2011. Regionalne zróżnicowanie nakładów inwestycyjnych oraz poziom wsparcia publicznego inwestycji w rolnictwie polskim. Roczniki Naukowe SERiA Vol. XIII, Issue 3, 163–167.

Polska w Unii Europejskiej – doświadczenia pierwszego roku członkostwa. http://www.cie.gov.pl/WWW/news.nsf/f9d73638327dd0d0c125707400367cc5/0cb1247c23df5689c1256ff2003996be?OpenDocument, accessed 10.08.2012.

Rabsztyn K. 2007. Program SAPARD w województwie małopolskim. Wykorzystanie środków w działaniu 2 – inwestycje w gospodarstwach rolnych. Roczniki Naukowe SERiA Vol. IX, Issue 2, 317–321.
Raczkowska M., 2006. Pomoc Unii Europejskiej w zakresie rozwoju obszarów wiejskich – inwestycje w gospodarstwach rolnych. Roczniki Naukowe SERiA Vol. VIII, Issue 4, 297–301.
Rudnicki R., 2007. Zróżnicowanie regionalnej aktywności gospodarstw rolnych w Polsce w zakresie pozyskiwania funduszy Unii Europejskiej w latach 2004–2006. Roczniki Naukowe SERiA Vol. IX, Issue 1, 416–421.
Sawicka J., 2009. Rozwój obszarów wiejskich w świetle reform Wspólnej Polityki Rolnej i Polityki Spójności Unii Europejskiej. Acta Scientiarum Polonorum, Oeconomia, 8 (2), 133–144.
Siekierski J. 2009. Wykorzystanie środków unijnych w rozwoju wsi i rolnictwa województwa małopolskiego. Acta Scientiarum Polonorum, Oeconomia 8 (2), 144–154.
Spychalski G., 2008. Krajowe instrumenty wspierania rolnictwa i rozwoju obszarów wiejskich w Polsce. Acta Scientiarum Polonorum, Oeconomia 7 (2), 91–101.
Szeląg-Sikora A., 2009. Wykorzystanie funduszy unijnych w aspekcie zróżnicowania regionalnego. Problemy Inżynierii Rolniczej 2, 39–47.
Szeląg A., Kowalski J., 2010. Subwencje unijne a modernizacja parku maszynowego w aspekcie typu gospodarstw rolnych. Inżynieria Rolnicza 3 (121), 199–20.
Szeląg-Sikora A., Wojciech J., 2007. Struktura obszarowa gospodarstw rolnych a wpływ poziomu wykorzystania funduszy unijnych na wyposażenie w park maszynowy. Inżynieria Rolnicza 6 (94), 247–253.
Wojtasik B., 2008. Analiza wsparcia działalności rolniczej na obszarach o niekorzystnych warunkach gospodarowania w ramach PROW w latach 2004–2006. Acta Scientiarum Polonorum, Oeconomia 7 (2), 103–113.

OCENA AKTYWNOŚCI INWESTYCYJNEJ ROLNIKÓW WYKORZYSTUJĄCYCH FUNDUSZE UNIJNE NA PRZYKŁADZIE WOJEWÓDZTWA LUBELSKIEGO[2]

Streszczenie. Przedstawiono wykorzystanie funduszy unijnych przez rolników na terenie województwa lubelskiego na działania inwestycyjne w zakresie techniki rolniczej. Analizą objęto fundusze przedakcesyjne oraz działania w ramach PROW. Od 2004 roku do połowy 2011 roku 15 410 beneficjentów wykorzystało ponad 1,5 mld zł. Beneficjentami byli właściciele większych gospodarstw o średniej powierzchni ponad 40 ha. Średnia wartość inwestycji wyniosła 238 tys. zł i wzrastała wraz z powierzchnią gospodarstwa. Średni wiek beneficjentów wynosił 38 lat.

Słowa kluczowe: fundusze unijne, modernizacja gospodarstw, technika rolnicza, inwestycje techniczne w rolnictwie, województwo lubelskie

Accepted for print – Zaakceptowano do druku: 28.02.2013

[2]Opracowano w ramach badań dziedzinowych „Ocena racjonalności doboru i wykorzystywania maszyn i urządzeń rolniczych w gospodarstwach rolnych Lubelszczyzny w kontekście poprawy ich efektywności i konkurencyjności na rynku" realizowanych w ramach projektu systemowego „Regionalny system zarządzania zmianą gospodarczą", współfinansowanego ze środków Europejskiego Funduszu Społecznego i wdrażanego przez Urząd Marszałkowski Województwa Lubelskiego.

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 27–34*

PRODUCTION DEVELOPMENT EVALUATION OF PLANT COMMODITIES ON SLOVAKIAN AGRARIAN MARKET

Patrik Rovný, Radovan Savov, Drahoslav Lančarič
Slovak University of Agriculture in Nitra

Abstract. Market liberalization and influence of the foreign competition were evident mainly in reductions of the areas with cereals, sugar beat and potatoes. In the case of sugar, there was mainly the influence of the reformation of sugar regimen by reducing the number of sugar beat processors. The year 2009 and also the year 2010 in terms of weather were very difficult for the farmers. Intensive rainfalls in Spring and very hot and dry weather in Summer affected all the plant production in negative way. The reasons for the price increase or decrease of commodities in the EU are as follows: cereals reserves, structural changes in the offer and demand, increase in demand on the Asian market, increase in biofuel production, protectionism business policy, currency development, low food production productivity in Africa and in other developing countries and climatic effects mainly in Europe (in the countries where cereals are mainly grown).

Key words: plant commodities, agricultural markets, prices, Slovak Republic

INTRODUCTION

Globalization represents all the events which become of a worldwide character. Globalization has different economic, social and political expressions and a different meaning of integration, internationalization, homogenization and worldwide concentration. It is significant in creating of new economic, political and social activities which disrupt traditional geographical borders. In fact, globalization represents intensification of economic activities in the real time.

Globalization as a multidimensional process is not only a driving power, but at the same time it is a resultant force of many development trends [Svatoš 2008].

In Agrokomplex of the Slovak Republic, the worldwide phenomenon of globalization started to be asserted and influential after integration into the EU. The positives and negatives of the globalization of the EU-10 countries have gradually appeared after entering

Corresponding authors: Slovak University of Agriculture, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic, e-mail: Patrik.Rovny@fem.uniag.sk, Radovan.Savov@fem.uniag.sk, Drahoslav.Lancaric@fem.uniag.sk

the EU, opening their economies and after accession of Common Agricultural Policy of the EU.

After the integration into the European Union, Slovakia and the other new member states began to enjoy the benefits associated with the liberalization of trade exchange and the introduction of the subsidization schemes provided by the Common Agricultural Policy.

The objective of the paper is to evaluate the price development of the chosen commodities in plant production in Slovakia and to focus on the factors influencing increase or decrease in the price of commodities on the domestic and foreign markets.

MATERIAL AND METHODS

Realization of the already mentioned objective, required the research within the period of the years 2004–2010. While getting the primary data, we considered the data from the secondary information databases of the Slovak Ministry of Agriculture (MPSR), The Research Institute of Agricultural and Food Economics (VÚEPP), Internet websites and our own findings from the monitored file of agri-companies in the Slovak Republic.

We used basic organizational and economic relations and numeric calculations, while analyzing and forming the theoretical and practical solutions.

Price development of agricultural commodities is monitored via trend functions and seasonal indexes. There were used the polynomial functions of the third and fourth degree:

$$Y_t = b_0 + b_1 \times t + b_2 \times t^2 + b_3 \times t^3 \quad (1)$$

$$Y_t = b_0 + b_1 \times t + b_2 \times t^2 + b_3 \times t^3 + b_4 \times t^4 \quad (2)$$

in which: b_0, b_1, b_2, b_3, b_4 are unknown parameters;
t is a time variable (months, years).

RESULTS

Market liberalization and influence of the foreign competition were evident mainly in reductions of the areas with cereals, sugar beat and potatoes. In the case of sugar, there was mainly the influence of the reformation of sugar regimen by reducing the number of sugar beat processors.

On the other hand, land area of the chosen crops gradually increased. The given trend of the increase was recorded mainly in oil plants growing, mainly oil rape (increase of the share by 5.33% as compared with 2004) and grain maize (increase of the share by 1.38% as compared with 2004), and i.e. crops with good market values. The continuing demand for oil plant on the domestic and foreign market was also connected with its processing for methyl ester (Table 1).

In 2009 was the situation affected by the high supply of cereals in the previous year, the low demand for cereals, decline in livestock number and low purchase prices. While in 2008 the sown area of sugar beet was reduced, in 2009 and 2010 growers responded to the situation with adverse developments in the prices of other agricultural commodities on the EU market by increasing the sown areas of sugar beet (46.3%) – Figure 1.

Table 1. Structure of sowing areas in main crops in years 2004–2010, in %

Specification	2004	2005	2006	2007	2008	2009	2010	Difference 2010–2004
				%				
Cereals, total	59.92	58.39	53.85	57.64	58.74	56.49	50.21	–9.71
Wheat	27.02	27.41	25.65	26.50	27.46	27.86	25.14	–1.88
Barley	16.31	15.01	13.56	15.43	15.66	14.39	9.77	–6.54
Rye	2.39	1.78	0.92	1.52	1.91	1.44	1.17	–1.22
Grain maize	10.86	11.32	11.10	11.56	11.33	10.60	12.24	1.38
Oil plants, total	14.46	15.69	18.40	17.00	18.32	19.67	19.62	5.17
Oil rape	6.72	7.80	9.00	11.30	11.97	12.23	12.05	5.33
Sunflower	6.62	6.70	8.00	4.76	5.51	6.09	6.09	–0.53
Potatoes, total	1.78	1.40	1.35	1.31	1.05	0.85	0.81	–0.97
Sugar beet	2.61	2.44	2.04	1.39	0.82	1.17	1.32	–1.29
Legumes	1.09	1.20	1.24	0.99	0.71	0.68	0.85	–0.24
Grape	0.88	0.96	0.87	0.85	0.71	0.69	0.60	–0.28

Source: Statistical Office of the Slovak Republic [2011] and own research.

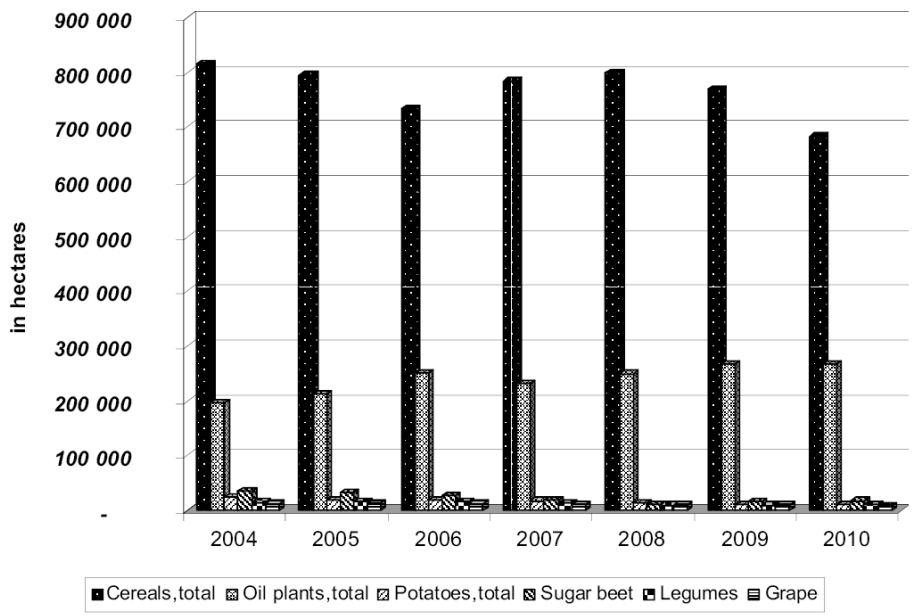


Fig. 1. Development of production areas in chosen crops in years 2004–2010, in hectares
Source: Statistical Office of the Slovak Republic [2011] and own research.

The increase in sown area for oilseeds significantly influences their multipurpose use, their market character, advance purchasing system, continuing global economic prosperity, manufacture of alternative energy sources, the technical breakthrough in animal feed, cosmetics, pharmaceuticals and in connection with this the continuing demand in the European and world market.

The year 2009 and also the year 2010 in terms of weather were very difficult for the farmers. Intensive rainfalls in Spring and very hot and dry weather in Summer affected all the plant production in negative way (Fig. 2).

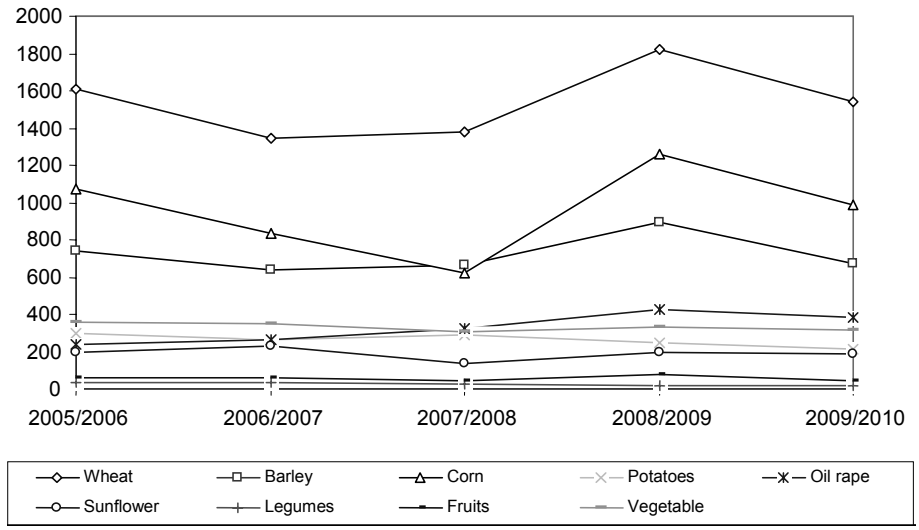


Fig. 2. Production of selected crops in the Slovak Republic, in thousand tons in years 2005–2010

Average harvests per hectare were decreasing almost in all commodities except sugar beet. The biggest decrease was observed in commodities as wheat, rye, legumes and grape (Table 2).

Table 2. Development of harvest in chosen crops in years 2004–2010, in tons per hectare

Specification	2004	2005	2006	2007	2008	2009	2010	Index 2010/2004
	$t \cdot ha^{-1}$							
Cereals, total	4,65	4,51	4	3,56	5,18	4,33	3,74	0.80
Wheat	4,8	4,31	3,85	3,82	4,87	4,06	3,46	0.72
Barley	4,13	3,62	3,48	3,14	4,18	3,45	2,72	0.66
Rye	3,83	2,84	2,41	2,63	3,1	2,87	2,23	0.58
Grain maize	5,83	6,97	5,55	3,97	8,17	6,85	5,53	0.95
Oil plants, total	2,43	2,12	2,06	2,02	2,54	2,23	1,88	0.77
Oil Rape	2,87	2,21	2,12	2,09	2,61	2,32	1,97	0.69
Sunflower	2,18	2,14	2,1	2,05	2,57	2,26	1,81	0.83
Potatoes, total	15,76	15,77	14,31	16,19	17,19	18,6	11,45	0.73
Sugar beet	45,03	52,16	49,46	44,89	61,07	56,11	54,52	1.21
Legumes	5,08	4,27	3,94	3,48	3,68	3,31	2,97	0.58
Grape	4,71	4,12	4,42	4,27	5,35	4,51	2,59	0.55

Source: Statistical Office of the Slovak Republic [2011] and own research.

The overall offer of the main commodities and their consumption on the domestic market in 2010 is shown in Table 3. It could be found that the demand for cereals and bakery products is income-inelastic, bread and bakery products belong to the group of the basic goods [Kubicová and Kádeková 2011].

Table 3. Offer and demand of chosen basic agricultural products in the Slovak Republic in years 2005–2007 in thousand tons

Crops	Economical year 2009–2010		
	domestic production (dp)	domestic consumption (dc)	Share of dp to dc
	ths. t		%
Wheat	1,538	878	175%
Barley	676	557	121%
Corn	988	835	118%
Potatoes	216	287	75%
Oil rape	387	196	197%
Sunflower	187	60	312%
Legumes	15	21	72%
Fruits	46	107	43%
Vegetable	312	485	64%

Source: [Green Report 2011].

In 2009 it is possible to see big decrease of plant commodities and on the other side in 2010 big decrease of all plant commodities (Figs 3 and 4).

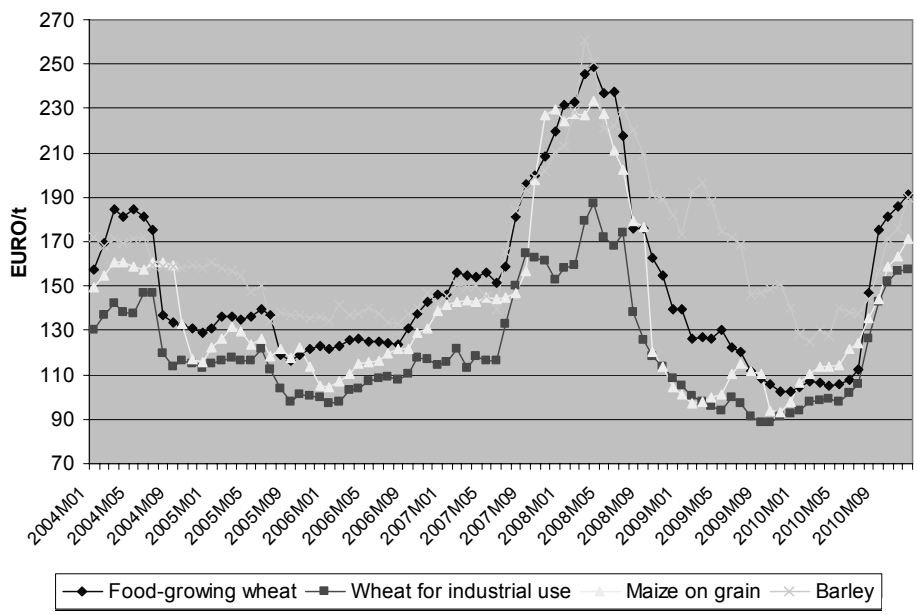


Fig. 3. Development of indexes in chosen commodities in years 2004–2010
Source: Statistical Office of the Slovak Republic [2011] and own research.

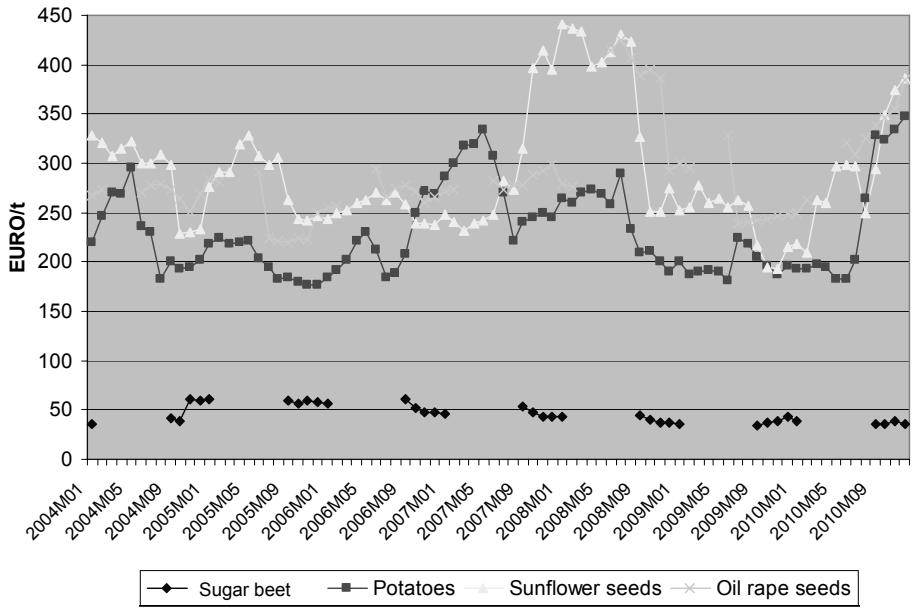


Fig. 4. Development of indexes in chosen commodities in years 2004–2010
Source: Statistical Office of the Slovak Republic [2011] and own research.

Trendline analysis

Trendlines equations are shown in the Table 6, together with the value of reliability by the R^2 indicator (index). We can see from the Table that in 57.46% the changes of the dependent variable in the price development of potatoes explained in the monitored period by the fourth-degree polynomical function (quadratic equation).

Table 6. Trend function prices of chosen commodities in 2004–2010

Commodities	Trendlines	Value of reliability R^2
Food-growing wheat	$Y = 1E\text{-}04x^4 - 0.0177x^3 + 1.0226x^2 - 20.532x + 243.83$	0.4942
Wheat for industrial use	$Y = 7E\text{-}05x^4 - 0.0115x^3 + 0.655x^2 - 13.10x + 183.92$	0.4389
Maize on grain	$Y = 9E\text{-}05x^4 - 0.0156x^3 + 0.8982x^2 - 17.924x + 221.83$	0.3975
Barley	$Y = 4E\text{-}05x^4 - 0.0081x^3 + 0.5329x^2 - 11.843x + 216.33$	0.4339
Potatoes	$Y = 0.0001x^4 - 0.0236x^3 + 1.2646x^2 - 23.279x + 322.15$	0.5746
Sunflower seeds	$Y = 0.0001x^4 - 0.02x^3 + 1.1594x^2 - 23.582x + 400.14$	0.2184

Source: Statistical Office of the Slovak Republic [2011] and own research.

CONCLUSIONS

Price development in Slovakia was affected by the substantial growth of the global demand for food that is becoming a strategic item which affects the economic and pricing policy. The prices are also affected by the inputs of farmers and processors the prices of which are rising, including energy, fuel, fertilizers, chemicals, seeds or wages. The prices of food producers and consumer prices depend on a number of other factors, including some unpredictable factors (mostly weather) [Krížová 2009].

The reasons for the price increase or decrease of commodities in the EU are as follows: cereals reserves, structural changes in the offer and demand, increase in demand on the Asian market, increase in biofuel production, protectionism business policy, currency development, low food production productivity in Africa and in other developing countries and climatic effects mainly in Europe (in the countries where cereals are mainly grown).

These factors cause the increase in the demand in a long-term horizon and the reaction of the demand is slowed down. The growing price of oil and price of gas, connected with it, automatically causes higher price for processing and transport.

The significant price volatility of plant commodities has been observed in the world agri-food markets in these latter years. It has been caused by the triggers of the so-called market shocks that negatively influenced the stability of supply and demand of agri-food commodities [Matošková 2011].

REFERENCES

Database of Statistical Office of the Slovak Republic, 2011.

Green Report. Report on Agriculture and Food Industry in the Slovak Republic 2010, 2011. Ministry of Agriculture and Rural Development of Slovak Republic, Bratislava.

Krížová S., 2009. Selected food verticals and their impact on prices of food products. Agric. Econ. – Czech 55 (2), 94–101.

Kubicová Ľ., Kádeková Z., 2011. Comparison of the income development and the food demand elasticities of the private households in Slovakia. Agric. Econ. – Czech 57 (10) 404–411.

Matošková D., 2011. Volatility of agrarian markets aimed at the price development. Agric. Econ. – Czech 57 (1), 34–40.

Svatoš M., 2008. Selected trends forming European agriculture. Agric. Econ. – Czech 54 (3), 93–101.

EWALUACJA ROZWOJU PRODUKCJI PRODUKTÓW ROŚLINNYCH NA RYNKU ROLNYM SŁOWACJI

Streszczenie. Wpływ liberalizacji rynków i konkurencji z zagranicy na redukcję powierzchni upraw zbóż, buraków cukrowych i ziemniaków. W przypadku rynku cukru, szczególnie odczuwalny był wpływ reformy tego rynku, która prowadziła do redukcji liczby przetwórców buraków cukrowych. Lata 2009 i 2010 były z punktu widzenia warunków pogodowych szczególnie trudne dla rolników. Intensywne opady deszczu wiosną oraz bardzo gorące i suche lato wpłynęły negatywnie na całą produkcję roślinną. Przyczynami wzrostu cen produktów w Unii Europejskiej są: rezerwy zbóż, zmiany strukturalne podaży i popytu, wzrost popytu na rynkach azjatyckich, wzrost produkcji biopaliw, protekcjonizm gospodarczy, rozwój waluty, niska wydajność produkcji w Afryce oraz w innych krajach rozwijających się, a także wpływ zmian klimatu szczególnie w Europie (w krajach, w których przede wszystkim są produkowane zboża).

Słowa kluczowe: produkty pochodzenia roślinnego, rynki rolne, ceny, Słowacja

Accepted for print – Zaakceptowano do druku: 28.02.2013

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 35–44*

SALE OF ORGANIC FOOD IN SPECIALIST AND GENERAL RETAIL GROCERY OUTLETS – A COMPARATIVE ANALYSIS

Joanna Smoluk-Sikorska, Władysława Łuczka-Bakuła
Poznań University of Life Sciences

Abstract. The article presents the results of an inquiry research carried out in 2011 among specialist and general retail grocery outlets offering organic food. A comparative analysis of the width and depth of organic products range was conducted and grounds for lack of the offer complexity, particularly in retail grocery outlets, were presented as well. The sources of supply in basic products groups and the distance to supplier as the factors determining the offer were discussed. The conducted research proves that the product range, especially in general retail outlets, is not sufficient, which results from the offer of the intermediate links of the organic food distribution channels and the relatively long distance to suppliers.

Key words: organic food, distribution, specialist outlets, general retail grocery outlets, product range, supply sources

INTRODUCTION

Organic farming is a significant element of the sustainable development of rural areas. Opposite to intensive agriculture based mainly on economic premises, in this system the most importance is attributed to short- and long-term environmental goals, which are harmoniously connected to economic and social goals. According to the latest FiBL--IFOAM Survey on certified organic agriculture worldwide in 2010 there are 37 million hectares of organic agricultural land. The regions with the largest organic areas Oceania – (12.1 million ha), Europe (10 million ha), and Latin America (8.4 million ha). The countries with the most organic land are Australia, Argentina and the United States [Willer and Kilcher 2012].

Poland is a country of great potential in organic farming development in regard to low chemicalisation of agriculture and strong dispersion of agricultural holdings. This system is one of the basic elements of the sustainable agriculture, because particular benefits,

Corresponding authors: Poznań University of Life Sciences, Faculty of Economics and Social Sciences, Wojska Polskiego 28, 60-637 Poznań, Poland, e-mail: smoluk@up.poznan.pl, luczka@up.poznan.pl

both environmental and socio-economic, are related to its growth. The organic farming has positive influence on quality of environment components, such as air, water, soil and it also increases biodiversity. Moreover, due to application of quite laborious organic methods, it is possible to maintain some part of workplaces in rural areas, and farmers' participation in agrienvironmental programme as well as gaining higher prices for certified products may result in obtaining incomes higher or comparable as in conventional agriculture.

Currently the share of organic agricultural land in Poland amounts to 3.4% of total agricultural land, while in Europe this ratio is at the level of 2.1%[1]. However, the necessary condition of organic farming development is properly functioning market of organic food, which would be able to take over the increasing volume of supply. In Poland this market is in initial stage and insufficiently formed distribution channels as well as logistical network constitute its significant problem [Kilcher et al. 2011]. Two kinds of the channels dominate: direct sale and through specialist outlets. Recently the growth of interest in sales of organic food in general retail grocery outlets has been observed. This occurrence fosters growth of possibility of sale from organic agricultural holdings and organic processors as well as increases the organics' accessibility for consumers.

The aim of the paper is the analysis of the structure and range of specialist and general retail grocery outlets' organic food offer and their supply sources. In order to achieve this goal, the results of research conducted in 2001 concerning retail sale of organic products were presented.

MATERIAL AND METHODS

In 2011 in the 8 largest agglomerations in Poland, i.e. warszawska, śląska, krakowska, gdańska, łódzka, wrocławska, poznańska and szczecińska, the investigation on organic food retail distributors was conducted. It covered 131 specialist outlets and 109 general retail grocery shops offering organic food. Questions in the inquiry questionnaire concerned mainly range of the offered organic food, prices, supply sources and evaluation of functioning and perspectives of distribution and market of this kind of food, as well as its main development obstacles. The research was funded by the Polish Ministry of Science and Higher Education within the research project No NN112 385440 "State and Condition of the Development of the Organic Food Retail".

Range of organic food

In Poland the indirect sale of organic food through specialist channels (specialists outlets) dominate [v. Osch et al. 2008]. An outlet is meant specialist when it sells large assortment of products in quite narrow and deep product line [Pilarczyk et al. 2001]. These channels assure more or less complex offer of organics.

In recent years general grocery retail outlets have also introduced organic products to their offer, which somehow increased the accessibility of organics for consumers. An outlet is meant general grocery when it quite small and offers most of the food products at high price [Pilarczyk et al. 2001].

[1]See website http://www.organic-world.net.

Decisions concerning the range of products are one of the most important ones in running a commercial activity. An outlet must subordinate their goals to customers' needs. Apart from good relation, favourable prices, adequate working hours assortment offer is one of the most important factors increasing demand [Cyrek 2010]. Selection of assortment means defining a specific combination of products, which a given outlet will offer customers. It is an essential element of sale strategy, which should be preceded by market research, defining segments and estimation of demand size. In planning and selection of product range, according to brands, types and classes, such factors as predicted turnover, profitability, expected costs and revenues as well as resulting margin realized upon the sale of particular products should be taken into account [Szulce 1998].

Most of the inquired retailers specializing in sale of organic food (almost 86%) offered over 100 different organic products and nearly 2/5 over 300 (Fig. 1). In turn, in case of general retail grocery outlets the majority (almost 48%) sold between 50 and 100 articles, wherein none of the investigated retailers had more than 200 organic products in the assortment. The differences between these two kinds of shops result mainly from the specificity of the inquired outlets and place of organic food in the applied sales strategy. These retailers predict that organic food would not increase the turnover in high degree and the offer of organics is a kind of diversification of their regular product range. In specialist outlets this type of food has a priority meaning and in nearly 2/3 of the inquired units the share of the organics in total assortment offer amounted to 60%. In general retail outlets this share is far fewer and generally totals a few per cent. In this kind of shops organic food is so to say an addiction to basic assortment, which is constituted by conventional products. Some part of the general retailers would have introduced organics to their offer earlier, however this moment was delayed by:

- small supply of domestic organic food (mainly consisted of processed products),
- lack of market information,
- high cost of gaining of organic food.

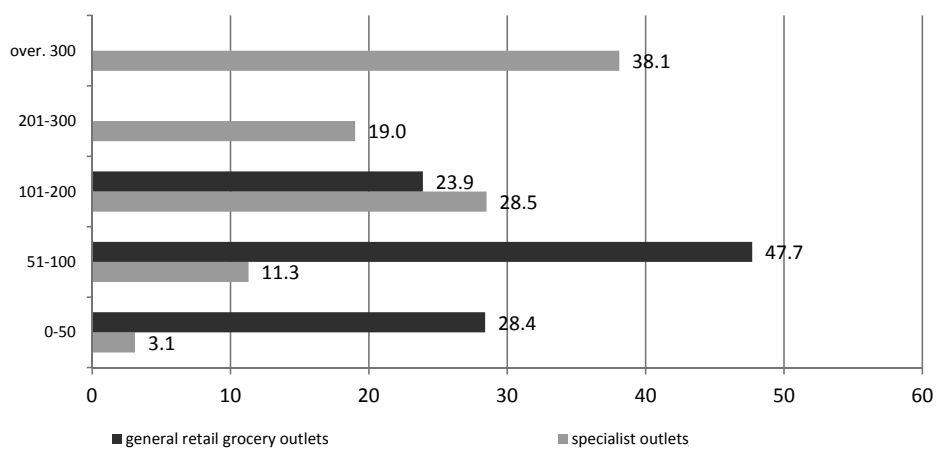


Fig. 1. The amount of organic products offered in the investigated outlets (%)
Source: Authors' own research.

The most specialist shops (about 2/3) offered all the product groups besides meat and sausages (Table 1). It results from the fact that part of the units run sale of food for vegetarians, and on the other hand the market offer of this product group is rather limited[2]. The majority of products are offered in such groups as: herbs, spices and cereals, in turn the fewest articles in eggs[3], meat and bread. In grocery shops, cereals (95%) and oils (80%) were mainly offered and the fewest units sold meat, sausages and bread. In case of this kind of outlets the most articles were offered in group cereals and herbs, spices, while the fewest in eggs, meat, sausages and dairy products.

The similarities in range of products (e.g. large share of cereals or spices) in both types of outlets mainly results from wider market offer of some products and their accessibility in intermediate links of distribution channels as well as relative ease of storage. In turn, the differences are the consequences of different sale strategies applied in these shops. In specialist outlets assuring of complex organics offers is very significant, because part of regular purchasers want to have an overall diet consisting of organic products, in turn customers of grocery shops are rather occasional consumers, who buy only particular groups of products or purchase organic food for little children [Łuczka-Bakuła 2007, Koreleska 2009].

Table 1. Assortment offer of the investigated retail outlets

Product group	Share of outlets offering the given product group (%)		Average amount of the offered products in the given group	
	specialist outlets	general retail grocery outlets	specialist outlets	general retail grocery outlets
Bread	69.0	20.2	12.7	3.0
Cereals	72.6	95.4	40.4	32.9
Fruit	65.5	51.4	15.1	6.8
Vegetables	65.5	27.5	18.2	7.2
Fruit products	67.9	77.1	29.8	8.3
Vegetable products	67.9	71.6	29.4	10.0
Spices, herbs	69.0	70.6	42.5	21.8
Oils	67.9	80.7	18.1	6.5
Dairy products	67.9	32.1	23.4	5.6
Eggs	69.0	51.4	3.4	2.1
Sausages	40.5	22.9	19.4	4.6
Meat	31.0	9.2	10.0	5.0
Tea, coffee	67.9	70.6	29.6	16.9
Sweets	67.9	53.2	31.6	7.5

Source: Authors' own research.

[2]In 2010 the meat processing had 5.1% share in whole organic processing.
[3]The specificity of this group limits its product range.

The retailers are aware that their offer does not entirely meet the expectations of consumers. In the opinion of all owners of the investigated grocery outlets, their offer does not assure the assortment complexity, whereas every fifth specialist distributor answered that their range of organic is sufficient (Fig. 2). Over 2/3 of all retailers indicated that sometimes there is a lack of some products, while definitely more owners of general retail outlets than specialist ones (by 24 percentage points) responded that often or very often there is a lack of some wanted articles.

Fig. 2. The degree of complexity of organic food offer in the opinion of the investigated distributors (in percentage points)
Source: Authors' own reserach.

As a reason for insufficient organic food offer, both types of retailers agreeably indicated narrow suppliers' product range and high price (Fig. 3). Specialist distributors assigned more meaning to seasonality of supply and high costs of gaining of products, mainly in regard to the necessity to assure the possibly most complex offer consisting of fresh products, which are characterised by seasonality and price volatility. In their opin-

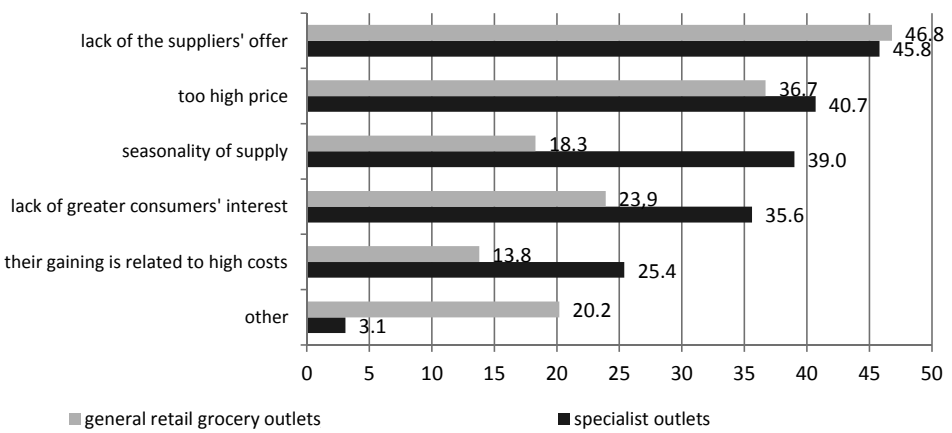
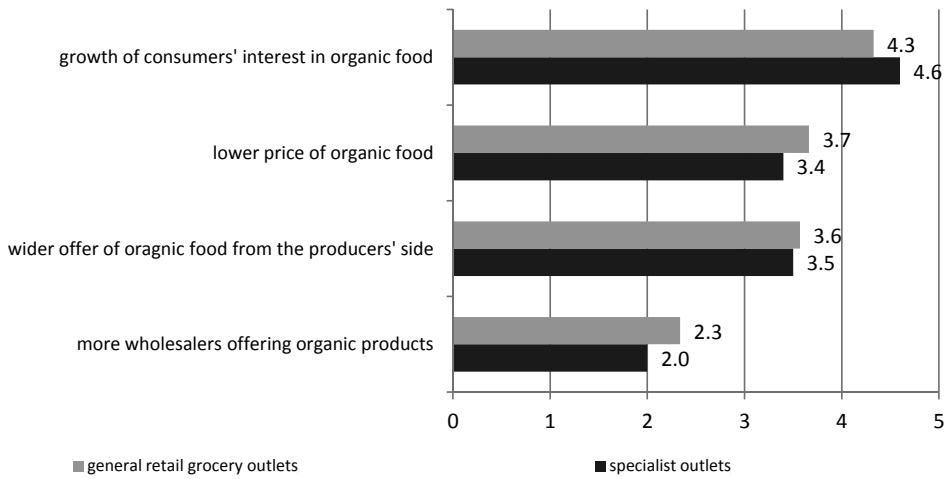


Fig. 3. Reasons for insufficient organics offer (%)
Source: Authors' own research.

ion, the significant factor was lack of consumers' interest, because consumers of organic food constitute in these outlets a large share of all purchasers, in opposite to grocery outlets, where buyers of organics are small percentage of customers.

Definite majority of specialist retailers (over 92%) and quite big share of general retailers (over 60%) aim at widening the range of organics in future. However, they condition their decision on particular factors, such as demand growth, lower price of organics or wider supplier offer (Fig. 4). Specialist distributors assign more meaning to determinants of supply character rather than the ones of demand character, which is also related to assuring wider offer of organic food. Factors connected to demand have less significance, because regular customers constitute large part of their outlets' clients of already formed awareness, who, while expressing their needs, at some degree influence the offer level in the investigated shops.



The investigated assigned ranks to particular factors from 1 - he least important to 5 - the most important.

Fig. 4. Factors determining growth of assortment offer of organics
Source: Authors' own research.

The product range in the inquired outlets, both specialist and grocery, only in part satisfies the consumers' needs. Too poor offer, in particular in case of fresh products, for which the demand is the highest, negatively influences the image and interest of organic food, most of all for occasional consumers. General retail grocery outlets dispose adequate equipment, which may be used for storage of fresh organic products, however the retailers very rare decide to widen their offer. It is worth noting, that often their location (large housing estates) favours gaining new customers' groups, which in regard to health conditions or lack of time are not able to find organic food in distant specialist shops situated mostly in city centres or shopping malls.

Supply sources

The selection of the supply sources requires evaluation of their purposefulness from the retailer. While deciding on the product range, they take into account many factors, among which the most important are [Szczepankiewicz 2004]:

- factors forming delivery prices, including discounts, conditions and terms as well as regulation of payment,
- commodity quality factors, which are brand, quality level, innovations and production technology,
- factors connected to delivery organisation, such as conditions of ordering, reliability,
- specific factors, which are transportation means, storage of supplies, technical support, repair service or supplier policy in the area of complaints and return.

From the variety of factors forming price, the transaction conditions are the most important ones for the investigated distributors, because in regard to limited supply and small amount of organic food suppliers, the retailers do not have the possibility to choose diverse supply sources. Considering high dispersion of supply, the supply sources are very often determined by specific factors, such as distance to provider and the means of transportation, which costs are additionally increased by the necessity to fulfil special requirements accompanying transportation of organic products. These costs influence price and may cause spatial limitation of product market [Tomanek 2004], which in the Polish conditions, by the necessity of searching for additional possibilities of sale, has particular meaning for organic food market development.

Quite big differences between specialist and grocery outlets occur in number of suppliers, which mainly results from the need for widening the offer in the specialist shops. The average number of suppliers of specialists shops amounts to nearly 24, wherein 10 is the dominant. In turn, in general retail grocery outlets this number totals almost 4, wherein 3 is the dominant. Agricultural holdings are generally providers of fresh eggs, fruit and vegetables, both to specialist and general retail outlets, partly dairy products, bread, cereals as well as fruit and vegetable products to specialist shops (Table 2). In turn, wholesalers deliver most of assortment to general retail grocery outlets (they have smaller meaning in case of eggs, fruit and vegetables, meat and sausages), whereas they are suppliers of coffee, tea, sweets, oils and fruit and vegetable products. Processors provide both types of outlets in meat, sausages, bread and fruit and vegetable products. Considering processed products, agents and producers' groups (in case of meat and sausages) have some significance, particularly for specialist retailers. The supply on farmers' market has marginal significance.

Table 2. The supply sources of the investigated outlets

Product	Agricultural holding		Wholesaler		Proce		Farmers' marketssor		Agent		Producers' group	
	1	2	1	2	1	2	1	2	1	2	1	2
1	2	3	4	5	6	7	8	9	10	11	12	13
Bread	43.4	23.8	38.2	50.0	25.0	26.2	–	–	9.2	11.9	11.8	–
Cereals	27.8	10.6	83.5	100.0	16.5	–	–	–	17.7	10.6	10.1	–
Fruit	68.9	35.7	54.1	64.3	–	–	1.4	–	6.8	–	9.5	–
Vegetables	74.7	55.6	54.7	44.4	–		1.3	–	6.7	–	10.7	–
Fruit products	20.0	6.7	71.3	87.6	22.5	19.1	–	–	20.0	–	7.5	–

Table 2 cont.

1	2	3	4	5	6	7	8	9	10	11	12	13
Vegetable products	25.0	8.2	72.5	76.7	21.3	23.3	–	–	20.0	–	7.5	–
Herbs. spices	8.8	–	85.0	100.0	16.3	–	–	–	8.8	6.1	7.5	–
Oils	15.0	13.3	85.0	80.7	26.3	–	–	–	7.5	6.0	5.0	6.0
Dairy	44.3	57.1	54.4	42.9	22.8	57.1	–	–	10.1	–	7.6	–
Eggs	86.1	82.1	27.8	35.7	2.5	8.9	1.3	–	5.1	–	3.8	–
Ham-and-sausage	27.3	–	40.9	40.0	43.2	60.0	–	–	4.5	–	13.6	–
Meat	35.3	–	41.2	–	41.2	100.0	–	–	2.9	–	17.6	–
Tea. Coffee	–	–	94.9	93.5	11.4	–	–	–	15.2	6.5	6.3	–
Sweets	–	–	96.0	90.5	12.0	19.0	–	–	14.7	–	2.7	–

1 – specialist outlets, 2 – general retail grocery outlets.
Source: Authors' own research.

The choice of means of transportation limits only to relatively expensive car transportation in regard to its high elasticity. On average, the most distant from the investigated specialist shops were wholesalers and processors, whereas the least – agents (Table 3). In turn in case of general retail grocery outlets, the wholesaler was the most distant source, whereas the least – agent and processor. The differences result from the fact that specialist shops search for wider assortment, often at very distant suppliers, while general retail grocery outlets limit that search to the suppliers located in the region, which mostly take the transportation cost over. Considering cost of transportation to specialist outlets, the cost is in half of cases beard by the outlets or even in 3/4 cases of transportation from an agent. On one hand, such large participation in transportation cost has influence on retail prices, on the other, gaining products from distant suppliers assures more diverse range of products, which results in meeting the needs of wider group of customers.

Table 3. Average distances between the investigated outlets and suppliers

Supplier	Distance (km)		Who takes the transportation cost over (%)					
			Supplier		Outlet		Jointly	
	1	2	1	2	1	2	1	2
Wholesaler	145.9	159.1	39.7	48.8	50.9	51.2	9.4	–
Agent	75.7	50.0	10.0	50.0	75.0	50.0	15.0	–
Processor	169.7	52.4	30.3	80.8	51.5	19.2	18.2	–
Agricultural holding	101.4	76.0	36.6	77.1	56.1	22.9	7.3	–

1 – specialist outlets, 2 – general retail grocery outlets.
Source: Authors' own research.

CONCLUSIONS

Specialist outlets dominate in distribution of organic food in Poland. Recently general retail grocery outlets have been introduced into sale of organic food. Nevertheless, in these outlets organic food has no priority significance and constitutes only a small share in total product range of an outlet. The offer is very often limited to processed products with longer term of validity. In turn, specialist outlets proposing more varied, but not always complete assortment, search for more diverse products at many different suppliers, which consequently shifts prices of organic food. Nevertheless, in both types of shops there are some lacks considering fresh products, particularly meat, which is related to small market supply as well as difficulties with storage (short validity term). This is one of the most important problems, because consumers claim that the offer of this product group should be wider and more accessible. This situation leads to a permanent imbalance on organic food market.

Despite a number of limitation and lacks, general retail grocery outlets constitute a possible opportunity for organic market, mostly in regard to localisation in population centres, where one can hardly find any shop specialising in organic food. Introducing this kind of outlets to organic food sale on wider scale might increase the accessibility of organics for broader group of consumers, particularly if these shops extended their offer with fresh organic products, which generally lack in retail networks.

REFERENCES

Cyrek P., 2010. Kierunki zmiany oferty przedsiębiorstw handlu detalicznego i ich ograniczenia. Acta Scientiarum Polonorum, Oeconomia 9 (3), 55–64.

Kilcher L., Willer H., Huber B., Frieden C., Schmutz R., Schmid O., 2011. Organic Market in Europe. FiBL, Frick.

Koreleska E., 2009. Kształtowanie produktu w koncepcji marketingu ekologicznego. Acta Scientiarum Polonorum, Oeconomia 8 (4), 79–86.

Łuczka-Bakuła W., 2007. Rynek żywności ekologicznej. Wyznaczniki i uwarunkowania rozwoju. PWE, Warszawa.

Pilarczyk B., Sławińska M., Mruk H., 2001. Strategie marketingowe przedsiębiorstw handlowych. PWE, Warszawa.

Szczepankiewicz W., 2004. Organizacja źródeł zaopatrzenia i rola handlu detalicznego w kanałach rynku. (in) Handel detaliczny funkcjonowanie i kierunki rozwoju, J. Szumilak (Ed). Oficyna Ekonomiczna, Kraków.

Szulce H., 1998. Struktury i strategie w handlu. PWE, Warszawa.

Tomanek R., 2004. Funkcjonowanie transportu. Wyd. AE w Katowicach, Katowice.

van Osch S., Burkhard S., Strauch C., Bauer C., 2008. Specialised Organic Retail Report Europe 2008. Practical Compendium of the Organic Market in 27 European countries. ORA Vienna, EKONZEPT Montpellier/Freising, Biovista Ettingen.

Willer H., Kilcher L., 2012. The World of Organic Agriculture – Statistics and Emerging Trends 2012. Research Institute of Organic Agriculture (FiBL), Frick, International Federation of Organic Agriculture Movements (IFOAM), Bonn.

SPRZEDAŻ ŻYWNOŚCI EKOLOGICZNEJ W SKLEPACH SPECJALISTYCZNYCH I DROBNODETALICZNYCH PLACÓWKACH SPOŻYWCZYCH – ANALIZA PORÓWNAWCZA

Streszczenie. W artykule przestawiono wyniki badań ankietowych przeprowadzonych w 2011 roku wśród sklepów specjalistycznych i drobnodetalicznych oferujących żywność ekologiczną. Przeprowadzono analizę porównawczą szerokości i głębokości oferowanego asortymentu oraz przedstawiono przyczyny braku kompleksowości oferty, zwłaszcza w sklepach detalicznych. Przedstawiono również źródła zaopatrzenia sklepów w podstawowe grupy produktów oraz przeciętną odległość placówek handlowych od dostawców. Z badań wynika, że oferowany asortyment, zwłaszcza w sklepach drobnodetalicznych jest niewystarczający, co głównie jest rezultatem niskiej oferty ogniw pośredniczących w kanale dystrybucji żywności ekologicznej oraz relatywnie dużego oddalenia dostawców.

Słowa kluczowe: żywność ekologiczna, dystrybucja, sklepy specjalistyczne, sklepy drobnodetaliczne, oferta asortymentowa, źródła zaopatrzenia

Accepted for print – Zaakceptowano do druku: 28.02.2013

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 45–55*

IT SYSTEMS ADOPTION AND ITS IMPACT ON THE FOOD AND AGRICULTURAL SECTOR

Tomasz Woźniakowski, Piotr Jałowiecki
Warsaw University of Life Sciences – SGGW

Abstract. The paper contains an overview of Information and Communications Technology (ICT) implemented in food and agricultural enterprises. The description of the sector summarizes some unique features compared to numbers describing food production aspects in Europe. For better understanding of the whole phenomenon the paper describes an innovative processes and technology progress in general and in the sector as well. Important aspects and potential problematic areas such as factors that influence ICT deployment are shown and analyzed. Main focus is directed on the technologies of e-business and its impact on organizational aspect of the sector. Also the role of ICT in the innovation process and product has been reviewed and certain areas of improved activities compared and summarized. Very forward-looking technology in the agri-food sector is SOA. With a common data exchange standards, it is possible to transfer information between different units.

Key words: ICT, e-business, agri-food sector, innovation, SOA

INTRODUCTION

Agri-food enterprises operate in a complex and dynamic environment. To meet increasing demands of consumers, government and business partners, enterprises continuously have to work on innovations of products, processes and ways of cooperation [Harsh et al. 1981]. Hence, a development towards a more knowledge-based economy is needed. Traditional software engineering approaches are inadequate to address these issues [Wolfert et al. 2010]. Business process management (BPM), in combination with reference information models, plays an important role. Designing and implementing successful business processes can provide important strategic advantages for the business into the next century [Keller and Teufel 1998]. Food production sector will indicate companies that place themselves in the middle of the "from farm to fork" chain, that belong to a group 15 of Polish Classification of Activities and according to NACE rev. 1.1 to a

Corresponding authors: Warsaw University of Life Sciences The Faculty of Applied Informatics and Mathematics, Informatics Department, Nowoursynowska 159, 02-776 Warsaw, Poland, e-mail: tomasz_wozniakowski@sggw.pl, piotr_jalowiecki@sggw.pl

group of 15th DA. In 2005, food production sector of the European Union (EU25) had a turnover of 836 billion over 70% of the processing of agricultural raw materials and employing 3.8 million people in the majority of employees in SMEs [Eurostat, CIAA 2006]. The sector produces processed agricultural products that belong to a group called "non--Annex I goods" that is not specified in the list of CAP (Common Agricultural Policy). However, materials used in this sector are mostly included in the list.

INNOVATION

The new concept is an invention, which properly works in the laboratory conditions. It becomes an innovation only when it can be adjusted in an industrial scale at acceptable cost level. New ideas pass from the invention stage to the phase of innovation. Effort in this direction is the result of independent development achievements in various fields Rogers [2006] defines innovation as "an idea, practice, or object perceived as new by a person or other entity for adoption". This definition is particularly popular in marketing. The most popular definition was proposed by Schumpeter [1934]. It describes innovation as "the introduction of a new combination", that identifies five possible cases:
1. Introduction of the new good;
2. Introduction of new production methods;
3. New market;
4. New source of supply;
5. Introduction of the new organization of industry.

It is not only the research that leads to innovation but also users of technology. This fact is used in EU programs to promote ICT as part of the Competitiveness and Innovation. These programs promote innovation and competitiveness by promoting the wider uptake and best possible usage of ICT by citizens, governments and enterprises, in particular: small and medium enterprises. The European Commission is analyzing the need for policy measures to support and facilitate the dissemination of information and communication technology adoption in particular advanced electronic business (e-business). For instance – projects of eBusiness Watch and eBSN. Among the technological innovations can be distinguished:
1. Product innovation;
2. Innovation Process;
3. Innovation system (business model).

The subject of product innovation is primarily switched to design and create a new product with features that distinguish it from wide range of other products that are offered to customers. An innovation process is the change of technology (the method of processing raw material into the product), which incorporates the content (parameters) and the order of sequence of operations that make up the technological process. Innovation System is in other words a creation of a new solution (the system) – biological and technological organization primarily in the so-called formation technology and communications, leading to changes in the flow of information in logistics processes and management processes. Business model innovation is the most complex incarnation of innovation that combines often radical changes in processes and creation of markets for new products. They require courage,

determination and willingness to experiment. They are usually connected to the negation of the accepted ways of thinking and rejection of stereotypes existing in the industry thought. In business, for example, new product management teams, when assessing the feasibility of introducing new products, tend to favor their introduction with a frequency that is unwarranted by subsequent commercial performance. Analysis of many new product failures points to a tendency to both design research, and interpret research results, in a way that does not allow equal opportunity for evidence to arise that runs counter to a new product launch decision [Barabba 1991].

TECHNOLOGICAL PROGRESS

Technology is defined as goods and services produced together with the means of production, respectively in the company, industry or economy. Technological change is a change in manufactured goods, services, or their means of production. Terms: technological change, advanced technology and technical progress are used interchangeably. Technological changes in production of goods and services are called – product innovation. Technological changes in production methods are called – innovation process, which includes for example, changes to production equipment, organization of production, movement of goods or information, or management [Kollinger 2005]. Economic phenomena associated with the usage of technology became popular in the last few decades to become a very important strand of economic theory, such as "patent races", "new trade theory", "new growth theory", "real business cycle", macro models [Dosi 1997]. We begin to understand the technical progress, not as an exogenous shock that changes the supply curve, but as an explicit part of the economic dynamics and management. The interest of economists to study the technical progress was inspired by Schumpeter, who saw significant technical innovations ("execution of a new combination") as the main source of long-term economic development. He believed that economic development must be driven by forces that exist in the economy and not only by external influence [Schumpeter 1934]. Specific group of related technological solutions can be associated with each technological paradigm, such as nuclear technology, biotechnology, or Internet technologies. Dosi calls the pattern and direction of technological progress based on the paradigm of trajectory. Technology, in this approach, is seen as a limited set of possible technological alternatives and theoretical future states. We may think of the external borders of the trajectory as the optimum combination of all the relevant technological and economic variables, in other words, the production possibilities frontier for a given technological paradigm. The formation of a new trajectory corresponds to the formation of groups of related technical innovation in the Schumpeterian sense. Movement of the company or the economy along a trajectory can be described by the diffusion of technology within the company or the economy. Numerous technological trajectories can exist in parallel. In addition, they require complementary state of knowledge, experience, skills and so on. When we continue to talk about trajectories or technological paradigms, we will use the definition given by Dosi. It is worth mentioning about the international diffusion of technology models, and models that describe the interactions between the technological leader and imitate others. The probability of successful imitation (adoption of innovation)

is higher for less developed imitator, which translates into lower costs and higher demand from imitation to innovation in this country. Higher demand will mean more intensive international exchange and faster diffusion of technology, which, in turn, translate into a higher rate of technological progress in the country imitator and higher economic growth. As a result, the growth rate will converge to mimic the growth leader, as long as the imitator not overtake the leader. However, if the cost of technology adoption in the country imitator will be high, due to such dissimilar economies, the diffusion of technology and international trade will be limited, and the convergence process does not occur. Therefore, a key issue for imitators are all steps to be conformed to the economy of technological leadership. Such actions should aim, above all, the capabilities of the adoptive country, by increasing the pool of potential users of technology.

E-BUSINESS

The concept of electronic business includes an exchange of information between producers, distributors and consumers of products and services, contracting, transmission of documents, videoconferencing, gaining new contacts, search etc. Support of e-business processes enable a B2B (Business to Business – for example, the exchange websites, corporate portals), B2C (Business to Consumer – such as virtual stores and interactive catalogs on the web quotation), often used in conjunction with the CRM (Customer Relationship Management – to streamline your job applications within the enterprise) and SCM (Supply Chain Management – applications implementing supply chain management). It is relatively new to view supply chain as a process, that is a single integrated flow across all business. Internet technology in distributed environment such as food producers can be considered as "the best possible solution" to handle whole problem [Basu and Wright 2007]. However, some constraints arise due to the nature of industry's products, and the specific structure of the sector. Subsequently, collaboration in the supply chain is often limited to operational issues and to logistics-related activities [Matopoulos et al. 2007]. Depending on the company's strategy, information systems, e-business can have an open (unrestricted accessibility via the Internet) or closed (extranets available for the selected group with authorization in the form of a password). Policy makers, industry and media have used various terms for the same concepts and also often attributed different meanings to the same terms. The consequence of this were numerous efforts made by various statistical and international organizations (e.g. OECD, European Commission, U.S. Bureau of the Census, Statistics Canada) to find clear definitions of terms as the first step to developing useful statistics to measure the "digital economy" [Mesenbourg 2000].

E-BUSINESS TECHNOLOGIES

Existing definitions can be seen as different in the three key elements [OECD 1999, p. 10]:

1. Actions/transactions;
2. Applications;
3. Communication networks.

These three elements coincide with the three dimensions of e-business:

1. Instance (the current implementation of application);
2. One or more applications that use the network infrastructure;
3. Communication technology infrastructure.

Earlier definitions of e-business and e-trade differed, depending on a component/dimension of e-business concern:

1. Activities (for example, sell at retail or supply made electronically);
2. Applications (such as a fully integrated online store or online catalog with a simple form of e-mail);
3. A communication network (such as Internet or traditional EDI).

METHODS OF IMPLEMENTATION

Methods of implementation and development of ICT systems and business processes create new opportunities for managers, and more and more influence on their decisions. The computer system can be supplied as SaaS (Software as a Service), implemented in accordance with customer specifications, may be a diagnostic or prognostic. Therefore, it is important to underline the role of agri-food supply chain networks (further abbreviated as AFSCN). Three basic forms of network governance can be distinguished in AFSCNs [Lazzarini et al. 2001]:

- Managerial Discretion (plan): discretionary actions by a coordinating agent, who centrally plans the flow of products and information;
- Standardization: standardized rules and shared mechanisms to orchestrate transactions;
- Mutual Adjustment: alignment of plans through mutual feedback processes and joint problem solving and decision making.

Multi-dimensional networks put the emphasis on standardization and mutual adjustment, requiring a high flexibility of processes and enterprises. A sequence of actions associated with development of ICT systems in agri-food sector may be of cascading, incremental, iterative, evolutionary, or spiral. The continuous development of information technology and increasing globalization of the economy gives rise to new problems when creating enterprise information systems. Simultaneously, globalization has meant that today's corporations have to be able to connect many of its departments working in different locations, using different hardware and software platforms, as well as different applications into one cohesive body. The problem of creation and development of ICT systems is related mainly to the provision of: system flexibility, interoperability, mechanisms for continuous improvement of the system. In the classical IT project, there are three phases: analysis, design and implementation. Most modern methodology assumes repetitiveness of manufacturing process, which means that the individual phases can (even must) penetrate. In the analysis phase business process model is formed, that specifies the system environment, and on the basis of a model system, maps its functionality in terms of the use-cases, classes and objects. Model analysis stage is a source of knowledge about the problem domain. Design phase develops system architecture. Model elements are added to the technical architecture. In areas particularly vulnerable to changes in de-

sign, patterns are used to increase flexibility. System model of the design phase includes knowledge of how the system performs its functionality (ontology). In the implementation phase model is transformed into a skeleton code, which when completed becomes a running system. Most challenging is to address the transformation of the design model to code. Most modeling tools is provided with a code generator that allows you to create skeleton code for various programming languages. There is still a gap between analysis and design stages and it even seems to extend. Technologies that we use when creating the systems are becoming more complex. Moreover, during the design phase, model should be supplemented with elements from different kind of standards, guidelines and standards, such as methods to access attributes and naming conventions. Usually these problems can be avoided by creating a separate analytical model and design that will need to manually update every now and then. This situation is very burdensome and, sooner or later, these models need to be manually fixed if are no longer valid. You cannot create two separate models simply by creating incomplete specification. Integration of information for the farm and food producers as a networked enterprise is complex. At all defined levels and types of integration, one can distinguish three basic approaches:

1. Implementing one standard system that provides all required functionality (requires managerial discretion governance);

2. Developing customized point-to-point interfaces (costly, complexity is growing exponentially if the number of interfaces is growing);

3. Adoption of integration standards that make it possible to plug different systems via standard connectors into a common platform [Lee et al. 2003].

FACTORS THAT INFLUENCE ICT DEPLOYMENT

Efficiency of the operators is determined by many factors, which include information technologies that base on computer technology and telecommunications. Their combination has led to a creation of powerful instrument – computer network, in particular the Internet. This opened great opportunities to build a modern business that bases on almost unlimited information exchange. New technologies have opened new possibilities... but not all of them have already been discovered.

Five different categories of measuring the intensity and impact of ICT can be distinguished:

- The first category refers to a discrete, non-economic measures, in this category. Measures base on data that is collected in respect of quantitative physical parameters such as number of telephone lines, television, Internet users, or personal computers and so on;
- The second category consists of economic measures related to ICT, which are based on studies of various aspects of the economy. This category of measurement technology, is mainly related to growth, productivity, investment and employment;

- The third category is related to technology adoption and diffusion. They characterize the effects of differentiation of the availability and adoption of products and services based on ICT;
- The fourth category refers to the establishment of a single index ranking that measures the progress of ICT;
- Fifth category includes digital divide measures – exclusion of companies and sectors with the usage of ICTs.

Here are the key factors that determine a success of information systems deployment:

1. Strategic factors: leadership, management, skills, technology;
2. Environmental factors: the level and area of company's interest, the current development of the company.

THE ROLE OF ICT IN THE PROCESS AND PRODUCT INNOVATIONS

The ability to innovate is a key competitive advantage of particular importance because of the increasing globalization of the economy. ICT can play an important role in facilitating the innovation of products/services and business processes. Half of product innovation and process innovation is possible because of ICT. Agri-food sector as a result of these studies can be described as significantly more innovative in relation to all companies. Agri-food sector in Poland, shows an even greater commitment to the introduction of new products/services. 50% for product innovation and 59% for process innovation.

Impact on businesses. The agri-food sector and e-business technologies have their main impact on production and logistics. The marketing activities and sales potential of e-business is not fully exploited for the benefit of the manufacturer. Large retailers want to maximize their direct control over customers. In general, the capabilities of ICT and e-business solutions enable large companies to manage more advanced projects with greater efficiency and savings. Observations of specific activities in the field of e-business perceptions of the importance of ICT show a large variation between large and small companies.

Perceptions of importance of e-business. Approximately 50% of companies of agri-food sector show that e-business is a small area of the business they perform and 15% of the important and vital part of their business. The obtained results of the survey show that there are two different groups: large companies that have implemented ERP systems in daily practice and small companies with low rates, that are about to introduce e-business.

Impact on organization. The impact is seen as important by companies of all sizes and growing with increasing size of the company. More than 1/3 of companies observe an important effect on the organization, as well as in training employees. Most of the companies see two major areas of expected high or medium impact: accounting and marketing (see Fig. 1)

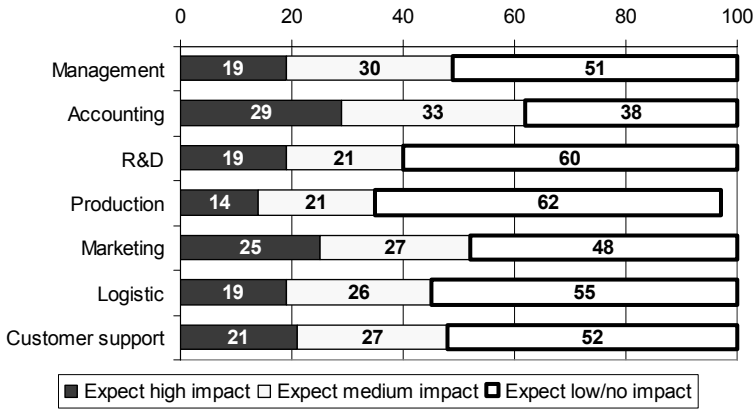


Fig. 1. Impact on organization
Source: Own work based on results of EU e-Business Watch Survey [2006].

HOW AND WHERE DOES IT HELP?

It can be stated without doubts that IT helps us in mastering our everyday existence. Otherwise, we would not tackle corresponding research problems. There are basically three areas of investigation – analogous to production systems for real goods – in which substantial progress has already been made by IT applications, and may certainly be expected in the future.

- IT supports the production process, i.e. by generating information output from data input by means of models.
- IT supports the procurement, i.e. the gathering of data as necessary model input.
- IT supports the logistics, i.e. the transformation of data and information over space and time.

Very forward-looking technology in the agri-food sector is SOA. With a common data exchange standards, it is possible to transfer information between different units. An integration is possible among certain layers:

- Business process management layer;
- Business service layer;
- Application service layer.

The use of BPMN (Business Process Modeling Notation) is a method of illustrating business processes in the form of a diagram similar to a flowchart (see Fig. 2). It helps to visualize business processes for better integration towards webservices and full interoperability.

There are marked advantages of organizing food production in chains of companies exchanging information and workflows for better efficiency, flexibility and quality. There has been the increasing requirement for a flow of information associated with a food product traceability [Hammoudi et al. 2009], the collection of information on its quality and safety for human consumption [Wolfert et al. 2010], and the flow of information associated with consumer demands needed for both production and inventory management decisions.

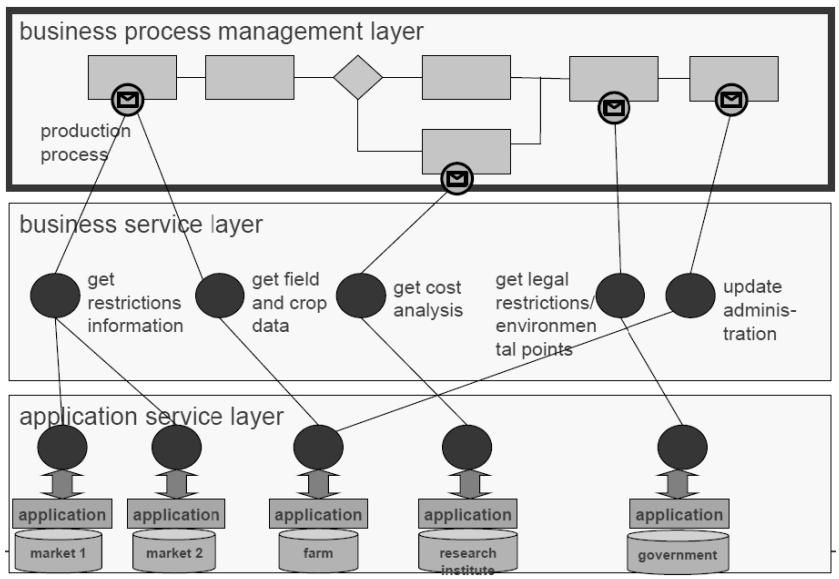


Fig. 2. Business process modeling using SOA
Source: Own work based on [Lee et al. 2003].

CONCLUSIONS

In conclusion, one major application of IT in agriculture will certainly be the development of knowledge-based, bio-economic models which:

- will contain appropriate input-output relationships as generalized production functions;
- will take into account space and time variability by incorporating the relevant, non-controllable yield factors, preferably with their direct values or at least with their probability distributions;
- will contain biological and technological, as well as economic components, in order to provide effective decision support for the agricultural land users.

Obviously, such models will have to be developed by multi-disciplinary teams, comprising subject matter experts from the fields of agriculture and business management, as well as computer scientists and statisticians. In order to guarantee practical relevance and user friendliness, extension specialists and selected professional farmers should be involved in the model building process as early as possible. As a rule, the development of a decision support model may be designed as a stepwise and iterative process. A thorough systems analysis and the establishment of a theoretical concept should lead to the prototyping of a first model version. These steps will be followed by tests on research farms and by extension specialists and farmers, as a base for model enlargements and refinements. After several model adaptations and improvements the final product will eventually be ready for the farming community. While the marketing will typically be conducted by public or private service providers, subject matter research and model development

will typically lie in the hands of university groups or specialized institutions for applied research. Since the agricultural sector, being composed of many small business entities is not able to finance these research and development efforts, funds will have to be provided through governmental agencies and research foundations, of course, based on competitive bidding and peer group reviewing of proposals. With such models we will certainly not regain the paradise lost of decision making under certainty by way of instinctive actions, but we will eventually be able to support decisions which yield results being technically and economically less inefficient than they are usually now.

REFERENCES

Barabba V.P., 1991. Through a Glass Less Darkly. Journal of the American Statistical Association Vol. 86, No. 413, 1–8.

Basu R., Wright J.N., 2007. Total Supply Chain Management. Butterworth-Heinemannn, Oxford, GB.

Dosi G., 1997. Opportunities, Incentives and the Collective Patterns of Technological Change.

E-Business Watch Survey, 2006. European Commission, Bonn, Germany.

The Economic Journal Vol. 107, Issue 444, 1530–1547.

Eurostat, 2006. European business. Facts and figures, Luxembourg.

Hammoudi A., Hoffmann R., Surry Y., 2009. Food safety standards and agri-food supply chains: An introductory overview. European Review of Agriculture Economics 36 (4), 469–478.

Harsh S.B., Stephen B., Connor L.J., Schwab G.D., 1981. Managing The Farm Business. Prentice Hall, Englewood Cliffs, New Jersey, NJ, USA.

Keller G., Teufel T., 1998. SAP R/3 Process-Oriented Implementation. Addison Wesley Longman, New York, NY, USA.

Kollinger P., 2005. Technological change: An analysis of the diffusion and implications of e-business technologies. German Institute for Economic Research, DIW, Berlin, Germany.

Lazzarini S.G., Chaddad F.R., Cook M.L., 2001. Integrating supply chain and network analyses: the study of netchains. Journal on Chain and Network Sciences 1 (1), 7–22.

Lee J., Siau K., Hong S., 2003. Enterprise Integration with ERP and EAI. Communications of the ACM 46 (2), 54–60.

Matopoulos A., Vlachopoulou M., Manthou V., Manos B., 2007. A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry. Supply Chain Management: An International Journal Vol. 12, Issue 3, 177–186.

Mesenbourg T.L., 2000. Measuring Electronic Business. Presentation to COPAFS, March 10, http://www.census.gov/econ/www/index.html.

Rogers E.M., 2006. Diffusion of Innovations, 5th Ed. The Free Press, New York, NY, USA.

Schumpeter J.A., 1934. The Theory of Economic Development: an inquiry into profits, capital, credit, interest, and the business cycle. Harvard University Press, Cambridge, MS, USA.

Wolfert J., Verdouw C.N., Verloop C.M., Beulens A.J.M., 2010. Organizing Information Integration in Agri-Food – A Method Based on a Service-Oriented Architecture and Living Lab Approach. Computers and Electronics in Agriculture Vol. 70, Issue 2, 389–405.

ZASTOSOWANIE TECHNOLOGII INFORMATYCZNYCH I ICH WPŁYW NA SEKTOR ROLNO-ŻYWNOŚCIOWY

Streszczenie. Artykuł zawiera przegląd technologii informacyjnych i komunikacyjnych (ICT) realizowanych w sektorze przetwórstwa żywności i przedsiębiorstw rolnych. Opis sektora zawiera podsumowanie kilku unikalnych cech oraz liczb opisujących aspekty produkcji żywności w Europie. Dla lepszego zrozumienia całego zjawiska ICT w tym sektorze artykuł opisuje procesy innowacyjne i postęp w technologii ogólnie, jak również w sektorze. Ważne aspekty i potencjalne obszary problemowe, takie jak czynniki, które wpływają na wdrożenia ICT są przeanalizowane i przedstawione w syntetyczny sposób. Główny nacisk skierowany jest na technologie e-biznesu i jej wpływ na organizacyjny aspekt sektora. Również rola ICT w innowacji procesowej oraz produktowej zostały przeanalizowane a pewne obszary poprawy działalności porównane i podsumowane. Bardzo przyszłościową technologią w sektorze rolno-spożywczym jest SOA. Wspólne standardy wymiany danych umożliwiają przesyłanie informacji pomiędzy różnymi jednostkami.

Słowa kluczowe: ICT, e-business, sektor rolno-spożywczy, innowacje, SOA

Accepted for print – Zaakceptowano do druku: 28.02.2013

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 57–65*

OUTLAYS ON INVESTMENTS IN FARMS SPECIALIZING IN MILK PRODUCTION, DEPENDING ON THE DEGREE OF PRODUCTION CONCENTRATION

Marcin Wysokiński, Mariusz Dziwulski, Sebastian Jarzębowski
Warsaw University of Life Sciences – SGGW

Abstract. The aim of this study was to determine the level of outlays on investments farms specializing in milk production depending on the scale of dairy cows breeding. The research involves agricultural holdings in Poland covered by FADN system in 2004–2009, in which the value of milk production in the total output was more than 60%. Studies have shown proportional relationship between the size of outlays on investments and the number of cows in the herd. In addition, the relationship was proved between an investment activity of farmers, depending on the situation of the milk market and dairy farm incomes. The article also examines the level of net investment in the studied groups of households per 1 ha of agricultural land, indicating a high diversity of farms in this regard.

Key words: investments, milk production, the scale of breeding, agriculture in Poland

INTRODUCTION

Accession to the European Union contributed to the strong development of Polish agriculture, including improving agricultural infrastructure, which is the result of increased investment activity of Polish farmers. According to the Central Statistical Office [Statistical Yearbook of Agriculture 2009] outlays on investments in agriculture in Poland increased from 2.2 billion PLN in 2004 to more than 3.9 billion PLN in 2009. There has been a marked improvement in the farm equipment in fixed assets, the farms have become more modern and competitive in relation to the western countries in the EU. It was also possible through the use of funds from the budget of the European Union or national, including the possibilities of using preferential loans. The beneficiaries of these measures were largely aimed on the milk production. According to data from FADN, in 2009, the average amount of surcharge in the type of agricultural dairy farm stood at 1,045.00 PLN per farm, to 677.00 PLN average sample of FADN. According to Bułkowska [2009]

Corresponding authors: Warsaw University of Life Sciences – SGGW, Department of Economics and Organization of Enterprises, Nowoursynowska 166, 02-787 Warsaw, Poland, e-mail: marcin_wysokinski@sggw.pl, mariusz_dziwulski@sggw.pl, sebastian_jarzebowski@sggw.pl

factor determining the investment activity of dairy farms in recent 10 years (2002–2012) have been preparing for accession and Polish accession to the EU, forcing many restructuring operations, such as to adjustment to production standards of the European Union. Was also observed strong level of concentration of production, resulting in an increase in the average dairy herd, increasing demand for agricultural land and farm equipment [Wąs et al. 2011].

Investments are necessary for the reproducing and development of the production capacity for improving the profitability and competitiveness of Polish agriculture [Mikołajczyk 2009]. According to Józwiak and Kagan [2008], the investment activities is an evidence to the commercial, farm modernization and expansion of production scale. Undertaken productive investments decide about development opportunities of farms. They show that a farmer increases assets or raise their quality, which contributes to increasing the farm capacity in the future. Improving technical work, as well as introduction of new machinery and equipment for agricultural production leads to increased productivity in both crop production and livestock. "On the other hand, lack of these actions may lead to processes that rely on reducing resource inputs, or reduce the number (or range) conducted activities [Kalinowski and Kiełbasa 2010; Mikolajczyk 2012].

RESEARCH AIM AND METHODOLOGY

This article attempts to assess the level of outlays on investments in dairy farms, depending on the scale of breeding cows. The research involves agricultural holdings in Poland covered by European FADN system in 2004–2009 (The Farm Accountancy Data Network). The research involves Mazovia and Podlasie region, including provinces Mazowieckie, Podlaskie, Lubelskie i Lodzkie, the area with the highest concentration of dairy cows in Poland. According to Central Statistical Office in 2010 the above regions generated over 54% of the total domestic production.

In the selection of objects for study, the purposeful method was used. For analytical purposes there were selected farms specialized in milk production. For this was used the FADN methodology based on classifying variable SO (standard production). As a criterion for determining the level of specialization of the surveyed households was used the value of milk production by specifying its share in the total output of the farm. For the study of this article were selected agricultural holings, that produce at least 60% of the final output of the farm.

In accordance with Manteuffel [1984], saying that the degree of specialization is determined mainly on the basis of the share in the structure of the final production (or goods) that branch or production activity, which is a definite dominance of one over the other. Industry specialization occurs when the activities in the production of one branch of the farm is large enough (eg 50, 60 or 75% of the final output of the farm).

In addition, it was assumed that the minimum size of the stock held by the surveyed units was 10 cows. In accordance with the principles of FADN groups have not less than 15 objects.

On the basis of own research, and literature [Juszczyk 2005][1] surveyed households were divided into 5 groups, considering the criterion for grouping the number of dairy cows on the farm with a similar size:
A – small farms (with 10 ÷ < 20 units),
B – average small (20 ÷ < 30 units),
C – medium-sized (30 ÷ < 40 units),
D – large (40 ÷ < 50 units),
E – a very large (50 or more units).

According to FADN methodology, gross investment = purchases – sales of fixed assets + breeding livestock change of valuation [Goraj 2010]. The presented results are the arithmetic means for selected groups of households. Chosen selection criterion of households makes they are not representative. However, they allow to observe the relation of dairy farms in the sector and to formulate valuable conclusions. For presentation of the results used tabulated statistics items, graphic and descriptive.

The number of farms that met the selection criteria was 874, 942, 959, 1032, 1056, 1145 accordingly in 2004–2009. Study sample systematically increased in each successive year. The largest group were the smallest farms (10 ÷ < 20 cows), accounting for over 50% of whole sample, the smallest group were formed farms with the largest herd of cows (over 50) – Table 1 presents number of households in each of the studied groups. The biggest changes were in the largest units – 40 ÷ < 50, and 50 or more cows. Their abundance in 2004–2009 increased by 3.2 and 3-fold, while the increase in the number of units in the group with the smallest scale was only 3%.

Table 1. Number of farms surveyed in selected groups in 2004–2009

Number of cows	2004	2005	2006	2007	2008	2009
A (≥ 10 < 20)	565	547	545	582	565	582
B (≥ 20 < 30)	206	272	278	290	293	314
C (≥ 30 < 40)	68	72	76	98	123	140
D (≥ 40 < 50)	20	35	40	31	46	64
E (≥ 50)	15	16	20	31	29	45

Source: Own calculations based on FADN data.

The share of the group with the smallest scale (A) showed a downward trend, decreasing by about 14 percentage points during the study period (from 64.6 in 2004 to 50.8% in 2009). Number of other groups characterized by the opposite tendency. The share of Group B and C increaded about 4 percentage points, respectively, from 23.6 to 27.4% and from 7.8 to 12.2%. The share of Group E, increased from 1.7 in 2004 to 3.9% in 2009. It is also a sign of increase in concentration of milk, that in some degree reflects the changes in the structure of dairy farmers in the region of Mazovia and Podlasie as well as Poland [Wysokiński 2011].

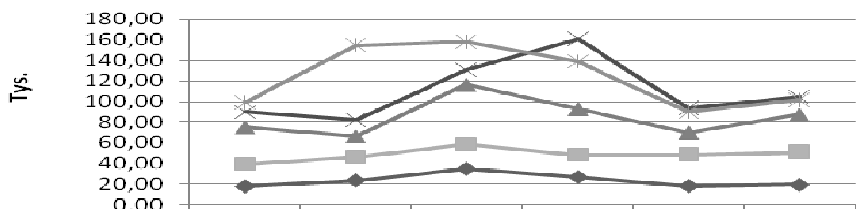
[1]"The number of dairy cows on the farm is well illustrated by the scale of production and other issues associated with it.".

DISCUSSION

Results of research proved diversity of gross investment between selected groups of farms the greater the scale of production including capital expenditures were higher (disturbance of this relationship was observed in 2007–2009, when the D objects on average invest higher amounts than E farms). This relationship is consistent with the thesis of J. Mikolajczyk [2009] that the level of investment expenditure depends on the amount of income generated by the farm.

By far the largest investment expenditures were incurred in the years 2006–2007, which could be related to the good economic situation in the market, as well as the launch of EU funds for the modernization of farms.

In 2009, intended funds for investments were higher than at the beginning of the analysed period (small differences from a few to several percentage points). Since 2007, farms with 40–50 cows invested more than individuals with larger scale of breeding. Probably the biggest farms stopped at a certain level of investment, reaching a satisfactory level of technology in the period 2005–2006. Figure 1 shows that the largest investment activity of E farms was attributed to the first years of research, in contrast to other farms – it can be associated with more efficient use of the Sectoral Operational Programme for the years 2004–2006 by E farms.

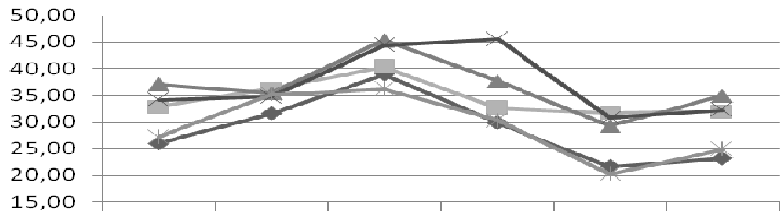


	2004	2005	2006	2007	2008	2009
A (≥10<20 cows)	18 017,0	23 811,2	35 003,9	26 985,3	18 382,8	19 359,6
B (≥20<30)	39 579,4	46 596,7	58 793,8	48 448,6	48 628,8	51 246,5
C (≥30<40)	74 694,8	66 075,1	116 333,	92 846,7	69 796,4	87 189,0
D (≥40<50)	90 212,0	82 461,8	131 082,	161 123,	94 217,4	104 867,
E (> 50)	99 278,0	155 220,	158 389,	139 147,	90 270,0	101 748,

Fig. 1. Gross investments in the surveyed dairy farms on average per farm in 2004–2009 (PLN)
Source: Own calculations based on FADN data.

Figure 2 shows that gross investment was a significant part of the total expences of households, about 20% of very large farms to almost 46% in the large farms. The lowest rate was recorded in the smallest farms (probably the economic size and generated incomes forced the consumer rather than investment approach). Dominated in this area large and medium-large objects. It shows their the most pro-development policy and willingness to invest, as well as existing needs of further modernization and concentration.

The highest share of gross investment in the total expenditure of households was stated in 2006–2007. It should be noted that the favorable conditions in the economy of the surveyed households (good economic situation, the availability of EU funds) sigificantly contributed to increase of investment activity during analised period.



	2004	2005	2006	2007	2008	2009
A (≥10<20 cows)	25,98	31,54	38,93	29,87	21,60	23,19
B (≥20<30)	32,82	36,29	40,29	32,56	31,67	32,02
C (≥30<40)	37,03	35,40	45,32	37,64	29,23	34,91
D (≥40<50)	34,16	34,69	44,37	45,49	30,82	32,29
E (> 50)	27,16	35,17	36,18	30,24	20,25	24,85

Fig. 2. The share of gross investment in the total expenditure of farms surveyed in 2004–2009 (%)
Source: Own calculations based on FADN data.

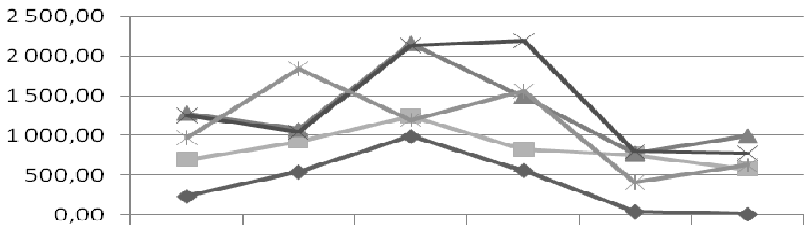
Changes in investment were accompanied by a strong increase in income of farmers maintaining dairy cows. According to the FADN data, the average income of a family farm of the type "dairy cows" increased by 72% to the level 34.6 thousand PLN in period 2004–2008.

Farmers could use the surplus for further investment in the farm. The action taken may have contributed to investment in longer or shorter period, to further increase the incomes and improve the economic situation. According to B. Gołębiewska [2010]: " Fixed equipment have a significant impact on their economic situation. Possession of modern machinery and technical equipment allows the use of new technologies, which contribute to the growth of labor productivity, improve quality and increase the scale of production: The level of farm income and gross investment are useful indicators to evaluate possibility of farms development. The investments made during the year can stimulate them for further action of investment in subsequent periods with the use of surplus funds earned. This action is rational. As noted by Ackoff [1973]: "Better rated are entities which are investing heavily in its future and pay for this by reduction in current profits, than those, which for increase in current profits sacrifice their future".

In 2009, the discussed index has returned to the level of the beginning of the study (2004), despite the fact that still functioned assistance programs for the modernization of agricultural holdings (RDP 2007–2013) – (decrease in income in the period 2008–2009 in dairy farms in Poland was on average 32%), which determined the decision about investment. According to a study by J. Mikołajczyk [2009] decrease in farm income allows for investments to a lesser extent.

To show a full picture of the investment activity of surveyed households, was calculated the level of net investment per 1 ha AL. Net investments in accordance with the FADN methodology is the value of gross investment less depreciation value in annual terms – Figure 3.

In each analyzed group, net investment had positive value. A positive value of this index shows assets reproducibility of the entities, although in varying degrees. Farms probably modernized machinery, exchanged worn out equipment or invested in buildings and structures.



	2004	2005	2006	2007	2008	2009
A (≥10<20 cows)	229,48	539,78	991,22	558,03	35,78	2,87
B (≥20<30)	699,18	927,38	1 238,21	822,36	760,90	573,80
C (≥30<40)	1 286,29	1 079,50	2 161,81	1 492,01	779,34	997,36
D (≥40<50)	1 255,20	1 043,36	2 134,88	2 198,73	800,51	779,73
E (> 50)	972,92	1 840,91	1 195,78	1 560,04	406,76	624,84

Fig. 3. Net investments per 1 ha agricultural land on average in the farm groups in 2004–2009 (PLN)
Source: Own calculations based on FADN data.

Taking into account the index, we can notice that its level in most of the analyzed years was growing to a certain point, after was decreasing. The highest level of investment per 1 ha of agricultural land, stand out farms of large and medium-large size, definitely the worst were shown in terms of the smallest objects, where in 2009, the index approached zero. During maintaining the downward trend may lead to a depreciation of productive assets and the long-term economic decline. On the other hand, the phenomenon of over-investment may characterize the largest-scale farms. Excessive equipment in large units with machines and devices can make significant costs depreciation, sometimes exceeding the level of resources intended for new investments.

The highest level of this indicator took place in 2006–2007. It is obvious that farmers used the favorable economic conditions during this period. After 2007, there was a definite decrease, which in units till 30 cows maintained until the end of the research. Ratio shows the relationship between the value of net investment per hectare of arable land and the size of the herd, which results from the analysis of the scatterplot (Figures 4 and 5) and correlation coefficients ($R_{2004} = 0.162$ and $p = 0.00$ $R_{2009} = 0.143$ and $p = 0.00$). Found a positive correlation between the value of investments and the size of the herd.

However, observing the data on the Figures 4 and 5, we can conclude that occurred quite large differences in terms of the size of the net investment index per 1 ha of agricultural land. Much of the investigated objects characterized by its negative value in both 2004 and 2009. Depreciation exceeded the level of investment spending. This means that the units have not been able reproduce its property, which is an unfavorable phenomenon in the long-term. Lack of explicit investment activities can lead to loss of competitiveness in some cases leading to bankruptcy. This in turn may lead to the further consolidation of dairy farms in the region of Mazovia and Podlasie in Poland as well.

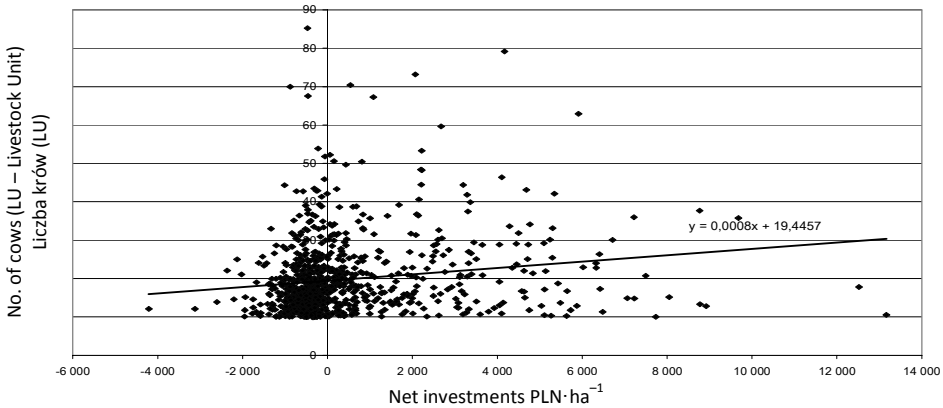


Fig. 4. The value of net investment per hectare of arable land and the number of dairy cows in 2004

Source: Own calculations based on FADN data.

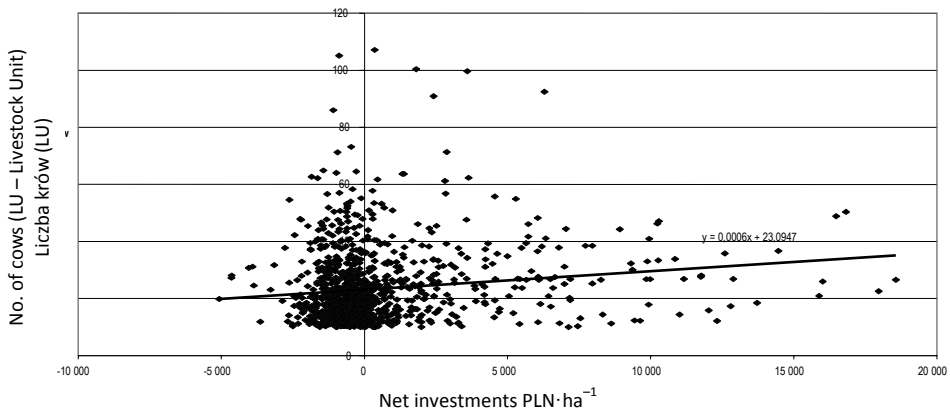


Fig. 5. The value of net investment per hectare of arable land and the number of dairy cows in 2009

Source: Own calculations based on FADN data.

CONCLUSIONS

The analysis of dairy farms data indicated that the level of investment expenditures in the researched units was dependent on the size scale of breeding cows. The highest level of gross investment characterized large and very large farms (with 40–50 and 50 cows and more), unlike small farms (10 ÷ < 20 units). The amount of investment expenditures depended largely on the economic situation at the milk market in Poland. Increasing farmers' income from 2004 to 2008, encouraged their investment activity, whereas in 2009 decrease of spending on investment resulted in the economic crisis. The level of net investment in the studied groups of households reached positive average values, which meant that dairy farms were generally able to reproduce owned property. Own calculation

proved, that investment activity of farms depends on the scale of production. Net investment index per 1 ha of agricultural land increased with scale of production except for the last group (E). This means that a high standard of farm equipment with a larger scale of production may contribute to the high cost of maintenance and excessive depreciation. The analyzed data also indicate a significant differences between selected groups in value of net investment per 1 ha. A large part of the units characterized by a negative value of net investment per ha of agricultural land, which suggests that the level of depreciation exceeded the expenses of the investments.

REFERENCES

Ackoff R.L., 1973. Zasady planowania w korporacjach. Państwowe Wydawnictwo Ekonomiczne, Warszawa.

Bułkowska M., 2009. Wsparcie środkami PROW 2004-2006 i SPO „Rolnictwo" inwestycji w gospodarstwach specjalizujących się w chowie krów mlecznych. Roczniki Naukowe SERiA Vol. 11, Issue 5, 26–32.

Gołębiewska B., 2010. Kierunki podejmowanych działań inwestycyjnych w gospodarstwach rolnych o zróżnicowanych powiązaniach z otoczeniem. Roczniki Nauk Rolniczych, Seria G Vol. 97, Issue 4, 60.

Goraj L. et al., 2010. Wyniki standardowe uzyskane przez gospodarstwa rolne uczestniczące w Polskim FADN w 2009 roku. IERiGŻ-PIB, Warszawa.

Józwiak W., Kagan A., 2008. Gospodarstwa towarowe a gospodarstwa wielkotowarowe. Roczniki Nauk Rolniczych. Seria G Vol. 95, Issue 1, 22–30.

Juszczyk S., 2005. Uwarunkowania ekonomiczno-organizacyjne opłacalności produkcji mleka w gospodarstwach wyspecjalizowanych. Wydawnictwo SGGW, Warszawa.

Kalinowski S., Kiełbasa B., 2010. Znaczenie usług doradczych w kreowaniu aktywności inwestycyjnej producentów rolnych. Acta Sci. Pol., Oeconomia 9 (2), 91–100.

Manteuffel R., 1984. Ekonomika i organizacja gospodarstwa rolniczego. PWRiL, Warszawa

Mikołajczyk J., 2009. Nakłady inwestycyjne w gospodarstwach indywidualnych według wielkości ekonomicznej w świetle polskiego FADN. Roczniki Nauk Rolniczych, Seria G Vol. 96, Issue 3, 182.

Mikołajczyk J., 2012. Zastosowanie miar oceny efektywności ekonomicznej do planowania oraz oceny działań dywestycyjnych w gospodarstwach rolniczych. Zagadnienia Ekonomiki Rolnej 3 (332), 131–138.

Rocznik statystyczny rolnictwa 2009 (Statistical Yearbook of Agriculture 2009), 2010. GUS, Warszawa.

Wąs A., Majewski E., Cygański Ł., 2011. Assessment of economic effects of innovations in automatic milking systems in podlaskie region (Poland) with the use of real option approach. Acta Sci. Pol., Oeconomia 10 (2), 107–120.

Wysokiński M., 2011. Wrażliwość gospodarstw mlecznych na zmiany warunków ekonomicznych. PhD Dissertation, SGGW, Warszawa.

NAKŁADY INWESTYCYJNE W GOSPODARSTWACH WYSPECJALIZOWANYCH W PRODUKCJI MLEKA W ZALEŻNOŚCI OD STOPNIA KONCENTRACJI PRODUKCJI

Streszczenie. Celem pracy była próba określenia poziomu wydatków inwestycyjnych gospodarstw rolnych wyspecjalizowanych w produkcji mleka w zależności od skali chowu krów mlecznych. Badaniami objęto gospodarstwa prowadzące rachunkowość rolną w ramach FADN w latach 2004–2009, w których wartość produkcji mleka w wartości produkcji ogółem wynosiła więcej niż 60%. Badania wykazały proporcjonalny związek wydatków inwestycyjnych z liczbą utrzymywanych krów mlecznych. Ponadto zaobserwowano związek pomiędzy aktywnością inwestycyjną rolników a koniunkturą na rynku mleka. W artykule przeanalizowano także poziom inwestycji netto w badanych grupach gospodarstw w przeliczeniu na 1 ha UR, wskazując na duże zróżnicowanie gospodarstw względem badanego wskaźnika.

Słowa kluczowe: inwestycje, produkcja mleka, skala chowu, rolnictwo w Polsce

Accepted for print – Zaakceptowano do druku: 28.02.2013

ACTA SCIENTIARUM POLONORUM *Oeconomia 12 (1) 2013, 67–77*

UNEMPLOYMENT IN RURAL AREAS IN POLAND

Dariusz Żmija
Cracow University of Economics

Abstract: The deagrarization process which manifests itself through the systematic decreasing of the role of agriculture in the productive involvement of human labour, as well as providing income for maintaining the rural population is progressing in the Polish countryside. Statistical data, regardless of the source, shows an unfavourable situation on the labour market for the population residing in rural areas. In the recent years, the number of persons registered as being unemployed increased. At the end of 2011, registered unemployment in rural areas achieved a level of 874.5 thousand persons, and the residents of the rural areas constituted 44.11% of all the registered unemployed. Unemployment in rural areas is a derivative of unemployment in the entire economy, the low mobility of rural residents, as well as the limited possibilities of the labour market in rural areas. It differs from unemployment in urban areas. It is of a more permanent nature, and the labour market is not as flexible. Among the unemployed in rural areas, the non-agricultural population (not having farms) is in a much worse situation as compared to the population connected with agriculture.

Key words: unemployment, unemployment structure, rural areas, labour market

INTRODUCTION

The phenomenon of unemployment has been known since the times of the classical economics. The meaning of unemployment was introduced to literature on the subject by J.A. Hobson in the middle of the 1890s and was described in numerous economic works [Budnikowski 2009, Hall and Taylor 2009, Kwiatkowski 2009, Klembowska 2012]. Factors of an economic nature, and also of a political, demographic, cultural and institutional background are indicated first and foremost as reasons for the present employment crisis and mass unemployment. Globalization processes, which are accompanied by the opening of domestic markets, a rise in competitiveness, work efficiency, world production, international trade and foreign investments, have an undoubted impact on the labour market. As a result of research – technical progress, a change in the employment structure has taken place as well as in the demand for labour and its nature. Academic and infor-

Corresponding author: Cracow University of Economics, Department of Economic Policies and Development Programming, Rakowicka 27, 31-510 Krakow, Poland, e-mail:zmijad@uek.krakow.pl

mational potential, the education level of a given society as well as access to information play an increasing role in the balance of power in the economy and the terms of its functioning. Unemployment transformed from a transitional phenomenon, being the result of subsequent economic crises, into a permanent structural phenomenon, which can clearly be seen in countries possessing a market economy. Unemployment to a large extent also touches rural areas. In Poland in the year 2011, rural areas take up 93.1% of the area of the country and are inhabited by 15,152.6 thousand persons, i.e. 39.3% of the total population [Central Statistical Office 1994–2011].

Poland's political transformation brought about many new processes of a social and economic nature, and has also energized the previously occurring phenomena on many occasions. The Polish rural areas have felt these changes in an acute manner, as the agricultural farms have been treated in a manner similar to non-agricultural enterprises. The specific traits of the agricultural sector, such as low soil mobility or low pricing flexibility as well as income demand for food have not been taken into account [Czyżewski 2010]. The transformation has disclosed an excess workforce involved in agricultural production in Poland, which is not conducive to the agrarian structure as well as effective management, and the accompanying phenomenon of unemployment is not conducive to limiting employment in agriculture.

MATERIAL AND METHODS

The basic objective of the article is the analysis of unemployment in rural areas in Poland. The paper concentrates on the discussion of the level of unemployment in Poland from 1994–2011, with a specific emphasis on rural areas. The reasons for its occurrence are also presented. The unemployment structure in Polish rural areas, its spatial differentiation and actions aimed at its limitation have been analyzed. An analysis of Polish and foreign literature was conducted and data from the Central Statistics Office and the Ministry of Labour and Social Policy was used.

It is not easy to come up with an explicit definition of the term unemployment as it is defined differently depending on the source. The occurrence of this phenomenon is connected with the lack of employment and takes place when the demand for labour is less than its supply and persons capable and willing to work cannot find employment. This phenomenon means the movement of labour resources from the production sphere to that of professional inactivity [Kabaj 1993].

Two main sources of data on unemployment exist in Poland. The first one is the reports of the labour offices on the topic of registered unemployment, which defines unemployment in accordance with the provisions of the Act on the promotion of employment and labour market institutions [Act on the Promotion of Employment and Labour Market Institutions]. The second source is the quarterly results of the Labour Force Survey (LFS). The aim of this research is to obtain information on the size and structure of the labour force. As a result of the research, the number of persons who are professionally active, meaning the number of persons working and those unemployed as well as the number of professionally inactive persons, meaning those who are not working and who are not in-

terested in working. The unemployment level is also estimated[1]. The level of unemployment is also the subject of research conducted within the framework of the national census and agricultural registry. A significant problem is the fact of the existence of hidden unemployment in the households, which is a phenomenon that is difficult to diagnose[2].

RESULTS AND DISCUSSION

Unemployment phenomenon characteristics

The level of unemployment registered by labour offices in the past two decades has been subject to significant fluctuation. In the middle of the 1990s, unemployment has become a permanent structural phenomenon in Poland, and in the years 1993–1994, it reached a level of almost 3 million persons. Decreasing the level of unemployed to a level below 2 million took place towards the end of the 1990s, however in 2003 it reached a level of almost 3.2 million persons. From that moment until 2008, a steady decrease in the number of unemployed was noted, however the world economic crisis changed these favourable tendencies and in consequence, at the end of 2011 – 1,982.7 persons were registered at labour offices and the level of unemployment amounted to 12.5%. Data on the number of registered unemployed in Poland in total as well as in a division into rural areas and the urban areas in the years 1994–2011 according to the status as at the end of the reporting period indicated in Figure 1.

The unemployment in rural areas was subject to similar changes. In the middle of the 1990s, unemployed residents of rural areas in the amount of 1,157.9 thousand persons constituted 40.8% of all registered unemployed persons in Poland. In subsequent years, the rural labour market was characterized by a decreasing tendency in the number of unemployed persons (similarly as the total unemployment). The dynamic increase in unemployment in rural areas took place towards the end of the 1990s and in 2002 reached a level of over 1.3 million persons. In the years 2003–2008, a decrease in the number of persons unemployed in rural areas was noted, however this dynamic was smaller than it was in urban areas. In subsequent years, the number of persons registered as being unemployed increased. At the end of 2011, registered unemployment in rural areas achieved a

[1]The level of unemployment is the percentage share of the number of unemployed in the number of the professionally active population (i.e. the employed and the unemployed). In the event of registered unemployment the definition refers to unemployed persons registered in the poviat (district) labour offices and the professionally active being the sum of the registered unemployed persons and those working in the public and private sector (the number of employed persons does not take persons performing their active military services or employees of the budget entities conducting business activities in the scope of national defence and public safety, into consideration). In the event of the Labour Force Survey (LFS), the definition regards unemployed persons and those who are professionally active in accordance with the definitions accepted in this research.

2Estimated data describing unregistered unemployment in rural areas indicate different values, even up to 1.5 million unemployed. See [Duczkowska-Małysz 2009]; In Poland, owners of farms with an arable land area above 2 equivalent ha cannot register as being unemployed. In accordance with the estimate on this account, ca. 1 million persons remain without employment [Kociszewska 2012].

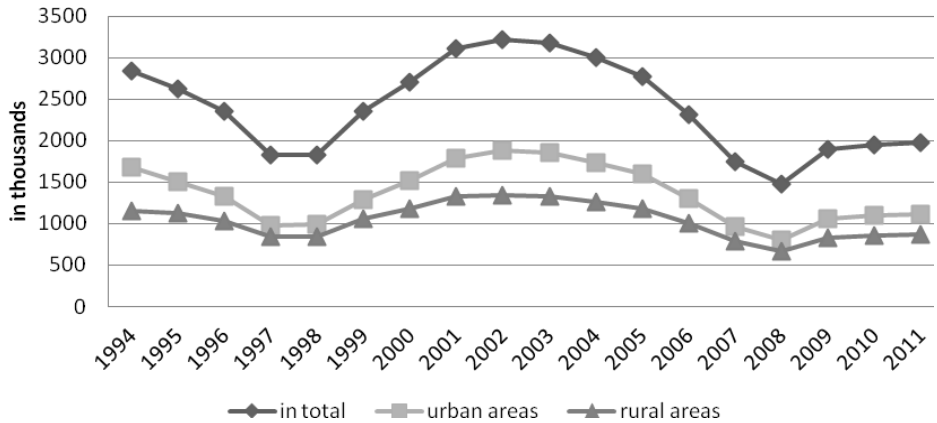


Fig. 1. The number of registered unemployed persons in Poland in 1994–2011 according to the status as at the end of the reporting period
Source: Own study on the basis of Central Statistical Office (GUS) data.

level of 874.5 thousand persons, and the residents of the rural areas constituted 44.11% of all the registered unemployed.

Results of the Labour Force Survey (LFS) showed a slightly different level of unemployment in rural areas in the researched period. Data regarding the number of unemployed persons in Poland according to the LFS in total as well as in a division into the rural and urban areas in the years 1994–2011 according to the status as at the end of the reporting period indicated in Figure 2.

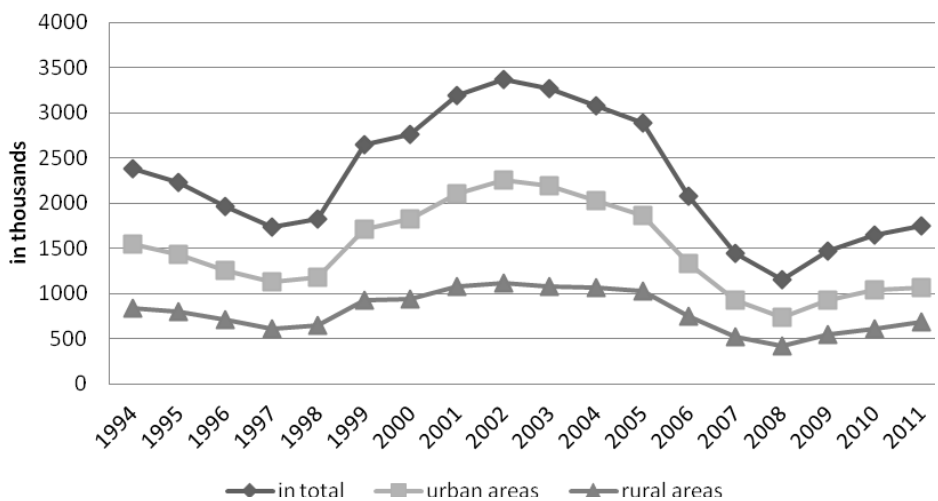


Fig. 2. The number of unemployed persons in Poland according to the LFS in 1994–2011 according to the status as at the end of the reporting period
Source: Own study on the basis of Central Statistical Office (GUS) data.

Divergence in data on the topic of unemployment according to labour offices and according to the LFS results first and foremost from the methodological differences, including the definitions of unemployed persons. The definition of the term unemployed accepted by the LFS is based on international standards, and is more rigorous and is connected with the need to register in a labour office. For example the LFS does not consider the partially redundant labour force in agricultural farms in the number of the unemployed, which in the case of Polish farms suffering from a surplus of the labour force is a significant issue. A part of the unemployment in rural areas cannot be disclosed by labour office registers, as in accordance with the provisions, an unemployed person is someone, who is not the owner or possessor of an agricultural property with an arable land area exceeding 2 equivalent ha. Both studies indicate similar tendencies in changes of the researched phenomenon, however in the periods of a favourable economic development and recovery, the unemployment in rural areas decreased at a lower rate than in urban areas, and in 2011 the share of registered unemployed persons in rural areas in the total number of unemployed increased in relation to the previous year.

Unemployment in Poland, also at rural areas, is characterized by a significant territorial differentiation, which mainly results from the asymmetrical social – economic development of the regions in Poland, the various geographic locations, and also the uneven advancement of the restructuring and privatization processes in the economy. At the end of 2011 residents of the rural areas constituted from 21.8% to 62.4%, depending on the province, in the total number of unemployed persons. The following provinces are characterized by a relatively small fraction of unemployed persons residing in rural areas in relation to the remaining provinces (voivodeships): Śląskie (21.8%), Łódzkie (33.5%), Podlaskie (34.1%) and Dolnośląskie (35.7%). However, a large fraction of unemployed residing in rural areas was noted in the Podkarpackie (62.4%), Świętokrzyskie (55.6%), Małopolskie (55.5%) and Lubelskie (54.4%). What is characteristic is that these provinces also possess the highest share of the population living in rural areas in relation to the total number of the population [Ministry of Labour and Social Policy 2012].

The variance of unemployed residing in rural areas according to selected traits

Unemployment in rural areas is a derivative both of unemployment in the entire economy as well as the low mobility of rural residents as well as the limited possibilities of the labour market in rural areas [Bański 2006]. The deagrarization process which manifests itself through the systematic decreasing of the role of agriculture in the productive involvement of human labour as well as the provision of income for maintaining the rural population is progressing in the Polish countryside. An important problem of unemployment at the polish rural areas is remaining without employment for a long period of time. According to the statutory provisions, someone recognized as being long-term unemployed is someone who remains in the district labour office registers for a total of over 12 months within the last two years, with the exclusion of periods of conducting internships and professional training and education for adults. In Poland at the end of 2011, the long-term unemployed in rural areas constituted 51.8% (452.8 thousand) of the total unemployed population in the rural areas. The level of unemployment in this category

of persons in comparison to the previous years has increased by 43.6 thousand persons, hence by 10.6% [Ministry of Labour and Social Policy 2012].

The number of unemployed persons in rural areas is not a homogenous group. It possesses a differentiated structure, which may be analyzed from the point of view of various criteria. The rural population can be divided into two categories:

- the population connected with agricultural farms, i.e. persons residing in rural areas, being members of a household with the user of an agricultural farm or an agricultural plot;
- population not connected with agriculture – i.e. persons residing in the countryside, being members of a household in which no member is a user of an agricultural farm or an agricultural plot.

Hence, differences exist between them in the scope of labour relationships. At the end of 2006, the level of unemployed amount the population connected with agriculture amounted to 6.5% and among the population not connected with agriculture – 17.3%. In 2011, the level of unemployment for these two groups amounted to 5.8% and 13.7% respectively. One could notice favourable changes in this scope, although unemployment for non-agriculture residents in rural areas is maintained at a much higher level.

The statistical data analysis also shows that a significant differentiation of the number of unemployed persons exists from the point of view of indicated traits: age, gender, education. Significant differences between the structure of the unemployed on urban and rural areas are noticeable. The structure of unemployment from the point of view of selected traits is also changing. Selected characteristics of the unemployed in rural areas in Poland in 2006 and 2011 are presented in Table 1.

The analysis of data regarding the unemployed according to the LFS allows for the statement that in 2011, the decrease in unemployment was greater in urban areas (19.73%) than in rural areas (8.56%) as compared to 2006. In both of the researched years, unemployment in a similar scope touched women as well as men. Structural changes of unemployed persons according to age groups showed a similar direction both in rural areas as in urban areas. An especially large increase in unemployment was noted in rural areas in the 25–34 and the 55–74 year old age group. In the 55–74 year old age group noted a greater increase in the number of unemployed persons in urban areas (54.05%) than in rural areas (40.60%) in 2011 as compared to 2006. In the case of unemployed persons aged from 25–34 years, the increase in the share in 2011 as compared to 2006 was greater in rural areas (23.57%) than in urban areas (0.96%). The share of the remaining age groups in the total number of unemployed persons has decreased.

In the researched years, the greatest number of unemployed persons both in urban and rural areas had a post-secondary, secondary vocational and basic vocational education. The number of unemployed persons with a higher education increased in the largest degree. In urban areas their share increased by 50.30% and in rural areas by 68.24% from 2011 in comparison to 2006. The greatest decrease in the share of the unemployed in these years took place among persons with a post-primary, primary and incomplete primary education (by 11.79% in urban areas and by 16.61% in rural areas) as well as with a basic vocational education (by 11.94% in urban areas and 12.44% in rural areas). This phenomenon is undoubtedly connected with the process of changing the education structure the urban and rural areas residents.

Table 1. Selected characteristics of unemployed persons in rural areas in Poland compared to unemployment in urban areas in 2006 and 2011

Selected data	Structure for the year				Dynamics	
	2006		2011			
	urban areas	rural areas	urban areas	rural areas	urban areas	rural areas
The total number of unemployed according to the LFS (in thousands)	1328	748	1066	684	80.27	91.44
According to age in (%)	×	×	×	×	×	×
15–24 years old	22.44	31.55	20.92	30.41	93.22	96.38
25–34 years old	28.99	26.74	29.27	33.04	100.96	123.57
35–44 years old	19.20	19.52	18.86	16.96	98.20	86.89
45–54 years old	22.36	18.32	20.17	14.18	90.18	77.43
55–74 years old	7.00	3.74	10.79	5.26	154.05	140.60
According to gender (%)	×	×	×	×	×	×
Men	49.17	49.20	49.62	49.42	100.92	100.44
Women	50.83	50.80	50.38	50.58	99.11	99.57
According to education in (%)	×	×	×	×	×	×
Higher	11.67	6.95	17.54	11.70	150.30	168.24
Post-secondary and secondary vocational	27.11	25.13	25.61	27.05	94.47	107.61
Secondary – general studies	12.42	8.96	13.79	10.67	110.99	119.15
Basic vocational	34.94	40.24	30.77	35.23	88.06	87.56
Post-primary, primary and incomplete primary	13.93	18.58	12.29	15.50	88.21	83.39
The total number of unemployed registered in the labour office in thousands from which:	930	602	691	472	74.30	78.41
Taking an unemployment benefit in (%)	11.18	9.14	18.09	14.19	161.76	155.37
Average time for searching for a job (months)	17.9	19.4	11.1	11.2	62.01	57.73

Source: Own study on the basis of Central Statistical Office (GUS) data.

The manner of combating unemployment in rural areas

A majority of countries in the world, especially those that possess a market economy take efforts to combat the problem of unemployment. Such actions are conducted first and foremost in the economic sphere, i.e. through maintaining an economic increase or maintaining and creating new jobs. In the social sphere, these actions are first and foremost aimed at reducing the level of unemployment, decreasing the level of persons without employment, and also decreasing the negative social effects caused by the occurrence of this phenomenon.

In Poland from the time of economic transformation and political changes and the occurrence of unemployment (visible) various manners of combating this phenomenon were used. At the beginning of the transformation, protective actions, meaning passive methods of fighting it were used first and foremost. With the passing of time, these actions were limited as a result of financial constraints in the public finance sector, as well as psychological aspects (encouraging unemployed persons to actively search for employment). The passive methods for combating unemployment were, with time, supplemented with active forms, which nowadays present themselves as one of the most important actions connected with combating unemployment in Poland.

The activation of the unemployed entails first and foremost in the granting of assistance in getting to the job, as well as to maintain it [Ministry of Labour and Social Policy 2011]. Labour market services are of great significance in this scope. The basic services on the labour market in Poland are employment agencies, professional consultancy and professional information, assistance in the active search for employment as well as the organization of training sessions. In accordance with the act on the promotion of employment and the in labour market institutions active forms of the promotion of employment and easing the effects of unemployment are: intervention works, public works, useful social works, internships and professional training and education for adults, loans for education, training sessions, scholarships in the period of continuing education, supporting business activities, reimbursement for commuting and accommodation costs and an additional unemployment prevention allowances. Passive forms of combating unemployment used in Poland include first and foremost unemployment benefits as well as pre-retirement benefits and pre-retirement stipends[3].

In accordance with the data of the Ministry of Labour and Social Policy, in 2011, 466.9 thousand persons residing in rural areas in Poland took up work. 52.4 thousand persons took up subsidized employment while 414.5 persons took up unsubsidized employment. In comparison to 2010, the number of jobs taken was 5.5% lower, while the decrease regarded subsidized employment, and the increase – unsubsidized employment. Other forms of activating the unemployed were i.e. internships, training sessions, professional preparation for adults, useful social (public) works. In 2011, 90.9 thousand persons residing in rural areas took advantage of this, which constitutes 61% (142.4 thousand) persons less than in the previous year. In all of 2011, one could notice a decrease in the number of unemployed residents in rural areas, who took advantage of active forms of combating unemployment [Ministry of Labour and Social Policy 2012].

In 2011, the share of the unemployed entitled to receive unemployment benefits increased in comparison to 2006 by 61.76% in urban areas and 55.37% in rural areas. Despite these changes however, there is a still a small percentage of unemployed persons are entitled to receive unemployment benefits. In 2011, only 18.09% registered unemployed persons received an unemployment benefit and in rural areas this indicator was even lower and amounted to 14.19%. In 2006 these variables were of even lower value – 11.18% and 9.14% respectively. The average time in searching for employment by the unemployed did improve: in urban areas it decreased from 17.9 months in 2006 to 11.1 months in 2011 and in rural areas from 19.4 months to 11.2 months.

[3]Pre-retirement benefits and pre-retirement stipends were granted until the end of 2002.

The absorption of rural labour surpluses outside the rural areas is difficult. This is due to the fact that the unemployed from rural areas loose to those from urban areas on the municipal local labour markets, and investors, due to the larger mobility of the labour resources, more willingly create jobs in urban areas. A large obstacle is also the low mobility of the rural population and a worse infrastructure of the rural areas [Kociszewska 2012]. For this reason, the development of entrepreneurship in rural areas, and also the appropriately used European Union Funds in order to create new jobs in rural areas is very important.

CONCLUSIONS

Statistical data, regardless of the source, shows an unfavourable situation on the labour market for the population residing in rural areas. Unemployment in rural areas is different than unemployment in urban areas. It possesses a more permanent nature, and the labour market is not as elastic. From among the unemployed persons in rural areas, the population not connected with agriculture and not connected with farms is in a much worse situation. There is an insufficient number of jobs in rural and urban areas for non-agricultural population. There is also a lack of comprehensive solutions for employing persons and their families, who lost their jobs as a result of the liquidation of previously state owned farms. In accordance with data from the LFS in 2011 the largest percentage of unemployed persons from among the rural population aged 15 and above was made up of persons with a basic vocational education, a post-secondary and a secondary vocational education 35.23 and 27.05% respectively. A similar situation is noted in urban areas, where the share of the population with this level of education amounts to 30.77 and 25.61%. A higher education is possessed by 11.70% of the unemployed in rural areas and 17.54% of the unemployed in urban areas. One can also note a tendency for the systematic increase in the share of persons possessing a higher education in the total number of the unemployed. The level of education of the unemployed residing in rural areas is lower than in urban areas.

In assessing the age structure of the rural population, it should be noted that from the point of view of labour resources, it is more favourable than in urban areas. The rural areas have a higher percentage of persons in productive age as well as in mobile age (up to the age of 44), and the percentage of older persons is lower (60 years old or above). In accordance with the LFS data, a majority of unemployed persons in rural areas, are made up of, similarly as in urban areas, persons up to 34 years of age.

The economic transformation disclosed developmental delays in agriculture and in rural areas. Former employees of agricultural farms as well as persons who lost their jobs from liquidated enterprises and institution have become part of the unemployed in rural areas. Unemployment in rural areas in Poland is characterized with territorial differentiation. In 2011 the greatest concentration of unemployment from among residents of rural areas was noted in the following provinces: Podkarpackie, Świętokrzyskie, Lubelskie, Małopolskie, hence, those provinces which possess the highest share of the population residing in rural areas in relation to the total number of the population and in the Warmińsko-Mazurskie Province, which was impacted by the liquidation of the

state owned farms. The level of unemployed persons searching for work for a long time is increasing in rural areas, and only a small part possesses the right to unemployment benefits. Hence, the realization of the concept of the multi-functional development of the rural area, and what follows, the activation of the rural areas in the direction of non-agricultural activities, which can impact the decrease of unemployment in rural areas. The state possesses a series of instruments aimed at combating unemployment. A lot of them are used in rural areas in Poland. These actions have contributed to 466.9 thousand unemployed persons in rural areas taking up employment.

The unfavourable situation in agriculture and on the rural labour market presents itself in a direct manner at the level of the rural population's standard of living. The threat of poverty indicator, expressed as a percentage of persons in households with expenditures below the relative poverty line amounted to 25% in the rural areas in 2011, and 10.9% of the countryside's residents lived below the living wage. Other negative phenomena of a negative meaning also overlap, such as the low level of education as well as the underinvestment of social infrastructure and the lack of its adjustment to the existing needs.

REFERENCES

Bański J., 2006. Geografia polskiej wsi (Geography of Poland's Rural Areas). Polskie Wydawnictwo Ekonomiczne, Warszawa.

Budnikowski T., 2009. Bezrobocie wyzwaniem współczesności (Unemployment – the Challenge of Modern Times). Instytut Zachodni, Poznań.

Central Statistical Office, 1994–2011. Aktywność ekonomiczna ludności Polski (Economic Activity of Poland's Population), Warszawa.

Central Statistical Office (GUS), Local Data Bank, 2011.

Czyżewski A., 2010. Co dała integracja europejska polskiej wsi (What has European Integration given to Poland's Rural Areas). W opinii ekonomisty. (in) Polska wieś 2010. Raport o stanie wsi, J. Wilkina, I. Nurzyńska. (Eds.). Wydawnictwo Naukowe Scholar, Warszawa.

Duczkowska-Małysz K., 2009. Przyszłość polityki rozwoju obszarów wiejskich. Możliwe scenariusze. Dylematy i wyzwania (The Future of the Rural Areas Development Policy. Possible Scenarios. Problems and Challenges). Ekspertyza przygotowana na zlecenie Ministerstwa Rozwoju Regionalnego. MRR, Warszawa.

Hall R.E., Taylor J.B., 2009. Makroekonomia (Macroeconomics). PWN, Warszawa.

Kabaj M., 1993. Jaki program przeciwdziałania bezrobociu? (What Program to Combat Unemployment?), Warszawa.

Klembowska D., 2012. Efektywność aktywnej polityki rynku pracy na przykładzie województwa warmińsko-mazurskiego (The Effectiveness of Active Labour Market Policies on the Example of the Warmia-Mazury Province in Poland). Acta Scientiarum Polonorum, Oeconomia 11 (3), 27–36.

Kociszewska I., 2012. Wybrane problemy społeczno-ekonomiczne rozwoju obszarów wiejskich (Selected Social-Economic Development Problems in Poland's Rural Areas). Journal of Agribusiness and Rural Development 2 (24), 127–137.

Kwiatkowski E., 2009. Bezrobocie. Podstawy teoretyczne (Unemployment, Theoretic Foundations). PWN, Warszawa.

Ministry of Labour and Social Policy, 2011. Polska 2011. Raport o rynku pracy oraz zabezpieczeniu społecznym (Report on the Labour Market and Social Welfare), Warszawa.

Ministry of Labour and Social Policy, 2012. Stan i struktura rejestrowanego bezrobocia na wsi w 2011 roku (The Status and Structure of Registered Unemployment in Rural Areas in 2011), Warszawa.

Ustawa o promocji zatrudnienia i instytucjach rynku pracy (Act on the Promotion of Employment and Labour Market Institutions) [Dz.U. z 2004 r. Nr 99, poz. 1001 z późn. zm.].

BEZROBOCIE NA OBSZARACH WIEJSKICH W POLSCE

Streszczenie. Na polskiej wsi postępuje proces dezagraryzacji przejawiający się systematycznym zmniejszaniem się roli rolnictwa w produktywnym angażowaniu pracy ludzkiej oraz dostarczaniu dochodów dla utrzymania ludności wiejskiej. Analiza danych, niezależnie od ich źródła, wskazuje na niekorzystną sytuację na rynku pracy ludności zamieszkującej tereny wiejskie. W ostatnich latach liczba osób rejestrujących się jako bezrobotne wzrastała. Na koniec 2011 roku rejestrowane bezrobocie na wsi osiągnęło poziom 874,5 tys. osób, a mieszkańcy wsi stanowili 44,11% wszystkich zarejestrowanych bezrobotnych. Bezrobocie na wsi jest pochodną zarówno bezrobocia w całej gospodarce, jak też niskiej mobilności mieszkańców wsi oraz ograniczonych możliwości rynku pracy na obszarach wiejskich. Różni się ono od bezrobocia w miastach. Posiada ono trwalszy charakter, a rynek pracy nie jest tak elastyczny. Wśród bezrobotnych na wsi w znacznie gorszej sytuacji znajduje się ludność bezrolna w porównaniu z ludnością związaną z gospodarstwami rolnymi.

Słowa kluczowe: bezrobocie, struktura bezrobocia, obszary wiejskie, rynek pracy

Accepted for print – Zaakceptowano do druku: 28.02.2013

CONTENTS
SPIS TREŚCI

INSTRUCTIONS TO AUTHORS

The journal *Acta Scientiarum Polonorum – Architectura* features original scientific articles related to all aspects of environmental processes.

General and technical requirements for the elaboration of papers:

1. **Size of the research paper** including tables, figures and photographs should not exceed 12 pages of A-4 format.
2. **Materials to be published** in *Acta Scientiarum Polonorum* should be prepared in accordance with the rules of the publishing process binding at the publishing office of a given series of the Journal.
3. **Style of documents** – the text of the paper should be typed with Times New Roman font 12 points, 11 of space between the lines, setting parts of the text in special typeface is allowed, e.g. italic or bold, but without underlining letters, words and sentences.
4. **Size of tables and figures** cannot exceed B-5 format (12.5 cm × 19.5 cm); descriptions of tables should be typed with Times New Roman 9 points, content of tables 8 points, single space, if possible without vertical lines, table format – doc. or rtf.

The following paper setting is binding:

1. **Title of the article** in Polish (or in English if the whole paper is in English; the same refers to the summary and key words).
2. **First name and surname** of the author (-s).
3. **Paper abstract** (from 600 to 1000 characters).
4. **Key words** – 6 words useful when indexing and searching.
5. **The main text of the research paper** should include: introduction with the aim and research hypothesis, material and methods, results, discussion, conclusions (or summary) and references.
6. **Title, abstract** (600–1000 characters) as a translation of the summary and **key words** in English.
7. **Address** of the author's (authors') place of work – post and e-mail address.
8. **Titles of tables** and their content, and captions of figures and legends must be provided in Polish and in English, while the numbers of tables and figures – with Arabic numerals.

Units and spelling – the international SI system is binding, e.g. $g \times dm^{-3}$ (and not g/dm^3).

References – when referring to the publications of other authors in the text of the paper, a surname and a year should be provided in brackets [Kowalski and Lewandowski 2000, Lewandowski 2001, Zalewski et al. 2001] or … according to Kowalski [2000]...

The list of references should be presented in the alphabetical order in the following way: author's (authors') surname, initials of first names; year of publishing if there is more than one paper of the same author published in a given year, after the year it is necessary to mark particular items a, b, c, etc.; title of the paper, bibliographical abbreviation of the publishing house and place of publishing, No of volume, book and numbers of pages, e.g.:

Chełkowski Z., 1966. Introdukcja troci do rzeki Gowienicy. Gospod. Ryb. 1 (2), 18–19.

Greń J., Kowalski Z., 1972. Statystyka matematyczna. PWN, Warszawa.

Turski W., 1972. Projektowanie oprogramowania systemów liczących. Mat. Konf. Projektowanie maszyn i systemów cyfrowych. Warszawa 2–5 czerwca 1971. PWN, Warszawa, 132–139.

The author sends the text of the paper in 2 copies to the editorial office. After he/she receives a review, the Author sends an editorial copy to the editorial office including the reviewer's comments, a corrected copy of the paper including an electronic carrier (diskette, CD or e-mail) and a response to the reviewer's and editor's comments. The main part of the publication (abstract, the text of the article proper and references) should be saved in one file. The editorial office reserves a right to make cuts and corrections, and to suggest changes and substantive supplementations agreed with the author. The graphic material (figures, diagrams, charts) should be prepared and sent as a separate electronic file (source files) in programs working in Windows environment (e.g. in Excel, Corel Draw, Photoshop etc.).

The author of the paper published is obliged to transfer his/her copyright to the publisher and submit a declaration that the paper has not been published in another journal.

The authors of the papers participate in the costs of their publishing. Information about fees and additional information for authors are available at the website

www.acta.media.pl