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LIMITATIONS ON THE ACTIVITY OF BUSINESS ANGELS IN FINANCING STARTUPS

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ABSTRACT

The article aims to identify limitations on the activity of business angels (also known as "angel investors") in financing startups. Business angels are the main source of external capital for startups, aside from family and friends. However, the degree to which they are active in the economy, in Poland and in other countries, is bound by certain restrictions, a number of which are related to supply and demand. The article seeks to deepen the theoretical considerations of these limitations from the perspective of demand and supply constraints. The study demonstrates that on the demand side, the greatest limitations that hinder business angels from financing startups are overly-complicated tax laws and a lack of tax incentives for investment activities. On the supply side, it is the failure to meet investment criteria imposed by business angels. Based on the conducted research, it can be concluded that without the interference of public institutions it will be difficult to effectively reduce the limitations on the activity of business angels.

Key words: sources of financing, entrepreneurial finance, startups, business angel, business angel investment
JEL codes: L26, M13, G24

INTRODUCTION

Business angels as a source of financing for startups appear both in the model of financing sources of innovative undertakings proposed by Sherman, as well as the concept of "funding-escalator" presented by Mason [Sherman 2005, Mason and Harrison 2000]. They are perceived as investors interested mainly in the initial stages of startup development (pre-seed, seed) [Mason and Harrison 2008, Croce et al. 2016, EBAN 2018].

Practice indicates, however, that startups in the initial stage of development are financed mainly by equity from the founders, loans from family and friends (the "3Fs") and public funds. Business angels or venture capital funds come second [Sherman 2005, Mason and Harrison 2008]. For example, in Germany in 2014–2017, startups were financed by public funds (32%), family or friends (31%), business angels (25.4%), venture capital (21%), bank loans (12%) and other sources [Deutcher 2017]. In Poland, according to data from 2017, startups were primarily financed from own funds, including reinvested revenues (68%), and only secondly by venture capital funds (domestic or foreign funds, 40%), EU funds 38% [PARP/NCBiR] and 33% by business angels [Beauchamp and Kowalczyk 2016, Beauchamp et al. 2017].

A high percentage of startups supported by venture capital funds in Poland may result from their increasing activity at all stages of the startup's development and insufficient activity of business angels [Deloitte 2016]. In addition, the share of public programs in the financing of startups in Poland shows a strong upward trend. This mainly applies to funds obtained from PARP and NCRD, but also to domestic accelerators. It is there-

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fore difficult for business angels to compete with public funds, mainly because these funds do not require the founders to give up any shares and are largely non-returnable. However, the fact that Polish startups prefer first venture capital funds as a source of financing rather than business angels, despite the different investment characteristics of both sources of financing, is striking. On the other hand, considering the fact that the Polish startup ecosystem is just developing, and business angels are not very active due to numerous barriers both on the demand and supply side, their roles are quite effectively taken over by venture capital funds.

This proves that there is a need to learn and explain why the activity of business angels in financing startups is low. The timeliness and significant importance of the research problem shows that the obtained results can be an important source of knowledge for all institutions interested in supporting the development of startups.

The purpose of this research is to indicate the limitations of business angel activity in the financing of startups. These limitations were considered from the supply side and from the demand side of the startup project market. The demand side is represented by business angels who report demand for investment projects presented by startups. The supply side is represented by startups themselves. The added value of this publication is a comprehensive review of the restrictions on the activity of business angels in financing startups, considering both the demand and supply sides. The research to date has had a much narrower scope than the division of restrictions on the activity of business angels which is adopted in the study.

BUSINESS ANGELS AND THEIR INVESTMENT PREFERENCES

The term "business angels" comes from Broadway, New York from the late nineteenth century. It was defined as rich investors who provided high-risk capital for financing the production of new musicals and theatrical plays. Business angels have become a key source of financing for risk-bearing, but promising business projects. They have financially supported many well-known entrepreneurs, such as Alexander Graham Bell (Bell Telephone) and Henry Ford [Ramadani 2009]. The pioneer of research on business angels in America is Professor Bill Wetzel from the University of New Hampshire in the USA.

The term business angels define investors interested in investments in enterprises at the initial stages of development [Wetzel 1983]. A similar definition of the subject is presented in the Cambridge Dictionary [Cambridge Dictionary] and EBAN (European Business Angels Network) [EBAN glossary 2018]. Mason and Harrison [2008] define business angels as individual investors acting independently or in formal or informal syndicates who invest their own money directly in an unlisted company with which they have no family connections. After the investment, they take an active part in managing the enterprise as advisers or members of the supervisory board.

As Preston [2004] points out, business angels play an active part in the enterprise in which they invest. Usually, these are people with extensive experience, who know the industry and the market perfectly. Their extensive contacts and commitment support innovation and building the competitive advantage of a startup. The involvement of business angels is particularly high in Great Britain, Ireland, and Central and Eastern Europe [Marro and Borg 2016].

The capital provided by business angels is referred to as "patient capital". Business angels invest in average term (from 5 to 10 years) and long term (over 10 years). They may withdraw their shares from the investment by selling shares to a trade investor, founders, venture capital fund or entering the stock exchange [Dibrova 2015, Mason and Botelho 2016, Marro and Borg 2016].

The expectations of business angels regarding the average rate of return on investment varies depending on the country. In Austria, Germany and the countries of Central and Eastern Europe, they are higher than in other regions of Europe and range from 30 to 41% on average [Marro and Borg 2016]. The investors prefer entities from the Fintech sector (25.2%) and ICT (21.3%) [EBAN 2017]. Although less than a decade ago the ICT sector was the main sector preferred by business angels in Europe, other sectors such as health care, Biotech, Mobile, Energy, Finance and Business Services constituted a small percentage among startups financed by business angels (less than 10%) [Mason and Harrison 2008, EBAN 2010].

In some countries, finding business angels is very difficult. This is because business angels prefer local investments due to the ease of business management or the ease of performing due diligence [Preston 2004]. This is also confirmed by the studies of Marro and Borg [2016] and the EBAN 2017 Statistics Compendium. However, Devigne et al. [2013] gives a different opinion. The authors argue that nowadays the choice of business angel investment location is practically unlimited due to the globalization of financial markets [Devigne et al. 2013].

Great importance is given in the financing of startups not only to individual angels, but also to their groups or associations (networks). These groups are perceived by angels as having many advantages. Business angels can combine their capital to make larger investments, enable diversification of investment risk, undertake costly analysis of potential investment projects as a group, and reduce the burden on individual members. Additionally, these groups are generally more visible to entrepreneurs, and can finance more transactions, which is an important factor. Groups are also often led by leaders who are the most sophisticated and active business angels in a given region, which affects investment decisions and their effectiveness [Kerr et al. 2014, Bonini et al. 2018].

Wetzel noted that "both the scale of investment activity and the total number of business angels are unknown and probably impossible to learn" [Wetzel 1983]. Collecting statistical information on the investment activity of angels is extremely problematic due to the fact that the business angel market is unorganized and invisible to other investors, as well as to startups. Not all individual investors perceive themselves as business angels. A significant number prefer to preserve their anonymity. They are not identified. There is no business angel certification system.

RESEARCH METHODS

The article is a review article. The documentary method of literature review was used to implement the research problem. The use of the above-mentioned method was aimed at enriching knowledge about the limitations on the activity of business angels. The most important element of the study was the search for similarities and differences in the scope of restrictions on the activity of business angels in the world. This subject is mainly discussed in countries where the activity of business angels has been the largest so far, i.e. in the United States and Great Britain.

Limitations on business angel activity occur on the side of demand for investment projects represented by business angels, as well as on the projects presented by startups – the supply side [Wieczyński 2011]. Limitations on the demand side are presented in Table 1. The main factors limiting the demand side in Poland are the lack of capital coming from business activities,

Table 1. Limitations on investment activity of business angels – demand side

Limitations on investment activity of business angels on the demand side
Lack of capital from business activities [Wieczyński 2011]
Lack of knowledge, experience and competence in searching for projects and conducting investments on the private market
Lack of tax incentives [Saublens 2007, Witblank 2009, Wieczyński 2011, Marro and Borg 2016]
Diverse legal regulations. Frequent changes of law (including tax regulations) and bureaucracy [AFME 2017]
Lack of information available about business angels [Marro 2016, Engineer et al. 2018]. The lack of a single market for business angels; significant fragmentation of national and local ecosystems for startups [AFME 2017]
No exit strategy [Saublens 2007, Masonai Botelho 2016]
Lack of understanding of technology and startup potential arising from technology [Ewens and Rhodes-Kropf 2015, Plummer et al. 2016, Cambosu 2018]
Issues related to the protection of intellectual property and patents [Maro 2016]

and the lack of knowledge, experience and competence in searching for projects and conducting investments on the non-public market [Wieczyński 2011]. The activity of business angels according to Saublens is very strongly dependent on taxes on private investment, capital gains or losses [Saublens 2007]. Marro and Borg [2016] indicate that the domestic fiscal system is the main obstacle for the investment of business angels. Investors from Italy, Luxembourg, Poland, the Netherlands, Croatia, Bulgaria, Ukraine, Denmark and Finland particularly complain about the high level of taxation in their country.

Tax incentives seem to have a large impact on business angel investment decisions. According to Wiltbank's research [2009], 24% of business angel investments would not have been made without tax incentives. As Wieczyński and others [2011] point out, high taxes, no tax breaks, and frequent changes of law and bureaucracy are a major obstacle to angel activities in Poland. Even though Wieczyński's analysis took place eight years ago, the situation in Poland has not fundamentally changed. According to the author, there is no private capital or incentives to invest for individual investors on risky projects at early stages of development.

Tax aspects seem to be one of the most significant restrictions closing the investment market in startups for individual investors, leaving only large funds as investment options. Similarly, Marro [2016] indicates that tax aspects are the most important limitations on investment activities of business angels in Europe. Other constraints such as the national legal framework and the excessive bureaucracy that investors must face at the start of the investment are of slightly less importance.

Engineer et al. [2018] shows that the lack of available information about individual business angels is the main limitation of the activity of business angels. The authors believe that the arduous search for business angels by entrepreneurs is a consequence of a purposeful strategy: that business angels prefer to provide as little information as possible so that they are not flooded with proposals by inefficient entrepreneurs.

Another limitation that can affect the level of future business angel activity is the lack of exit strategies. These restrictions were indicated by Saublens [2007], Masona and Botelho [2016], as well as the authors of the Finance for Europe report *The Shortage of Risk Capital for Europe's High Growth Businesses* [AFME 2017].

An important limitation on the demand for startup projects reported by business angels is the lack of understanding of technology and the potential of the startup resulting from technology. Due to the complexity of the startups, deep tech startups especially have much more difficulty obtaining financing. It is difficult to attract an investor who is competent and able to read the enterprise's potential and also understand the technology offered by the startup [Cambosu 2018]. The lack of understanding of the potential of radical innovation and technology, which leads to a reduction of interest on the part of investors, is also indicated by Plummer, and Ewens and Rhodes [Ewens and Rhodes-Kropf 2015, Plummer et al. 2016].

In addition, among the limitations on business angel investment, the following are also mentioned:
- no information available regarding business angels,
- the lack of a single market for business angels,
- significant fragmentation of national and local ecosystems,
- diverse legal regulations, including tax regulations [AFME 2017],
- issues related to the protection of intellectual property and patents,
- the potential of the international market in the short term,
- the negative impact of the product on the environment,
- the ethical dimension of the undertaking,
- social responsibility,
- discrimination based on sex [Marro 2016].

LIMITATIONS ON THE INVESTMENT ACTIVITY OF BUSINESS ANGELS – THE SUPPLY SIDE

The main factor limiting the investment activity of business angels from the supply side is the failure of startups to meet the investment criteria imposed by business angels on projects submitted for funding. Limitations on investment activity of business angels on the supply side are presented in Table 2. A too-high

Table 2. Limitations on investment activity of business angels on the supply side

Limitations on investment activity of business angels on the supply side
Too high risk of venture failure [EBAN 2018]
Lack of faith, motivation and trust in the founder or board [Maxwell and Lévesque 2014, Murnieks et al. 2016, Warnicki et al. 2018]
Lack of communication skills [Croce et al. 2016, Mason et al. 2017]
Lack of experience and business competence of the founders [Croce et al. 2016, Mason et al. 2017]
High transaction costs [Saublens 2007]
Too low investment value [Saublens 2007]
Too low rate of return
Unrealistic project budget [Saublens 2007]
Bad business models combined with a lack of business strategies [OECD 2016]
Overpriced valuation [EBAN 2018]
Excessive focus on technical aspects [EBAN 2018]
Omission of market-related factors [EBAN 2018]

Source: Author's own study.

risk of enterprise failure as the main factor limiting the activity of business angels is indicated by the EBAN report from 2018 [EBAN 2018].

From research by Mason and Harrison [2000] and Carpentier [2015], it appears that about 3–5% of projects are funded. The lack of faith and trust in the founder or board of the enterprise as well as lack of motivation and faith in the success of the enterprise, in the management team, or a weak entrepreneurial spirit are also a limitation of the activity of business angels [Maxwell and Lévesque 2014, Murnieks et al. 2016, Warnicki et al. 2018].

Croce et al. [2016] and Mason et al. [2017] indicate that, among the limitations on investment activity of business angels, is a lack of experience and business competences of founders or startups in raising funds from business angels, including lack of knowledge of so-called investment readiness, which is the capacity of an enterprise to understand and meet the specific needs and expectations of investors [Aminoff 2018]. According to Carpentier [2015], if a startup is not managed by a management team with industry-related competence, it will not get financing by business angels. Saublens [2007] mentions that among the limitations of the activity of business angels in startup finance are: high transaction costs, too-low investment value, unrealistic project budgets, dilution of shares in subsequent financing rounds, different perception of project innovation by both parties, and also projects that are replicas of foreign projects.

The authors of the OECD report [2016] pointed out that limitations on business angel activity could be found in poor business models combined with a lack of business strategies, flawed financial planning, and lack of communication skills from entrepreneurs. The above-mentioned limitations are confirmed by the authors of the expert opinion from the Ministry of Economy. The majority of investment projects in Poland worth up to several million PLN are, among other things, inadequately prepared in terms of substance, have unjustified valuation expectations, and exhibit excessive concentration on technical aspects. The lack of experienced managerial staff [Wieczyński et al. 2011] is still a part of these limitations. Similarly, in the EBAN 2018 report, the authors indicated that business angels decide not to invest due to, among other reasons:

poorly prepared projects, unjustified valuation, low return on investment. Excessive focus on product and technology, bypassing market-related factors, such as proven demand and clear competition landscape, also effectively deter investors [EBAN 2018].

CONCLUSIONS

Business angels can play an important role in financing startups if appropriate steps are taken to reduce restrictions on both the demand and the supply side of startup projects. Among the many factors limiting the activity of business angels on the demand side for startup projects are lack of capital, knowledge, competence and experience, and above all the lack of tax incentives for investment activities and complex tax law. The fiscal system seems to be a factor that, thanks to properly created tax incentives, as research in the United Kingdom shows, is able to effectively increase the activity of business angels. Approximately 24% of business angel investments would not have been realized in the UK without tax incentives [Witblank 2009]. In Poland, there are no studies on tax incentives for business angels, but tax issues – high taxes, no tax incentives for business angels, frequent changes in law, including tax laws – are a very significant obstacle to business angel activity.

A factor limiting the activity of business angels which is increasingly emphasized in the literature is the lack of understanding of technology and the startup's potential resulting from a given technology. This is particularly true for technology startups. Due to the complexity of startups, especially deep technology startups, it is much more difficult to attract an investor who is competent and can read the startup potential resulting from modern technology.

Factors limiting the activity of business angels on the supply side of projects reported by startups can be broadly described as factors influencing the failure to meet investment criteria imposed by business angels. The shape of these factors is largely influenced by startups themselves. These factors range from too-high venture risk to a lack of knowledge, experience and competence of management boards/founders to strictly economic factors, such as: high transaction costs, low return on investment, unjustified project valuation.

Restrictions on business angels are the result of poor-quality projects submitted by startups. No business angel will be interested in a project in which a weak business model or lack of business strategies, or faulty financial planning and lack of communication skills on the part of entrepreneurs, will appear.

Based on the review of factors limiting the activity of business angels on both the demand and supply sides, it is not possible to effectively reduce these restrictions without interference from public institutions.

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OGRANICZENIA AKTYWNOŚCI ANIOŁÓW BIZNESU W FINANSOWANIU STARTUPÓW

STRESZCZENIE

Artykuł ma na celu identyfikację ograniczeń aktywności aniołów biznesu w zakresie finansowania startupów. Anioły biznesu są największym źródłem kapitału zewnętrznego dla startupów, oprócz rodziny i przyjaciół. Jednak aktywność aniołów biznesu jest ograniczona nie tylko w Polsce, ale także w innych częściach świata. Ograniczenia te wynikają z wielu warunków dotyczących zarówno popytu, jak i podaży. Badanie pogłębiają teoretyczne rozważania o ograniczeniach aktywności aniołów biznesu w finansowaniu startupów z punktu widzenia barier popytowych i podażowych. Artykuł uzasadnia, że od strony popytowej największymi ograniczeniami aktywności aniołów biznesu w finansowaniu startupów jest brak zachęt podatkowych dla działalności inwestycyjnej i skomplikowane prawo podatkowe. Z kolei od strony podażowej jest to niespełnianie kryteriów inwestycyjnych narzuconych startupom przez anioły biznesu. Na podstawie przeprowadzonych badań można stwierdzić, że bez ingerencji instytucji publicznych trudno będzie skutecznie zmniejszać ograniczenia aktywności aniołów biznesu w finansowaniu startupów.

Słowa kluczowe: źródła finansowania, finanse przedsiębiorstw, startup, anioł biznesu, inwestycje aniołów biznesu

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FEEDFORWARD NEURAL NETWORKS AND THE FORECASTING OF MULTI-SECTIONAL DEMAND FOR TELECOM SERVICES: A COMPARATIVE STUDY OF EFFECTIVENESS FOR HOURLY DATA

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ABSTRACT

The presented research focuses on the construction of a model to effectively forecast demand for connection services – it is thus relevant to the Prediction System (PS) of telecom operators. The article contains results of comparative studies regarding the effectiveness of neural network models and regressive-neural (integrated) models, in terms of their short-term forecasting abilities for multi-sectional demand of telecom services. The feedforward neural network was used as the neural network model. A regressive-neural model was constructed by fusing the dichotomous linear regression of multi-sectional demand and the feedforward neural network that was used to model the residuals of the regression model (i.e. the residual variability). The response variable was the hourly counted seconds of outgoing calls within the framework of the selected operator network. The calls were analysed within: type of 24 hours (e.g. weekday/weekend), connection categories, and subscriber groups. For both compared models 35 explanatory variables were specified and used in the estimation process. The results show that the regressive-neural model is characterised by higher approximation and predictive capabilities than the non-integrated neural model.

Key words: Prediction System, feedforward neural network, regressive-neural model, forecasting
JEL codes: C45, C53, D24

INTRODUCTION

Researchers conduct scientific studies on sales forecasting for businesses in order to discover effective predictive tools. Promising results can then be used by companies as forecasting methods in their Prediction Systems (PS). In turn, an effective PS supports the operational management of an enterprise [Daft and Marcic 2011, Griffin 2015]. Operational management is an important element in achieving a company's strategic objectives. The author's research into the effectiveness of specific forecasting models can be used to provide a specific telecommunication company with a useful support structure for price calculations, financial planning, and effective network management.

The aim of this research study was to test and compare two models, i.e. the feedforward neural network and the regressive-neural model, in terms of their effectiveness in modelling and forecasting the demand for telecom services. In the case of the second model, i.e. the regressive-neural model, the feedforward neural network was applied to reflect the variability which was received after the elimination of a deterministic component. Various methods of eliminating deterministic components from data can be found in the research literature on the subject [Makridakis and Wheelwright 1989, Box et al. 1994, Makridakis et al.

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1998]. According to Masters [1993], neural networks can be better taught if deterministic components are removed from data. This enables a neural network to focus its capabilities on a nonlinear and smaller variability. This approach, according to Masters, enables researchers to obtain better results than with the use of a neural network for the modelling and forecasting of a full variability. Under Masters' approach, a regression model or other technique should be used to prepare data for a neural network model. This combination of both models is called a regressive-neural model or integrated model [Kaczmarczyk 2006, 2016].

This study undertook examination of the following hypothesis: When conducting short-term forecasting of the demand for telecom services, an integrated model allows for more accurate results than a non-integrated neural network model. The attempt to verify this hypothesis was conducted on the basis of the obtained values for the following coefficients: fit coefficients, autocorrelation coefficients, partial autocorrelation coefficients, and the average errors of expired forecasts ex-post.

The research was conducted by examining empirical material which was provided by one telecommunications network operator. The material included the number of seconds (hourly) of outgoing calls from the operator's network according to: type of 24-hour cycle, connection category, and subscriber group. The data contained a variety of analytical sections which facilitated multi-dimensional analyses to help gauge the effectiveness of the examined methods in forecasting demand.

THE ISSUE OF FEEDFORWARD NEURAL NETWORKS

Many business applications of artificial neural networks are known [Smith and Gupta 2002, Zhang 2004]. In order to conduct this study (described in the empirical section of the article), feedforward neural networks were used [Rojas 2013]. In such networks, neurons are usually arranged in layers, and inter-neuronal connections are applied only to the neurons in neighbouring layers (Fig. 1). The typical structure of a feedforward multilayer neural network in the field of neural networks is often called a multilayer perceptron. The input layer, which consists of input buffers, is the first layer. The number of input neurons is equal to the dimension of input vector X. The input layer is characterised by the fact that signals only come out of this layer. The output layer is the last layer of the network. The number of neurons in this layer corresponds to the dimension of given vector d from the pair of training vectors (X, d). In particular, the output layer may contain one neuron. There are no signals from the output layer to other layers. All other layers of neurons, placed between the input layer and the output layer, are called hidden layers. The number of neurons in these layers can vary. In many practical cases, one hidden layer is used. Each hidden layer receives input signals from the preceding layer and sends its output signals to the layer following it. In some applications, interlayer connections relate not only to neighbouring layers, but also to distal layers. In each case, however, there is one direction of the signal flow – from the input to the output.

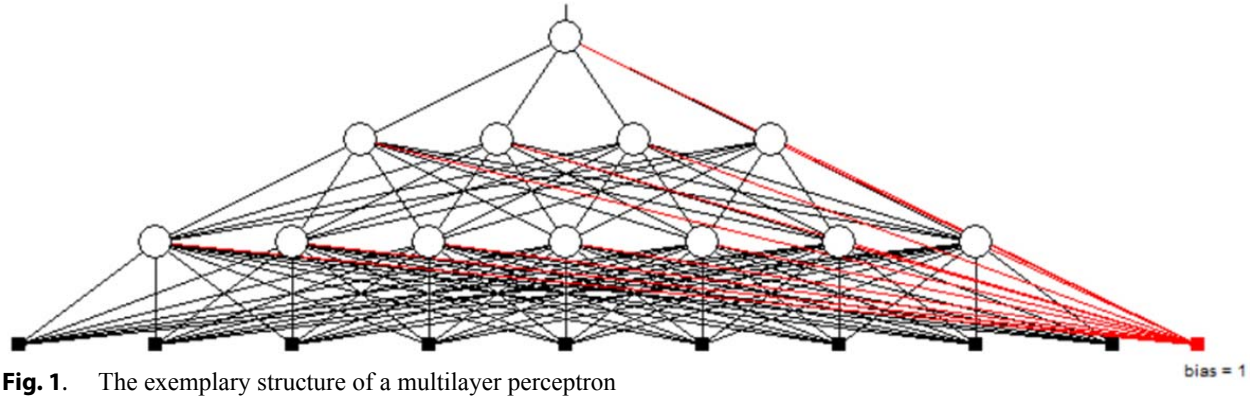


Fig. 1. The exemplary structure of a multilayer perceptron

Source: Author's own coverage with the use of Neuronix programme.

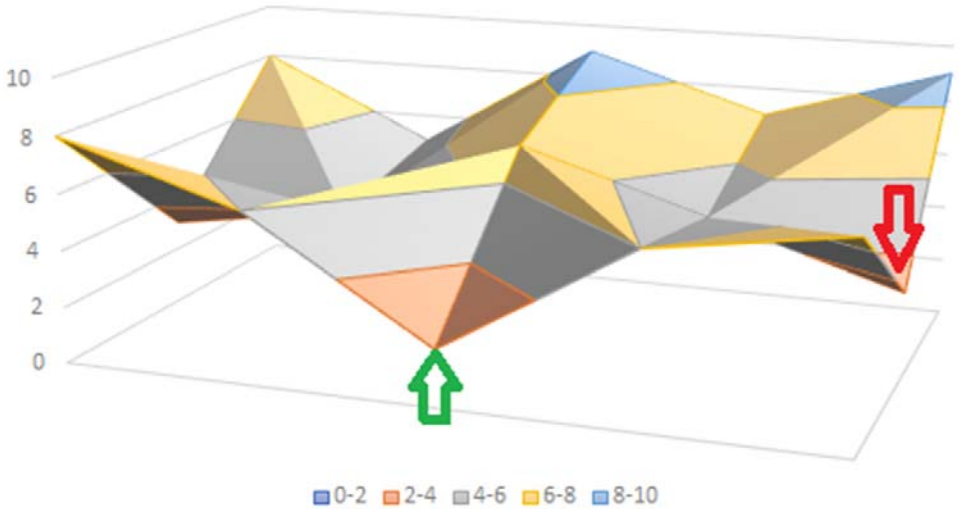
In the research study, the feedforward neural network was tested as the non-integrated technique and as a segment in the integrated model (i.e. the neural network worked as the tool which was integrated with the regression model). In the literature on the subject, two types of neural data representation are described: one-of-*N* or *N*-in-one. In the first, the input layer of a neural network should involve the number of neurons that is equal to all possible values of input variables. It is usually implemented in the case of nominal scale. Thus, when a researcher considers, for example, the variable of "hours during the day", he assumes 24 neurons in the input layer because the variable takes 24 possible levels and each level requires a separate neuron. When it comes to neural data representation *N*-in-one, a researcher assumes one neuron for one variable. So, all levels of the variable will be given to the same neuron in the learning process or testing process.

An unwanted phenomenon during the network learning process is to stop the learning at a local minimum of the error function. The learning process of neural networks is a very complex issue [Tiliouine 2007]. A simplified error function of neural networks is presented in Figure 2. The local minimum of the error function was marked in red (the arrow pointing downwards) and the global minimum of the error function was marked in green (the arrow pointing upwards).

Research literature describes various techniques to avoid stopping the learning process of a neural network at a local minimum of the error function. Some of these techniques include: methods based on a global optimization algorithm (genetic algorithms, simulated annealing); random change in the order of giving learning samples (patterns) after each learning epoch; the multi-start method (which involves the multiple estimation of a neural network at the different, random, and initial values of weights); and the method using the momentum coefficient.

PRESENTATION OF DATA AND RESEARCH ASSUMPTIONS

The modelled and forecasted demand (response variable *Y*) was hourly counted seconds of outgoing calls within the framework of several different analytical sections. From this, the constructed models (the neural model and the regressive-neural model) can be considered as multi-sectional models [Kaczmarczyk 2016, 2017]. In order to identify the analytical sections, classification factors were specified. The classification factors were as follows: hours during 24 hours;



The red arrow (pointing downwards) indicates the local minimum of the error function, the green arrow (pointing upwards) indicates the global minimum of the error function.

Fig. 2. A simplified exemplification of the error function of neural networks

Source: Author's own coverage on the basis of exemplary data.

type of 24 hours; connection categories; subscriber groups. The particular analytical levels (sections) of each classification factor were distinguished. For example, if the subscriber groups were considered as the classification factor, only two levels were taken into account (business subscribers and individual subscribers). Each assumed classification factor and its levels are presented in Table 1.

For example, 24-hour cycles of demand for outgoing calls (generated by the separate subscriber groups) during the chosen working 24 hours (Wednesdays) in a period of one year are presented in Figure 3.

There were 35 total levels of classification factors. Within the framework of all the neural networks, one-of-*N* was adopted as the type of neural data representation. Therefore, each of the classification factors was treated as an explanatory (independent) variable during the preparation of the neural model or the regressive-neural model. The number of explanatory variables was 35.

Table 1. Each classification factor and its assumed levels

Variable marking	Classification factor	Levels of classification factor	
X_1	hours during 24 hours	$x_{1,1}$	– 12 am–01 am
		$x_{1,2}$	– 01 am–02 am
		$x_{1,3}$	– 02 am–03 am
		$x_{1,4}$	– 03 am–04 am
		$x_{1,5}$	– 04 am–05 am
		$x_{1,6}$	– 05 am–06 am
		$x_{1,7}$	– 06 am–07 am
		$x_{1,8}$	– 07 am–08 am
		$x_{1,9}$	– 08 am–09 am
		$x_{1,10}$	– 09 am–10 am
		$x_{1,11}$	– 10 am–11 am
		$x_{1,12}$	– 11 am–12 pm
		$x_{1,13}$	– 12 pm–01 pm
		$x_{1,14}$	– 01 pm–02 pm
		$x_{1,15}$	– 02 pm–03 pm
		$x_{1,16}$	– 03 pm–04 pm
		$x_{1,17}$	– 04 pm–05 pm
		$x_{1,18}$	– 05 pm–06 pm
		$x_{1,19}$	– 06 pm–07 pm
		$x_{1,20}$	– 07 pm–08 pm
		$x_{1,21}$	– 08 pm–09 pm
		$x_{1,22}$	– 09 pm–10 pm
		$x_{1,23}$	– 10 pm–11 pm
		$x_{1,24}$	– 11 pm–12 am
X_2	types of 24 hours	$x_{2,1}$	– working 24 hours
		$x_{2,2}$	– Saturday
		$x_{2,3}$	– Sunday
X_3	connection categories	$x_{3,1}$	– mobile networks
		$x_{3,2}$	– local calls to the same network
		$x_{3,3}$	– local calls to other networks
		$x_{3,4}$	– trunk calls
		$x_{3,5}$	– international calls
		$x_{3,6}$	– other connections
X_4	subscriber groups	$x_{4,1}$	– business subscribers
		$x_{4,2}$	– individual subscribers

Source: Author's own coverage.

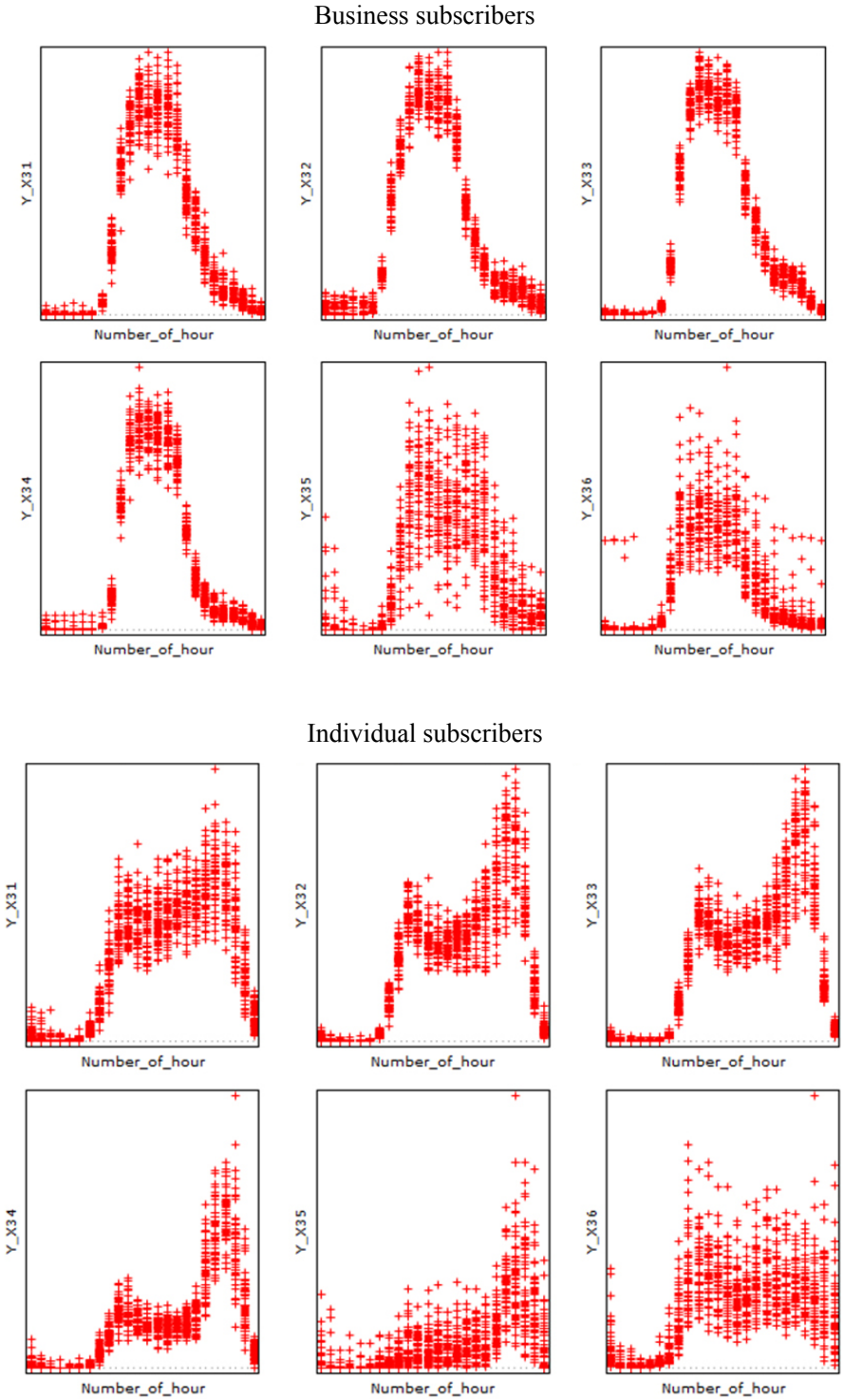


Fig. 3. The hourly measurements of time (seconds) of outgoing calls generated by business or individual subscribers during working days

Source: Author's own coverage.

The research was carried out to compare and asses the effectiveness of the two different tools (the neural model and the regressive-neural model) in the short-term forecasting of the multi-sectional demand for telecom services. The explanatory variables were adopted as dichotomous variables in both the tested techniques. Dichotomous variables take only 0 or 1 (0 when the analysed level of a classification factor does not occur, or 1 when the analysed level of a classification factor occurs).

The non-integrated neural network model was the first analysed tool. Then, the second model, i.e. the regressive-neural model, was studied. In both cases, the effectiveness of the approximation and the forecasting of response variable Y was checked.

In the case of the regressive-neural model, the following stages were implemented:

1. The estimation of the linear (multiple) regression model. The regression model was used to capture typical demand values for telecom services that are generated in the distinguished analytical sections:

$$Y = \alpha_0 + \sum_{r=1}^{24} \gamma_r X_{1r} + \sum_{i=1}^{3} \beta_i X_{2i} + \sum_{j=1}^{6} \delta_j X_{3j} + \sum_{p=1}^{2} \mu_p X_{4p} + Z,$$

$$y_t = \alpha_0 + \sum_{r=1}^{24} \gamma_r x_{1rt} + \sum_{i=1}^{3} \beta_i x_{2it} + \sum_{j=1}^{6} \delta_j x_{3jt} + \sum_{p=1}^{2} \mu_p x_{4pt} + z_t, \quad t = 1, 2, ..., n,$$

$$\hat{y}_t = \alpha_0 + \sum_{r=1}^{24} \gamma_r x_{1rt} + \sum_{i=1}^{3} \beta_i x_{2it} + \sum_{j=1}^{6} \delta_j x_{3jt} + \sum_{p=1}^{2} \mu_p x_{4pt}, \quad t = 1, 2, ..., n.$$

2. The computation of the residual values (i.e. cleaning time series of the response variable):

$$z_t = y_t - \hat{y}_t, \qquad t = 1, 2, ..., n$$

3. The calculation of the demand forecast by using the regression model:

$$y_T^* = \alpha_0 + \sum_{r=1}^{24} \gamma_r x_{1rT}^* + \sum_{i=1}^{3} \beta_i x_{2iT}^* + \sum_{j=1}^{6} \delta_j x_{3jT}^* + \sum_{p=1}^{2} \mu_p x_{4pT}^*, \qquad T = n+1, n+2, ..., n+h.$$

4. The modelling and the forecasting of residual values of the regression model by the use of the neural model:

$$Z = f\left(X_{1,1}, ..., X_{1,24}, X_{2,1}, X_{2,2}, X_{2,3t}, X_{3,1}, ..., X_{3,6}, X_{4,1}, X_{4,2}, \Pi\right),$$

$$z_t = f\left(x_{1,1t}, ..., x_{1,24t}, x_{2,1t}, x_{2,2t}, x_{2,3t}, x_{3,1t}, ..., x_{3,6t}, x_{4,1t}, x_{4,2t}, \pi_t\right), \quad t = 1, 2, ..., n,$$

$$\hat{z}_t = f\left(x_{1,1t}, ..., x_{1,24t}, x_{2,1t}, x_{2,2t}, x_{2,3t}, x_{3,1t}, ..., x_{3,6t}, x_{4,1t}, x_{4,2t}\right), \quad t = 1, 2, ..., n,$$

or

$$z_T^* = f\left(x_{1,1T}^*, ..., x_{1,24T}^*, x_{2,1T}^*, x_{2,2T}^*, x_{2,3T}^*, x_{3,1T}^*, ..., x_{3,6T}^*, x_{4,1T}^*, x_{4,2T}^*\right),$$

$$T = n+1, n+2, ..., n+h.$$

5. The correction of values obtained with the use of the regression model by the residuals obtained with the neural model, in order to construct the origin demand/correction of the prediction, as obtained with the regression model by the prognostic (neural) residuals, in order to forecast demand:

$$\hat{d}_t = \hat{y}_t + \hat{z}_t, \qquad t = 1, 2, ..., n,$$

or

$$d_T^* = y_T^* + z_T^*, \qquad T = n+1, n+2, ..., n+h.$$

The conception of the regressive-neural model is that the regression model was used as the filter of demand (Y) and the neural model was applied to construct a remain variability (i.e. regression errors) by using the same explanatory variables as in the case of the regression model.

In both the tested models (the neural model and the regressive-neural model), a selected type of neural networks was used, i.e. the feedforward neural network. The logistic function was applied as the activation function of the neurons. The chosen neural data representation (one-of-N) means that the number of all levels of classification factors is equal to the number

of neurons in the input layer of the neural network. The architecture of the tested neural network resulted from the structure of the data and the assumed neural data representation. Regarding the structure of the data and the adopted neural data representation, the input layer of the tested neural models included 35 neurons in the author's research study. Due to the fact that the forecasted variable (representing demand) was only one, the output layer of the neural networks involved only one neuron.

Both the models were estimated on the basis of the same data and the same period. This uniformity enabled the transparent comparison of the usefulness of the tested tools (which was the aim of the study).

The error backpropagation algorithm was applied in the learning process. Weights of the neural networks were corrected after each gave the learning pattern from the learning set (i.e. the learning pattern was understood as 35 values, which equalled 0 or 1, relating to the explanatory variables and a value of the response variable). As a criterion for assessing the neural models, the testing error was assumed.

The following methods were used in order to reduce the probability of stopping the learning process at a local minimum of the error function: the learning patterns mixing in each epoch; the momentum coefficient; and the multi-start method.

When it comes to the selection of the architecture of the neural network, the empirical method was used. This method consists of testing many neural networks with various numbers of hidden layers and various numbers of neurons in these layers. In both the tested models (the neural model and the regressive-neural model), the following architectures of the neural networks were tested: 35-35-1, 35-30-1, 35-25-1, 35-20-1, 35-15-1, 35-10-1, 35-5-1. Based on the number of constructs, seven non-integrated neural model experiments and seven regressive-neural model experiments were carried out. Each of these 14 experiments was based on:

- the decuple estimation of the particular neural model with the determined architecture;
- the comparison of the obtained estimation effect;
- the selection of the best-fitted neural model for each of the tested architectures.

After concluding the above-described experiments, the best-fitted model was chosen.

The basis of the comparison between the goodness of neural model fit and the goodness of regressive-neural model fit was: R^2, the autocorrelation function and the partial autocorrelation function of the residuals.

The forecast's accuracy, which was obtained by the use of both the compared techniques, was proved by means of the mean absolute error (*MAE*) and the root mean square error (*RMSE*). Both the errors related to expired forecasts ex-post. The formulas of the above-mentioned errors are as follows:

$$MAE = \frac{1}{T-n}\sum_{t=n+1}^{T}\left|y_t - y_t^*\right|$$

$$RMSE = \sqrt{\frac{1}{T-n}\sum\nolimits_{t=n+1}^{T}\left(y_t - y_t^*\right)^2}$$

where:

T – a forecast horizon,

n – the number of observations which were used in the estimated models.

In order to compare the neural model and the regressive-neural model, the same forecasting period was adopted. This assumption enabled the clearest comparison of the two techniques.

RESEARCH RESULTS AND DISCUSSION

Estimation of both the tested models was carried out on the basis of the data for the period from January 1 to February 20 of a selected year. Both models were estimated from data which included 14,688 cases. The period February 21–28 was assumed as the forecasting period.

The learning process characteristics of the neural networks in both models are presented in Table 2.

The values of the parameters of neural network learning and testing were selected on the basis of the conducted experiments. The higher the learning coefficient, the faster the solution search speed. The momentum coefficient affects the stability of a network's learning process. The higher the value of this coefficient, the higher the inertia of a neural network's learning process. The tolerance coefficient is used to determine the permissible error on a single network output. The tolerance coefficient is in the range of 0–1 (which is dictated by the logistic activation function whose values belong to the same range). A low tolerance coefficient means

Table 2. The values of the learning and testing parameters of the neural networks

Coefficient name	Value or yes/no
Learning coefficient	0.8
Momentum coefficient	0.6
Learning tolerance	0.15
Testing tolerance	0.25
Bias coefficient	yes

Source: Author's own coverage.

that only results that are very close to the pattern are acceptable. Bias determines whether an additional neuron whose output is equal to 1 is to be used. If it is used, all neurons in the hidden and output layers are connected to this additional neuron. This solution results in better stability during the learning process and is a classic example of improving network performance.

The volume of the testing set was 15% of the total data set, i.e. 14,688 × 15% = 2,203 cases. The volume of the learning set was 85% of the total data set, i.e. 14,688 × 85% = 12,485 cases. The testing set was assumed in such a way that it contained the cases related to all tested analytical sections (e.g. categories of connections, groups of subscribers).

The criterion of stopping the learning process was understood as achieving an assumed RMSE threshold. The threshold was minimised during the learning process. The obtained value of the RMSE was the basis of the assessment of the right neural network topology and the right weights values.

When it comes to the non-integrated neural model, the best results of the learning process were obtained for network architecture 35-20-1. This learning process is shown in Table 3.

During the experiments with the use of the regressive-neural model, the best results were achieved by the use of neural model architecture 35-20-1 (Table 4).

The R^2 of the neural model and the regressive-neural model amounted to 0.8112 and 0.9198, respectively. So, in the case of the regressive-neural model, the value of R^2 indicated much a better fit of the model

Table 3. The learning process of the neural model that was chosen after all the experiments

ε	Epoch	Learning		Testing	
		RMSE	Out of tolerance	*RMSE*	Out of tolerance
0.100	4	0.0948	1 291	0.0987	0
0.090	3	0.0849	417	0.0872	0
0.080	3	0.0770	298	0.0789	0
0.070	10	0.0702	164	0.0698	0
0.060	18	0.0620	148	0.0597	0
0.050	34	0.0529	147	0.0498	0
0.045	41	0.0479	145	0.0449	0
0.040	82	0.0436	132	0.0397	0
0.035	It was not reach after caring out of 1 000 epoch				

*Value of ε is *RMSE* threshold of testing set, below which the network learning process was stopped; the neural network model architecture: 35-20-1.

Source: Author's own calculations.

Table 4. The learning process of the neural model that was chosen as part of the regressive-neural model

ε	Epoch	Learning		Testing	
		RMSE	Out of tolerance	*RMSE*	Out of tolerance
0.100	7	0.0943	1 854	0.0979	33
0.090	2	0.0872	1 398	0.0887	6
0.080	3	0.0804	1 183	0.0797	2
0.070	4	0.0725	459	0.0685	0
0.060	18	0.0618	354	0.0599	0
0.055	27	0.0574	287	0.0548	0
0.050	53	0.0522	157	0.0494	0
0.045	It was not reach after caring out of 1 000 epoch				

*Value of ε is *RMSE* threshold of testing set, below which the network learning process was stopped; the neural network model architecture: 35-20-1.

Source: Author's own calculations.

to the data. The goodness of the fit of the regression model (which was considered as a module of the regressive-neural model) was as follows: R^2 0.4971, standard error of the estimate 58,177.46.

The next object of research was the autocorrelation function and the partial autocorrelation function of the model's residuals. This research showed that repetitions are visible in the 24-hour cycle. However, in the case of the regressive-neural model, the repetitions were evidently lower in comparison to the non-integrated neural network (Fig. 4). This was because the non-integrated neural network was unable

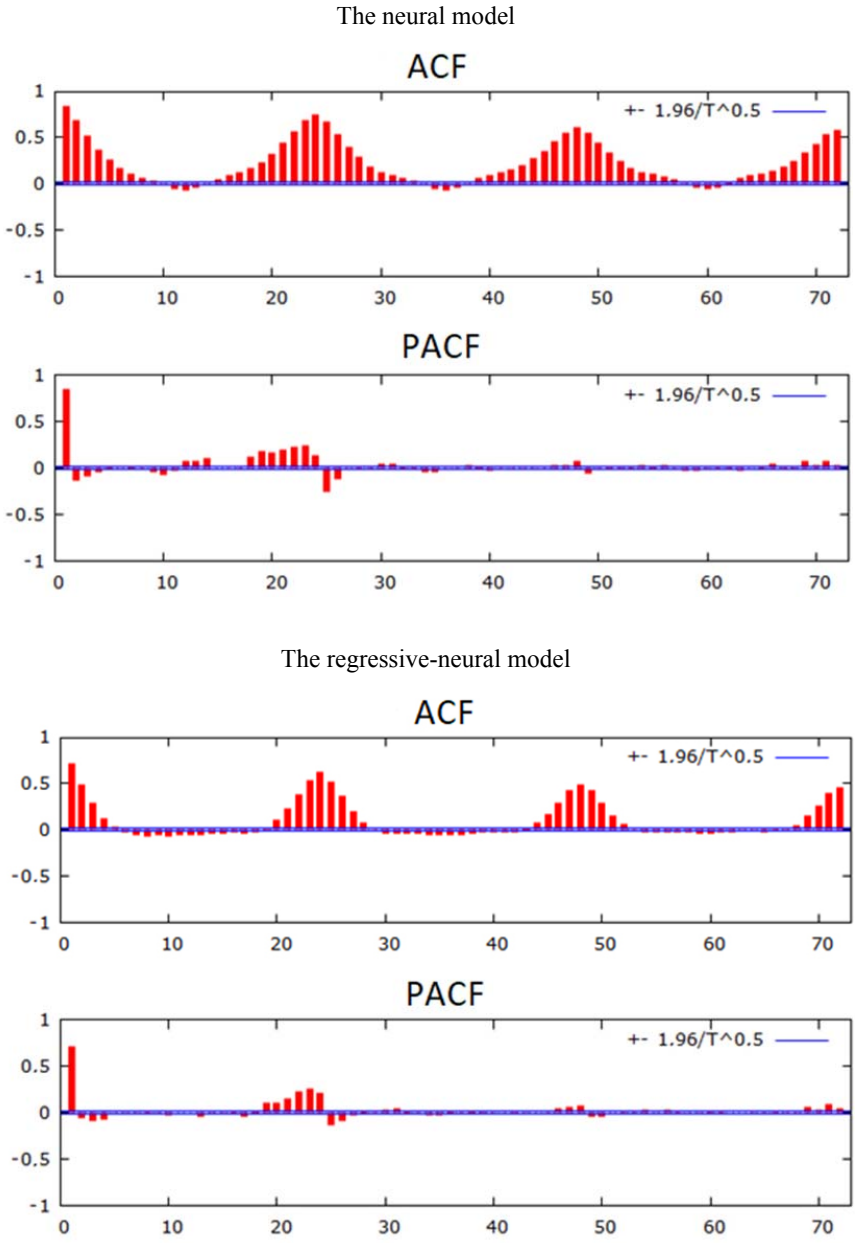


Fig. 4. The autocorrelation function (ACF) and the partial autocorrelation function (PACF) of the neural model residuals and the regressive-model residuals

Source: Author's own calculation.

to effectively model so many levels of demand. The regressive-neural model was characterised by a higher effectiveness in terms of its ability to make approximations.

Unusual observations (influence observations and outliers) were recognised in the data (Fig. 5). They were confirmed with the use of calculated Cook's distances and standardised residuals. However, the unusual

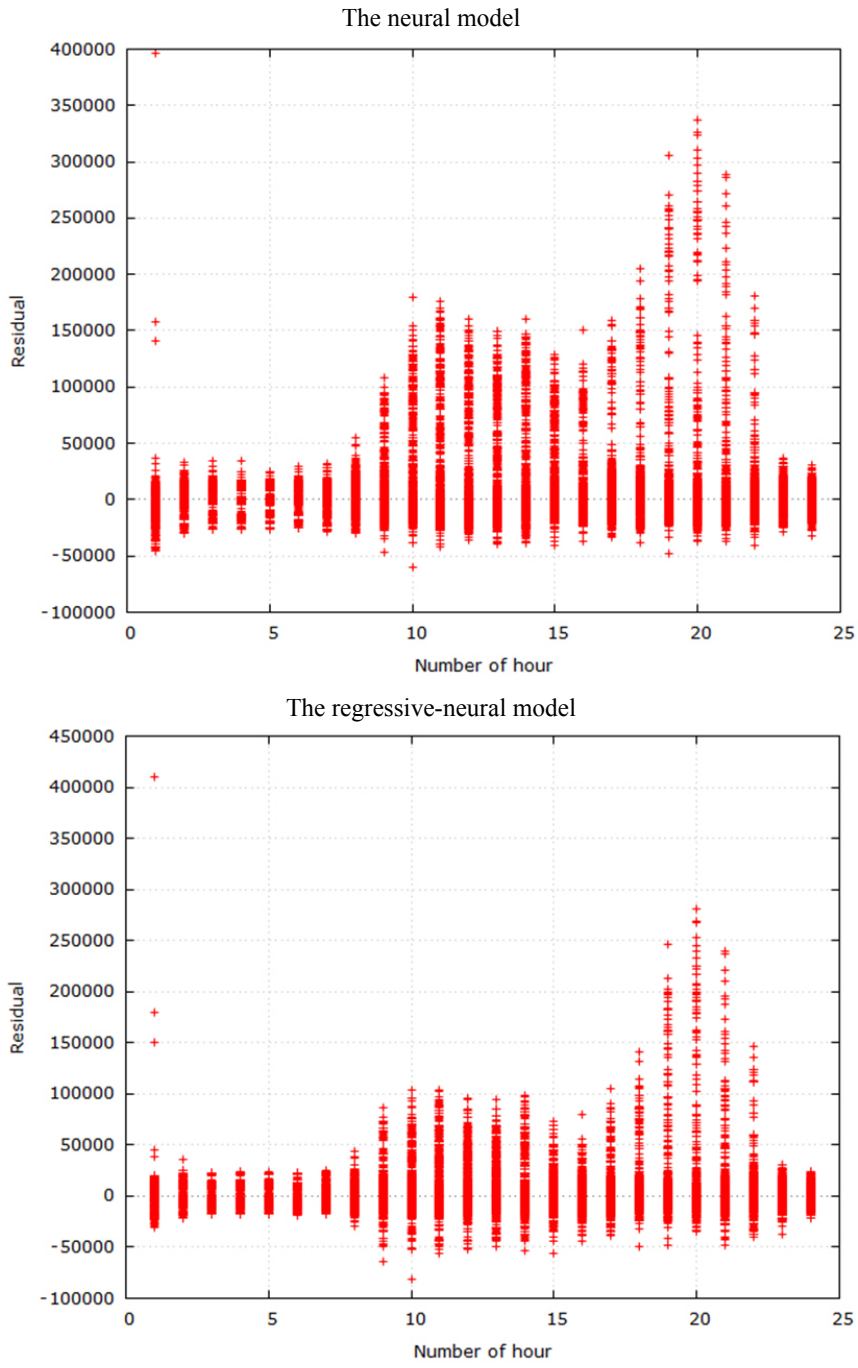


Fig. 5. Scatter plot of the neural model residuals and the regressive-neural residuals

Source: Author's own calculation.

observations were left without any changes because of the risk of effacing the real patterns [Dittman et al. 2011].

The analysis of the scatter plot of the regressive-neural model residuals and the normal probability plot of these residuals (Fig. 6) confirmed the better fit of this model to the data.

In both cases, the highest values of the residuals can be observed during peak hours (which were different

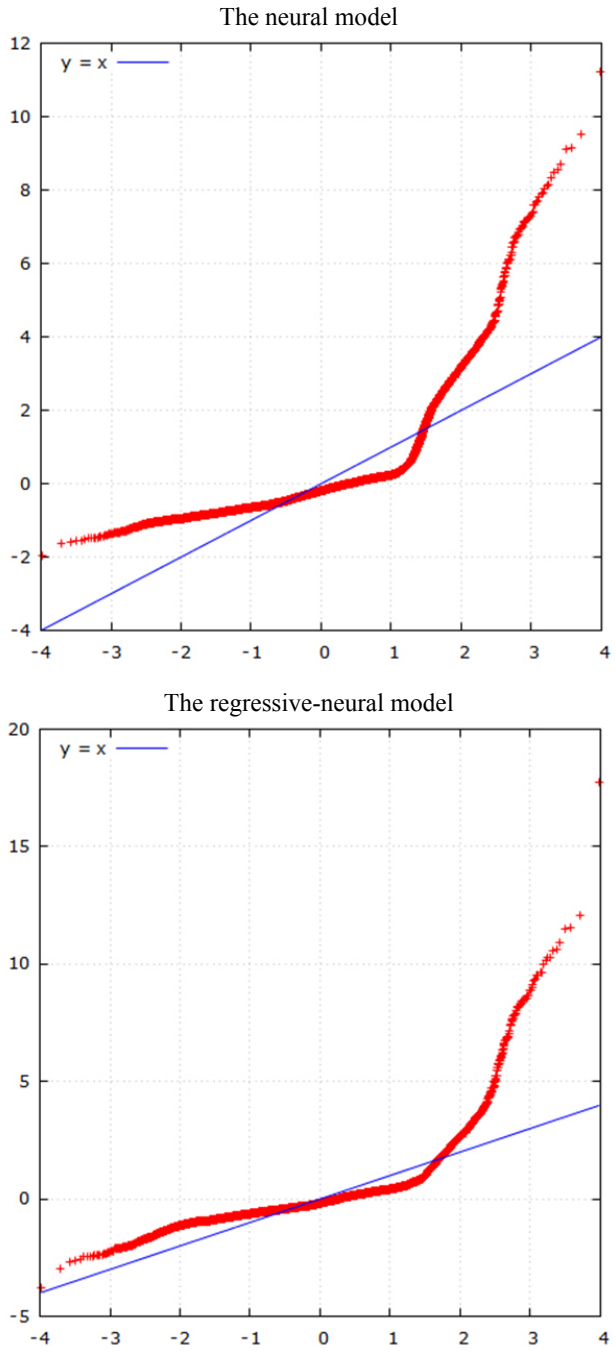


Fig. 6. Normal probability plot of the tested models

Source: Author's own calculation.

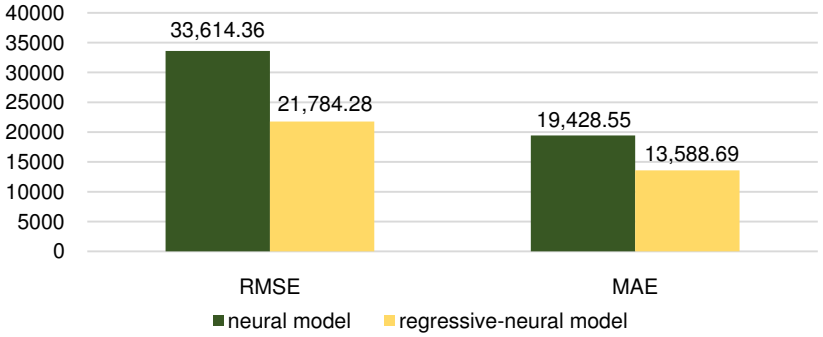


Fig. 7. Comparison of the forecasting effectiveness of the neural model and the regressive-neural model
Source: Author's own calculation.

for both the subscriber groups). This analysis showed that the residuals of the second model are characterised by evidently lower values in comparison to the non-integrated model (Fig. 5). Moreover, one can differentiate the distribution of the integrated model residuals from distribution of the non-integrated model residuals through their similarity to the normal distribution (Fig. 6).

The effectiveness of the prediction for both of the tested techniques are shown in Figure 7.

The forecasting errors indicated that the predictive accuracy of the regressive-neural model is much higher in comparison to the non-integrated neural model. In the case of the integrated model, both the average errors of forecasts (the *RMSE* and *MAE*) were significantly lower than in the case of the neural network model.

CONCLUSIONS

The obtained research results confirmed the hypothesis. They show that the regressive-neural model allows for better results in terms of the approximation and the short-term forecasting of multi-sectional demand for telecom services than does the non-supported neural model. This conclusion can be formulated on the basis of the received values of the following coefficients: R^2, the autocorrelation coefficients, the partial autocorrelation coefficients, and the average errors of expired forecasts ex-post.

Further research in this field could be based on the comparison of neural network models and regressive-neural models within the framework of a lower number of analytical sections (e.g. only within the business group, or even only within the business group and working 24 hours). Moreover, if a regression model were to be constructed on single analytical section, the variable Y_{t-1} in the regression model would cause a better fit to the data.

A higher goodness of the model fit and the forecasting accuracy in terms of demand could also be achieved by separating particular types of 24 hours. The phases of the cycle of demand in different categories of connections within the same subscriber group and during the same type of 24 hours are very similar. So, it is possible to reduce the complexity of their approximation.

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JEDNOKIERUNKOWE SIECI NEURONOWE W PROGNOZOWANIU WIELOPRZEKROJOWEGO POPYTU NA USŁUGI TELEFONICZNE – PORÓWNAWCZE BADANIA EFEKTYWNOŚCI DLA DANYCH GODZINOWYCH

STRESZCZENIE

Zaprezentowane wyniki badań są związane z systemem prognostycznym przeznaczonym dla operatorów telekomunikacyjnych, ponieważ są skoncentrowane na sposobie konstrukcji modelu do efektywnego prognozowania popytu na usługi połączeniowe. Artykuł zawiera wyniki porównawczych badań efektywności modelu sieci neuronowej i modelu regresyjno-neuronowego (zintegrowanego) w zakresie krótkookresowego prognozowania zapotrzebowania na usługi telefoniczne. Jako model sieci neuronowej zastosowany został model sieci jednokierunkowej. Model regresyjno-neuronowy został zbudowany na podstawie połączenia dychotomicznej regresji liniowej wieloprzekrojowego popytu i jednokierunkowej sieci neuronowej, która służyła do modelowania reszt modelu regresji (tj. pozostałej zmienności). Zmienną objaśnianą były sumowane co godzinę liczby sekund rozmów wychodzących z sieci wybranego operatora. Połączenia telefoniczne były analizowane pod względem: typów doby, kategorii połączeń i grup abonentów. Wyszczególniono 35 zmiennych objaśniających, które wykorzystano w procesie estymacji obu porównywanych modeli. Stwierdzono, że model regresyjno-neuronowy charakteryzuje się większymi możliwościami aproksymacyjnymi i predykcyjnymi niż niezintegrowany model neuronowy.

Słowa kluczowe: system prognostyczny, jednokierunkowa sieć neuronowa, model regresyjno-neuronowy, prognozowanie

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COMPARISON OF ENROLMENT IN HIGHER AGRICULTURAL EDUCATION IN POLAND AND OTHER EUROPEAN UNION COUNTRIES FROM 2013–2017

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ABSTRACT

The aim of the article is to identify changes in the level of enrolment in higher agricultural education in Poland compared with other European Union countries in the years 2013–2017. An additional aspect of study was the causal relationship between the number of people undertaking higher agricultural education and the effectiveness of the functioning of agriculture in a given country. The dynamics ratio was used to present the existing tendencies. Additionally, admissions for individual types of studies were examined and the differences in values from individual countries were presented. Spearman's coefficient of rank correlation was used to analyze the causative relationship. Poland belongs to a group with relatively low levels of higher agricultural studies. In addition, the number of persons undertaking education at agricultural universities is closely connected with the efficiency of agriculture in a given European Union country.

Key words: agriculture, knowledge, education, higher education, enrolment, Poland, EU
JEL codes: I21, I23, J24, Q10

INTRODUCTION

Modern economy is based on the effective use of existing human potential. Human resources are the source of achieving success by the proper use of acquired knowledge or gained experience. Obtained information may be transformed into intelligence aimed at solving problems as well as supporting others in acquiring and sharing the knowledge [Fitzenz 2001]. Thus, a human being is an important factor of competitive advantage.

Of particular importance in this aspect is improvement in the quality of intellectual resources which, as noted by Borowiec, depends on how well the education system functions [Borowiec 2011]. The process of gaining an education is significant not only because of the level of knowledge that is achieved but also because education is closely connected with a field of study and influences the effective functioning of the job market.

The completion of higher education studies in agriculture is very important to the agricultural sector. The global economy has created a growing challenge for companies that must operate under conditions of high competition in agribusiness and the food industry. Since Poland's accession to the European Union, competition in this arena has developed significantly, and Polish companies, after restructuring during the transformation period, have begun to modernize in terms of organization and management [Firlej 2009a]. The functioning of the modern agri-food industry is undoubtedly the most important element of agribusi-

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ness because its task is to secure perishable plant and animal raw materials, and to transform them into more durable and safe products for consumption [Firlej 2009b]. This requires high qualifications and professional competence. Knowledge acquired during university studies are focused primarily on the proper management of agricultural enterprises, the ability to obtain subsidies, how to make rational investment decisions, and how to optimize work organization in agriculture. According to Firlej and Kubala [2018], agricultural enterprises managed by people who have completed a level of higher education will achieve a higher level of efficiency. At the same time, such managers will use the resources available within their activities more effectively. As is pointed out by Maguire [2004], the agricultural education system has been a major contributor to agricultural research, production and institutional successes. Parr et al. [2007] also emphasize that education in sustainable agriculture is beginning to emerge as a way to address many complex social and environmental problems.

Addressing problems related to the education of future farmers is very significant nowadays, especially due to an observed decrease in employment in agriculture among young people. The issue of higher education in agriculture have been addressed by, among others, Francis et al. [2000], Gołębiewska and Klepacki [2005], Mulder [2005], Parr [2011], Boguski [2012], Rudnicki [2013], Baggett et al. [2015], Firlej [2017], Firlej and Kubala [2018]. Another research topic is the relationship between agricultural education and agricultural efficiency, addressed by such authors as Huffman [1999], Krzyżanowska [2000], Wołoszyn [2002], Wiatrak [2005] and Kołoszko-Chomentowska [2008]. The existing studies, however, do not deal with enrolment in higher agricultural education in the member states of the European Union, which is the focus of this research paper.

MATERIAL AND STUDY METHODOLOGY

The aim of the article is to identify changes in the level of enrolment in higher agricultural education in Poland compared with other European Union countries in the years 2013–2017. An additional aspect was to study whether there is a causal relationship between the number of people who undertake higher agricultural education and the effectiveness of a country's system of agriculture, which was presented with the use of agriculture added value (in millions of dollars). As noted by Poczta and Kołodziejczak [2008], agriculture added value is one of the basic measures of diversifying the productivity of agriculture. The need to study this relationship has been discussed by Porceddu and Rabbinge [1997], who emphasized that agricultural education in Europe has an important role in agricultural efficiency. Coleman et al. [2004] describe knowledge as the main factor influencing the efficiency of farms and Nowak et al. [2016] point to the existing gaps in research between the level of education and agricultural productivity.

Two variables were adopted to present the existing tendencies: the number of newly admitted students to Bachelor's and Master's degree agricultural studies, and that same number compared with the total number of newly admitted students. To analyze the first variable, the dynamics ratio between 2013 and 2017 was used, as well as admissions for individual types of studies in 2013 and 2017 compared with other member states. The dynamic ratio was the percentage ratio of the number of newly admitted students to agricultural studies in 2017 and the level of this variable in 2013. Determining the share focused on expressing the percentage of students in individual countries admitted in agricultural studies in the total number of students undertaking this type of study in the European Union. To describe the changes for the second variable the differences in their values between 2013 and 2017 were used.

At the same time, groups of countries characterized by a similar level of number of people newly admitted to Bachelor's and Master's degree agricultural studies compared with the total number of the newly admitted students in the analyzed period were selected. The Ward's method was used, which is regarded as an agglomeration method and based on the analysis of variance aimed at minimizing the sum of the squared deviations in clusters. The Spearman's coefficient of rank correlation between the number of people undertaking higher agricultural education and the added value of agriculture was used to analyze the causative relationship. This coefficient is used to

describe the strength of correlation of two features when the features are measurable and the examined population is small, and when the features are of a qualitative nature and it is possible to order them. Spearman's rank correlation coefficient takes values from the range <–1, + 1>. The closer it is to +1 or –1, the stronger the relationship.

The data required for calculations was gathered from the Eurostat database for the years 2013–2017. The study period was dictated by the access to the data concerning the analyzed aspects. Croatia, France and Ireland were not included into the study due to the lack of statistical data. Country codes in the tables and the figures comply with ISO 3166-1. The calculations were conducted in Statistica v. 13 program.

STUDY RESULTS

Diverging trends may be observed in the total number of students newly admitted to agricultural Bachelor's degree studies between 2013 and 2017 (Table 1). There was a slight increase in their number by 4.11% between 2013 and 2014. Over the next few years, a gradual decrease is visible. Compared to 2014, in 2017 the number of newly admitted agricultural enrollees in the European Union dropped by 3,515 students – 7.05%.

In 2013, the largest number of students admitted to agricultural Bachelor's degree studies was in Italy (16.48%), followed by Germany (15.36%) and Poland (11.85%). A relatively high number of agricultural students (over 5%) were also admitted in the Czech Republic, Great Britain, Greece and Romania. Admissions below 1% were recorded in seven countries, the lowest being in Cyprus, Malta and Luxembourg.

Similar tendencies were observed in 2017. The highest number of students admitted to agricultural Bachelor's studies was also found in Italy, followed by Germany and Poland. However, while in the first two countries an increase was recorded between 2013 and 2017 (to 17.69 and 15.36%), a decrease to 9.88% was observed in Poland. Subsequently, the highest admissions (over 5%) were in Romania, Great Britain, Greece and the Czech Republic. Admissions below 1% were recorded in eight countries, the lowest in Cyprus, Malta and Luxembourg. The largest increase of admitted agricultural students between 2013 and 2017 was observed in Romania (by 3.39%), while the biggest drops were in the Czech Republic (by 3.15%) and Poland (by 1.97%).

Considering the dynamics between 2013 and 2017, it should be emphasized that an increase of new Bachelor's agricultural students was recorded only in eight countries. The highest growth was observed in Cyprus and Romania (by 95.83 and 52.98%, respectively). In the remaining countries there were declining tendencies, the largest in the Czech Republic, Latvia and Estonia. There was a relatively high decrease of the newly admitted in Poland, where between 2013 and 2017 the dynamics was at the level of 80.66%, and as a consequence it was the 7th biggest drop of the analyzed phenomenon in this period.

Taking into account the number of students newly admitted to Master's degree studies in the years 2013–2017, diverging trends may be also observed (Table 2). Between 2013 and 2014, as well as in 2015 and 2016, a slight growth was recorded. Over the next years there was a decrease in the number of persons undertaking agricultural Master's degree studies. Between 2013 and 2017 an increase of 4.21% was observed.

In 2013, the largest number of admissions at this educational level were in Germany and Poland (15.89 and 14.54% of the total number of the students newly admitted to Master's degree studies in the EU). Relatively high admissions (over 5%) were found in Romania, Italy, the Czech Republic, Spain and Great Britain. On the other hand, admissions lower than 1% were recorded in six countries (the lowest admissions were, similarly as in the case of Bachelor's degree studies, in Luxembourg, Cyprus and Malta).

Changes took place in 2017, where the largest number of admissions were observed in Germany, Italy and Romania (12.49–16.68% of the total number of students newly admitted to Master's degree studies). The subsequent biggest admissions were in Poland, Great Britain, Spain and the Czech Republic. Admissions below 1% were recorded in seven countries (the lowest admissions were in the same countries as in 2013). The biggest growth of admissions between 2013 and 2017 was in Italy, Great Britain and

Table 1. Characteristics and changes in the number of students newly admitted to agricultural Bachelor's degree studies in the years 2013–2017

Item	2013 persons	2014 persons	2015 persons	2016 persons	2017 persons	Share 2013 (%)	Share 2017 (%)	Dynamics ratio 2017/2013 (%)
AT	386	351	393	329	330	0.81	0.71	85.49
BE	2 370	2 480	1 983	2 122	2 289	4.95	4.94	96.58
BG	1 318	1 303	1 247	1 112	990	2.75	2.14	75.11
CY	24	21	30	33	47	0.05	0.10	195.83
CZ	4 035	3 419	2 663	2 397	2 443	8.42	5.27	60.55
DE	7 212	7 752	7 582	7 275	7 121	15.05	15.36	98.74
DK	305	318	339	367	389	0.64	0.84	127.54
EE	199	180	160	150	132	0.42	0.28	66.33
ES	2 153	2 077	1 851	1 656	1 691	4.49	3.65	78.54
FI	898	841	739	636	815	1.87	1.76	90.76
GB	3 674	4 284	4 125	4 308	4 040	7.67	8.71	109.96
GR	2 919	3 387	3 351	3 194	3 399	6.09	7.33	116.44
HU	1 133	1 121	1 030	848	1 198	2.36	2.58	105.74
IT	7 898	8 552	7 951	8 371	8 204	16.48	17.69	103.87
LT	717	701	895	866	660	1.50	1.42	92.05
LU	0	0	0	0	0	0.00	0.00	×
LV	325	423	239	221	209	0.68	0.45	64.31
MT	0	13	7	28	40	0.00	0.09	×
NL	1 196	1 257	1 275	1 239	1 320	2.50	2.85	110.37
PL	5 677	5 306	4 897	4 955	4 579	11.85	9.88	80.66
PT	785	864	893	971	622	1.64	1.34	79.24
RO	2 799	3 291	4 400	4 961	4 282	5.84	9.24	152.98
SE	503	526	472	510	423	1.05	0.91	84.1
SI	572	608	563	506	466	1.19	1.01	81.47
SK	816	807	856	760	678	1.70	1.46	83.09
EU	47 914	49 882	47 941	47 815	46 367	100.00	100.00	96.77

Source: Authors' own studies based on Eurostat.

Romania (respectively, by 3.62, 2.77 and 2.68%). On the other hand, the biggest fall in admissions in that period was in the Czech Republic and Poland (respectively, by 3.28 and 5.61%).

Taking into account the dynamics between 2013 and 2017, it should be emphasized that an increase of students newly admitted to agricultural Master's degree studies was recorded in 12 countries. The highest

Table 2. Characteristics and changes in the number of students newly admitted to agricultural Master's degree studies in the years 2013–2017

Item	2013 persons	2014 persons	2015 persons	2016 persons	2017 persons	Share 2013 (%)	Share 2017 (%)	Dynamics ratio 2017/2013 (%)
AT	401	362	339	349	341	1.64	1.34	85.04
BE	887	1 031	974	1 016	1 108	3.63	4.35	124.92
BG	599	881	682	730	651	2.45	2.56	108.68
CY	13	7	8	8	15	0.05	0.06	115.38
CZ	2 056	1 542	1 385	1 426	1 307	8.41	5.13	63.57
DE	3 882	4 314	4 417	4 509	4 247	15.89	16.68	109.4
DK	333	354	303	373	359	1.36	1.41	107.81
EE	144	129	110	141	128	0.59	0.50	88.89
ES	2 054	2 015	2 151	2 401	1 954	8.41	7.67	95.13
FI	124	181	143	133	155	0.51	0.61	125.00
GB	1 433	1 880	2 107	1 906	2 198	5.86	8.63	153.38
GR	432	361	291	437	428	1.77	1.68	99.07
HU	675	541	615	632	628	2.76	2.47	93.04
IT	2 260	2 441	2 903	2 883	3 277	9.25	12.87	145.00
LT	318	249	266	278	292	1.30	1.15	91.82
LU	29	3	3	42	33	0.12	0.13	113.79
LV	56	62	133	138	127	0.23	0.50	226.79
MT	0	0	0	0	0	0.00	0.00	x
NL	591	662	682	756	710	2.42	2.79	120.14
PL	3 554	3 173	2 787	2 593	2 275	14.54	8.93	64.01
PT	934	948	767	885	917	3.82	3.60	98.18
RO	2 398	2 714	2 543	3 074	3 181	9.81	12.49	132.65
SE	339	347	359	337	335	1.39	1.32	98.82
SI	260	231	248	245	174	1.06	0.68	66.92
SK	665	681	647	633	625	2.72	2.45	93.98
EU	24 437	25 109	24 863	25 925	25 465	100.00	100.00	104.21

Source: Authors' own studies based on data Eurostat.

growth was in Latvia, Great Britain and Italy (126.79, 53.38 and 45%, respectively). In the case of other EU countries declining trends were recorded, the highest in the Czech Republic, Poland and Slovenia.

An important index that shows the changing admissions to higher agricultural education in the European Union is the ratio of new agricultural students to the total number of students newly admitted to higher

education studies. In the analysis of Bachelor's studies (Fig. 1) in 2013, the highest level of the index was in the Czech Republic, Greece, Italy and Slovenia (from 3.34 to 4.88%). The admissions in Poland were 1.52%, which was the 15th position among the analyzed European Union countries. In 2017 the largest admissions were observed in Greece, while the Czech Republic dropped to the second position. There was a significant increase of admissions during these years in Hungary (1.33%) and Romania (1.29%), which put them in third and fourth place with the largest admissions. A growth in admissions during these years was observed in nine countries. The biggest decrease of the index value between 2013 and 2017 was in the Czech Republic and Belgium (by 0.75 and 0.40%). In Poland the admissions value slightly declined by 0.02%.

In the analysis of the Master's degree studies (Fig. 2) in 2013, the highest level of the index – as in the case of Bachelor's degree studies – was in the Czech Republic (4.78%). Next positions were occupied by Spain, Hungary and Slovenia (from 3.70 to 3.81%). The admissions in Poland in that year were 1.41%, which was the 19th position among the analyzed European Union countries. In 2017 the largest admissions were recorded in Romania, then the Czech Republic, Lithuania and Hungary. Poland was in the 20th position. An increase of admissions during these years was found in ten countries. The biggest decrease of the index value between 2013 and 2017 was in Spain, Greece, Slovenia and the Czech Republic. In Poland a drop in admissions by 0.01% was recorded.

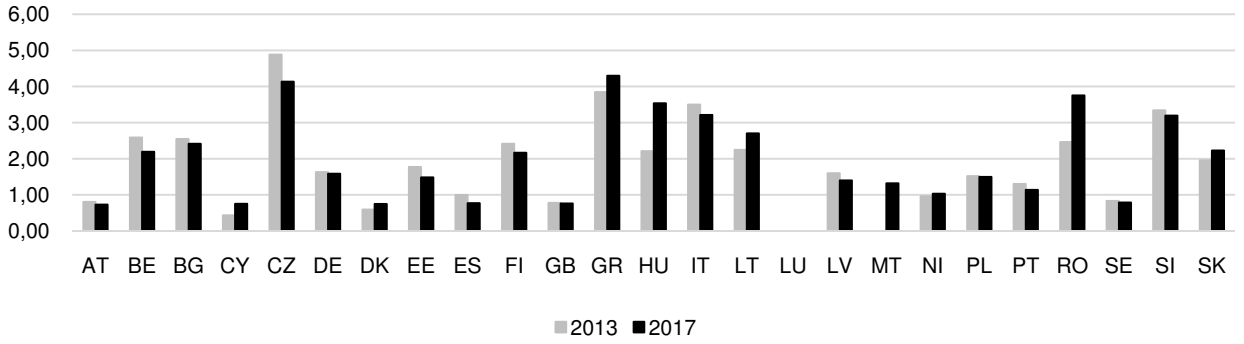

Fig. 1. The share of newly admitted students to agricultural Bachelor's degree studies compared with those newly admitted to all higher education studies (%)

Source: Author's own studies based on Eurostat.

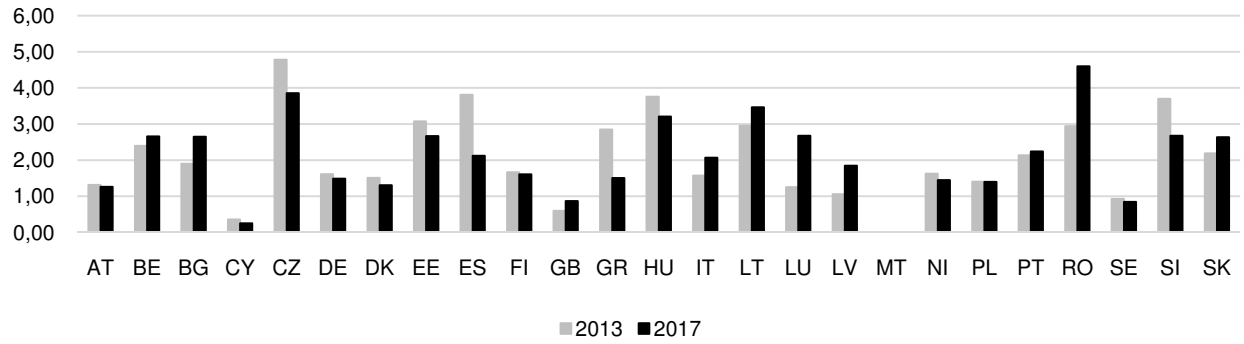

Fig. 2. The share of newly admitted students to agricultural Master's degree studies compared with those newly admitted to all higher education studies (%)

Source: Author's own studies based on Eurostat.

The Ward method was used to select a group of European Union countries with similar levels of newly admitted Bachelor's and Master's agricultural students, compared with the total number of newly admitted students in the analyzed period. On the basis of the analysis of the horizontal tree chart (Fig. 3), it was concluded that the closest to the vertical axis are Denmark and Sweden. They are joined by Austria, Great Britain and the Netherlands. Cyprus, Malta and Luxembourg are also connected with this group of countries. The second cluster includes Poland and Spain, joined by Germany and Portugal and at a further distance, Latvia. The next group consists of Belgium and Bulgaria, which are connected with Slovakia at a further distance. The cluster is joined by Estonia and Finland and subsequently Italy, Hungary and Lithuania. A separate group represents Greece and Slovenia, with the Czech Republic and Romania in the longer distance.

An additional aspect of the study was to conduct research aimed at presenting the cause and effect relationships between the number of persons undertaking higher agricultural education and the economic effectiveness of the functioning of agriculture in a given country. The added value in agriculture is shown in Table 3.

The highest level of added value in agriculture in all years was observed in Italy, Spain, Germany and Great Britain. A relatively high level was recorded in the research period in Poland (which had the highest among EU countries from Central and Eastern Europe). Between 2013 and 2017 an increase in value was noted in four countries, the largest in Denmark and Spain. In Poland, the value added of agriculture decreased between 2013 and 2017 by 2.87%.

During calculations, observations were ranked from highest to lowest. The lowest value of the calculated indicator is for the year 2013 and amounts to 0.802 (Table 4). In the remaining years the correlation index fluctuates from 0.825 to 0.884, which proves the existence of a very strong relationship between the analyzed variables.

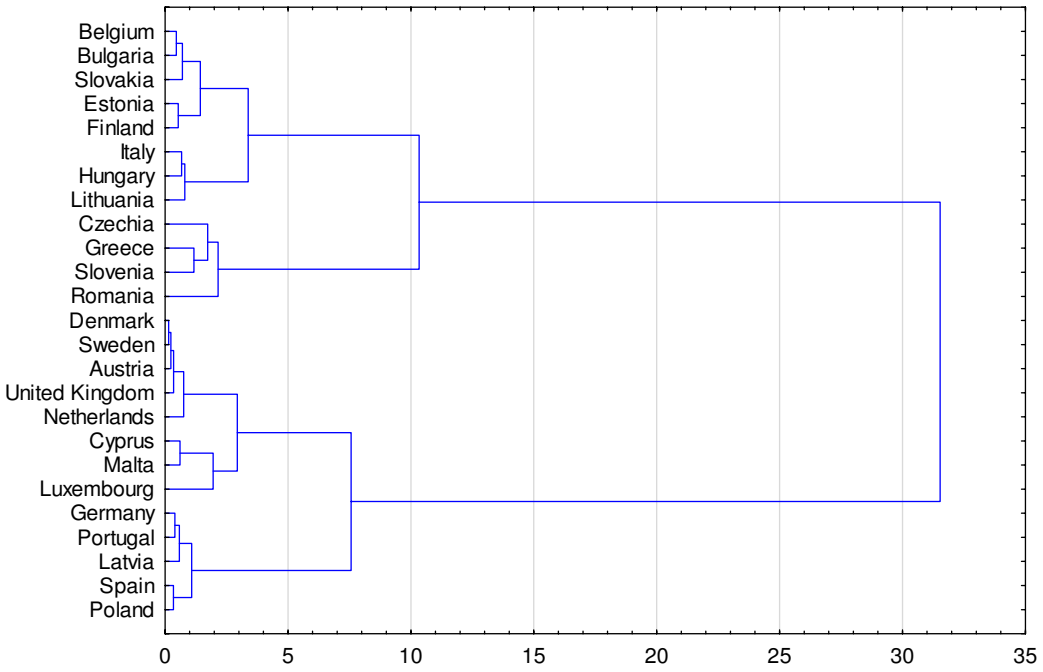

Fig. 3. Dendrogram of a group of European Union countries differentiated by the number of students newly admitted in agricultural studies compared with the total number of newly admitted students

Source: Author's own studies based on Eurostat.

Table 3. Value added in agriculture years 2013–2017 (millions USD)

Item	2013	2014	2015	2016	2017
AT	5 396	5 307	4 314	4 385	5 010
BE	3 584	3 447	3 186	2 982	3 277
BG	2 562	2 590	2 077	2 159	2 370
CY	484	427	364	394	406
CZ	5 033	5 141	4 162	4 028	4 443
DE	32 981	34 075	22 072	23 289	28 704
DK	4 474	4 880	2 898	3 109	4 707
EE	752	799	613	515	637
ES	34 188	33 513	31 208	33 291	35 311
FI	6 933	6 546	5 174	5 689	5 930
GB	18 063	19 449	17 076	15 457	15 636
GR	7 693	8 054	7 464	6 984	7 520
HU	5 208	5 557	4 605	4 879	5 247
IT	44 631	41 761	37 004	35 179	37 164
LT	1 661	1 662	1 428	1 322	1 481
LU	171	192	131	132	165
LV	992	1 047	983	888	973
MT	120	127	116	120	123
NL	15 705	15 488	13 196	13 841	15 400
PL	15 066	14 246	10 513	11 238	14 634
PT	4 703	4 659	4 089	4 030	4 336
RO	10 338	9 426	7 446	7 673	9 259
SE	7 097	6 822	5 987	5 739	5 717
SI	865	1 006	883	868	829
SK	3 565	4 075	2 964	3 022	2 960

Source: Author's own studies based on Eurostat.

Table 4. The relationship between economic effectiveness and the number of newly admitted students

Year	Spearman's rank correlation coefficient
2013	0.802
2014	0.825
2015	0.841
2016	0.833
2017	0.844

Source: Author's own studies based on Eurostat.

The significance of the calculated factors was also proved. Due to the small number of observations during the testing of the null hypothesis, their accurate distribution was used. In all cases the null hypothesis, stating that there is a lack of correlation between the analyzed variables, was rejected for the benefit of the alternative hypothesis indicating that there is a correlation and it is positive.

SUMMARY AND FINAL CONCLUSIONS

The agriculture industry today is facing great challenges resulting from the need to properly modernize the processes of agricultural enterprises, to obtain subsidies in order to develop the industry, and to meet the high demands imposed on agricultural producers. Therefore, it is necessary to take measures to help shape the people who undertake higher agricultural education. This in turn may bring an indirect increase in the work efficiency in agriculture. The conducted study presents the situation of students newly admitted to higher agricultural studies in the European Union and allows to come to the following conclusions:

1. One of the main problems of the future of agriculture in the European Union is the decreasing tendency of students to enroll in higher agricultural studies. Regarding the admissions to Bachelor's degree studies between 2013 and 2017, this tendency was observed in 15 European Union countries, and in the case of Master's degree studies, in 12 countries. One of the largest decreases in enrolment was observed in Poland (the 7th largest fall of admissions to Bachelor's degree studies and the second to Master's degree studies).
2. When considering the relationship between the number of newly admitted persons to higher agricultural studies and the total number of newly admitted students to higher education studies, it can be concluded that higher agricultural education has the highest values in the Czech Republic, Romania, Hungary (with regard to Bachelor's degree and Master's degree studies), Greece, Italy and Slovenia (with regard to Bachelor's degree studies) and Lithuania (with regard to Master's degree studies). Higher agricultural studies have the lowest values in Cyprus, Great Britain and Sweden. However, between 2013 and 2017, an increase in the importance of higher agricultural studies admissions in the total number of admissions may be observed in nine countries (Bachelor's degree studies) and in 10 countries (Master's degree studies).
3. On the basis of the selected groups of European Union countries with similar levels of people newly admitted to Bachelor's and Master's degree agricultural studies, compared with the total number of newly admitted students, it may be stated that Poland belongs to the group with a relatively low level of higher agricultural studies preference. Additionally, the admissions in Poland are one of the lowest among the member countries in Central and Eastern Europe. The highest importance of higher agricultural studies is in the Czech Republic, Greece, Romania and Slovenia. An increase in the number of students undertaking these studies in the analyzed period may be observed in Greece and Romania, however, in the Czech Republic and in Slovenia, in spite of the year-to-year decrease in newly admitted students, there are still high admissions.
4. The number of persons undertaking education at agricultural universities is closely connected with the agricultural efficiency in a given European Union country, which means that in countries with a significant percentage of persons undertaking higher agricultural education, a high ability to transform the workload into efficiency is recorded. However, there are limitations associated with this method, mainly due to a lack of statistical data. The key issue is to gain knowledge about the education that farmers in each country have, and what percentage of people completing agricultural studies work in agriculture.

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TENDENCJE W PODEJMOWANIU STUDIÓW ROLNICZYCH W POLSCE NA TLE KRAJÓW UNII EUROPEJSKIEJ W LATACH 2013–2017

STRESZCZENIE

Celem artykułu jest identyfikacja zmian w poziomie podejmowania wyższego wykształcenia rolniczego w Polsce w porównaniu z krajami Unii Europejskiej w latach 2013–2017. Dodatkowym aspektem było zbadanie związku przyczynowego między liczbą osób podejmujących wyższe wykształcenie rolnicze a efektywnością funkcjonowania rolnictwa w danym kraju. Wskaźnik dynamiki wykorzystano do przedstawienia istniejących tendencji. Dodatkowo zbadano przyjęcia na poszczególne rodzaje studiów oraz przedstawiono różnice w wartościach w poszczególnych krajach Unii Europejskiej. Do analizy związku przyczynowego wykorzystano współczynnik korelacji rang Spearmana. Polska należy do grupy o stosunkowo niskim poziomie podejmowania studiów rolniczych. Ponadto liczba osób kształcących się na uniwersytetach rolniczych jest ściśle związana z efektywnością rolnictwa w danym kraju Unii Europejskiej.

Słowa kluczowe: rolnictwo, wiedza, edukacja, szkolnictwo wyższe, nabór, Polska, UE

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THE ROLE OF DERMOCOSMETIC PACKAGING IN CONSUMER BUYING DECISIONS

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ABSTRACT

The aim of this study is to identify the role of packaging as a determining factor in the purchase of dermocosmetic products, and to assess the impact of various elements and features of dermocosmetic packaging on product perception and buying decisions made by consumers. A direct personal interview survey covered a group of female consumers making regular purchases of dermocosmetic products in pharmacies. The survey revealed that although dermocosmetic packaging is not seen as one of the major determinants to purchase, its close connection to the perception of a dermocosmetic's safety cannot be ignored. While shopping, consumers tend to consider the following features of dermocosmetic packaging: its effectiveness in protecting the product; label information; and product security.

Key words: dermocosmetic products, packaging, buying decisions, consumers
JEL codes: M30

INTRODUCTION

Unit packaging plays an important role in managing consumer products and is used as a marketing tool, becoming the basic identifier and determinant of a product's competitiveness. Packaging involves a set of features that, when properly designed and selected, indicate the nature and attributes of the packaged product, which affects consumer purchasing behavior. Poorly designed packaging leads to consumer misinterpretation of a product's features and attributes, which reduces the effectiveness of a company's marketing strategy. It is therefore important to identify the elements affecting consumers' perceptions of a product and their purchasing decisions. The dynamically developing market of dermocosmetics, with a wide range of products on offer, has seen interesting developments in unit packaging.

Dermocosmetics are cosmetics aimed at the care of specific skin types and skin problems, distributed only in pharmacies [Rzeźnik et al. 2012]. Much has changed since these types of cosmetics gained their own definition and category, and dermocosmetics have slowly begun to fill the shelves of the largest drugstore chains. However, consumers still mainly associate them with pharmacies and as having specialized properties, perhaps because pharmacies are places where prescription and non-prescription drugs (known as "over-the-counter" or OTC drugs) are available, along with dietary supplements and dermocosmetics [Mruk et al. 2014].

Given the wide variety of products, diversified unit packaging and sales methods, coupled with psychologically-conditioned behaviour patterns of individual consumers, it is impossible to definitively state that product packaging is one of the major factors

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determining buying decisions. However, as unit packaging is closely connected with the product itself, it plays a significant role in the buying patterns displayed by consumers [Ankiel-Homa 2012].

FUNCTIONS OF THE PACKAGING OF DERMOCOSMETIC PRODUCTS

Product packaging is cross-functional and plays a fundamental role along the supply chain, fulfilling requirements placed on it from logistics, marketing and the environment. Figure 1 shows the main packaging interactions. Packaging satisfies certain functionality criteria which comprise the following: product protection, production process functionality, storage and transport chain functionality, product and producer presentation, provision of necessary information, usefulness, consumer acceptance, compliance with environmental protection requirements and conformance to applicable standards [Lisińska-Kuśnierz and Ucherek 2006].

Packaging requirements are enumerated in the applicable regulations. The form, structure and material of packaging should guarantee the following: its tightness, durability, functionality, adequate shape and size, barrier capacity, consumer acceptance and positive impression of the product, producer and brand. Often packaging details such as color, graphic design, manufacturing and finishing techniques, and the usage solutions (i.e. opening, closing and dispensing) are the only differences to be found [Walden-Kozłowska 2005]. Visual design of packaging is a set of messages which can be conveyed by the kind of materials, size, shape, color, graphic features (such as the position of text, images, symbols, drawings, etc.) and functional solutions (such as easy product dispensing) [Lisińska-Kuśnierz and Ucherek 2006].

Packaging color can attract a consumer's attention, as well as make it easier to recognize the product, create a positive image of the product, brand and producer, and give an accurate impression of a product's capacity. Moreover, well-matched colors may help distinguish a product be other similar-purpose products and inspire consumer trust. Graphic design, i.e. all kinds of text, colorful elements, symbols, photographs and drawings, should not only provide information, but also appeal to consumers, encouraging them to buy the product [Walden-Kozłowska 2005]. The colors of dermocosmetic packaging remain more ascetic in style than other cosmetics which are available in drugstores. Dermocosmetic packaging is usually done in cold colors (white, blue), which helps to associate them with the idea of purity, freshness and sterile preparation. Some packaging colors and symbols have come to be associated with a particular skin problem, e.g. green – with acne, red

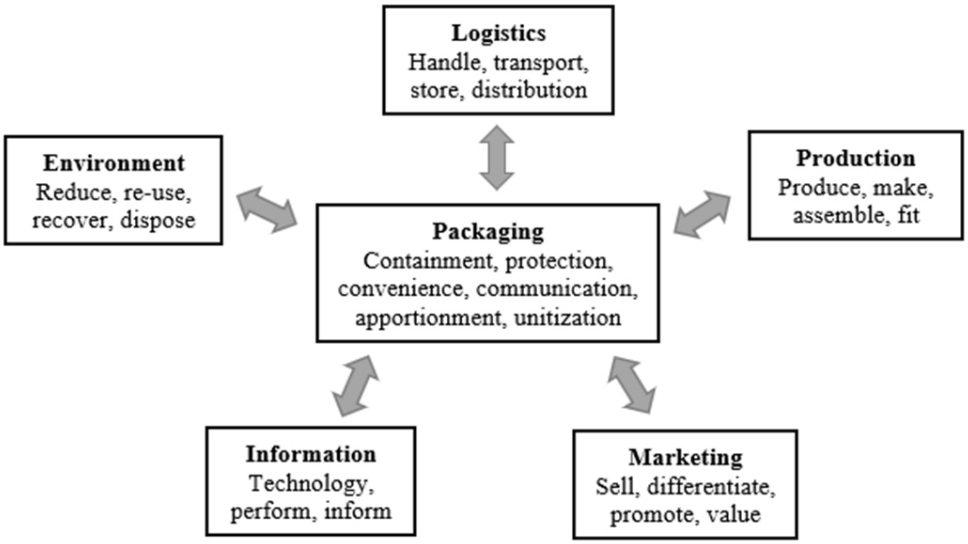

Fig. 1. The packaging interactions

Source: Saghir [2002].

– with vascular issues, orange – with sun protection. There is also a market trend among dermocosmetics producers to use practical packaging, e.g. airless packaging, tubes, and sprays that ensure more sterile and safe use of products.

Product packaging is not one of the major factors determining the buying decision. However, since it is closely connected with the product itself, it plays a significant role in the buying patterns displayed by consumers [Ankiel-Homa 2012]. The significance of unit packaging in the buying process is conditioned, to a large extent, on the type of buying decision. In habit-based decisions, the packaging reminds the consumers of the product and brand, and strengthens their habitual behaviors. In such cases, the structural and visual elements are more important than information. In impulse--based decisions, the packaging serves as a means of advertising the product; it identifies both the brand and the product, invoking certain impressions regarding the product's value. In such cases, the structural and visual elements of unit packaging are considered the most significant. In prudent decisions, the packaging carries specific product information and influences the marketed product assessment [Ankiel-Homa 2012].

The unit packaging determines the consumer's perception of functionality, the ease of opening and closing, and environmental-friendly aspects. The features of the packed product, along with its quality and the benefits derived from its use, including the economic benefits, health-related benefits, natural character or environmental friendliness of the product are viewed by the consumer through the prism of its packaging [Ankiel-Homa 2012].

Cosmetics packaging has been studied by various authors. According to Topoyan and Bulut [2008], the packaging design of commonly marketed brands is associated with a higher precedence of purchase expectations. Packaging design becomes more significant when it is designed for aesthetics and to deliver specific information to consumers. Grundey [2010] confirmed that packaging plays an important role in the process of creating a product, promoting it and finally selling it. All functions of the packaging as protection, utility and communication are important, and have to be analyzed when creating a new product. If they are not judged correctly, the price of the product can be seen as too high or the product can be unattractive to consumers, and thus they will not be willing to purchase it. Grundey showed that cosmetic brands could be recognized by only the packaging, without knowing the brand. Cosmetic brands try to use neutral, earth, natural and recycled materials in their packaging design, which greatly appeals to consumers. Applying green and innovative technologies in packaging also plays as a strong positioning factor for cosmetic brands and their primary and secondary packaging to support transportation and prolong shelf-life.

Ezekiel et al. [2014] revealed that there are significant relationships between the packaging color, labeling and the quality of the packaging materials and consumer choice of cosmetic products. Packaging label, color and the quality of packaging material should create a favorable impression of the product for customers. Mohamed et al. [2018] showed that cosmetics consumer behavior was, in fact, affected by the visual elements of the cosmetics packaging designs and thus affected the consumers' purchase intentions. Moreover, material and color of hairstyle, skin care, and make-up product packaging were proved to be of high importance with respect to the level of attractiveness and effect on consumers' preferences. Adofo [2014] found that consumers consider the packaging of a beauty product before they make a purchase, and the level of influence that packaging has on the consumers' buying decision was high. However, most researchers said that packaging does not guarantee quality, but rather helps in catching consumers attention, defining the product identity, and protecting the product.

As mentioned above, cosmetics packaging has been studied by many authors, but there is little research on the packaging of dermocosmetics sold in pharmacies. Due to the fact that dermocosmetics are products intended for the care of skin problems, the author decided to check whether in this case packaging and its features also play an important role in consumer purchasing decisions.

The aim of this study was to identify the role of packaging as a factor determining the purchase of dermocosmetic products, and to assess the impact of various elements and features of dermocosmetic packaging on product perception and buying decisions made by consumers in pharmacies.

MATERIAL AND METHODS

The material was the unit packaging of dermocosmetics intended for face care. This specific category was chosen because it is the largest category of dermocosmetic products available in the dermocosmetic market. Respondents were asked to assess the significance of dermocosmetic product packaging, and the specific elements and features taken into account in the buying process.

With a view to solving the research query and meeting the set objective, direct personal interview surveys were conducted over the course of July, August and September 2017, in the Wielkopolskie Province on a group of 553 female consumers aged 15 and older. A non-probability sampling method was employed to select the respondents, as a result of which only women declaring regular purchases of dermocosmetic products were surveyed. The research results indicate a high share of women in making buying decisions [Kieżel and Smyczek 2012], both regarding cosmetics [Jurowczyk 2013] and dermocosmetics [Baranowska-Skimina 2012], therefore the study sample were women declaring regular purchases of dermocosmetics in pharmacies.

The sample selection process also took into account such demographic features as age, education, monthly net income per family member, subjective assessment of one's own financial position and place of residence. Those criteria were considered significant as they differentiate the buying styles of individual consumers. The structure of respondents included in the survey is presented in Table 1. This structure, according to the age criterion, corresponded to the distribution of the population of inhabitants of Wielkopolska [GUS 2015]. Women aged 20–29 accounted for 29.7% of all respondents while women aged 15–19 constituted only 7.0% of the surveyed group. Most respondents had attained the higher (54.8%) or secondary educational level (35.8%) and resided in cities of more than 101,000 inhabitants (37.8%) or 51,000–100,000 inhabitants (21.9%). Most respondents declared monthly net income for one family member above PLN 2,001 (75.6%) and assessed their own financial position as average or above average (85.2%).

Table 1. The survey sample structure

Specification		Sample size	Percentage (%)
Sex	women	553	100.0
Age (years)	15–19	39	7.0
	20–29	164	29.7
	30–39	125	22.6
	40–49	79	14.3
	50–59	89	16.1
	60+	57	10.3
Education	primary	12	2.2
	vocational secondary	40	7.2
	secondary	198	35.8
	higher	303	54.8
Monthly net income for 1 family member (PLN)	up to 1 000	10	1.8
	1 001–1 500	31	5.6
	1 501–2 000	94	17.0
	2 001–2 500	150	27.1
	2 500+	268	48.5
Subjective assessment of own financial position	very bad	4	0.7
	below average	43	7.8
	average	309	55.9
	above average	162	29.3
	very good	35	6.3
Place of residence	rural area	76	13.7
	town up to 20,000 inhabitants	67	12.1
	town of 21,000–50,000 inhabitants	80	14.5
	city of 51,000–100,000 inhabitants	121	21.9
	city of more than 101,000 inhabitants	209	37.8

Source: Author's own compilation based on the surveys conducted ($N = 553$).

RESULTS AND DISCUSSION

In the conducted survey, the impact of unit packaging of dermocosmetic products on consumer buying decisions was analyzed. Surveys conducted by the Centre for Public Opinion Research TNS OBOP in 2007 for the cosmetic market [Urząd Ochrony Konkurecji i Konsumentów 2007] indicated that only 7% of the respondents admitted to paying attention to the visual aspects and packaging. The preliminary research, carried out by the author on a group of 150 female respondents in 2015 [Malinowska 2015], also revealed that dermocosmetic packaging was not an important purchase determinant (an average of 2.87). In the current 2017 study, the respondents also stated that the packaging was not an important purchase determinant (an average of 2.80). The survey results are shown in Table 2. However, it should be noted that the packaging of a dermocosmetic product is closely connected to its brand. In consequence, while searching for a given product, the consumer looks for a specific packaging.

Spearman's rank-order correlation was used to identify statistically significant relationships between socio-demographic factors and the significance of the product packaging for choosing dermocosmetics when shopping in pharmacies. The age of the respondents, their education, place of residence, monthly income per family member, or the assessment of their own financial situation did not have an essential influence on the differences in their declared importance of the dermocosmetic packaging in the product purchase process ($p > 0.05$). The assessments of importance of the packaging (on a scale from one to five, where 1 – the least important factor and 5 – the most important one) were similar to one another in individual groups.

As part of the personal interview, respondents were asked to assess the significance of specific dermocosmetic packaging features that they take into account in the buying process. These included: type of packaging material,

Table 2. The packaging as a determinant of buying a dermocosmetic product in the pharmacy

Specification		Value	Spearman rank order correlation results
Sex	women	2.80 ±1.19	–
Age (years)	15–19	3.13 ±1.32	$R = –0.078$; $t(N – 2) = –1.83$; $p = 0.068$
	20–29	2.82 ±1.18	
	30–39	2.79 ±1.21	
	40–49	2.85 ±1.18	
	50–59	2.76 ±1.19	
	60+	2.53 ±1.14	
Education	primary	3.50 ±1.31	$R = –0.03$; $t(N – 2) = –0.698$; $p = 0.486$
	vocational secondary	2.63 ±1.27	
	secondary	2.84 ±1.20	
	higher	2.77 ±1.17	
Monthly net income for 1 family member (PLN)	up to 1 000	3.40 ±1.07	$R = 0.022$; $t(N – 2) = 0.506$; $p = 0.613$
	1 001–1 500	2.61 ±1.26	
	1 501–2 000	2.59 ±1.16	
	2 001–2 500	2.94 ±1.28	
	2 500+	2.80 ±1.15	
Assessment of own financial situation	very bad	2.25 ±0.96	$R = –0.001$; $t(N – 2) = –0.025$; $p = 0.98$
	below average	3.28 ±1.28	
	average	2.72 ±1.20	
	above average	2.77 ±1.15	
	very good	3.17 ±1.15	
Place of residence	rural area	2.70 ±1.20	$R = 0.053$; $t(N – 2) = 1.234$; $p = 0.218$
	town up to 20,000 inhabitants	2.93 ±1.18	
	town of 21,000–50,000 inhabitants	2.60 ±1.09	
	city of 51,000–100,000 inhabitants	2.74 ±1.18	
	city of more than 101,000 inhabitants	2.91 ±1.24	

p – significance level for the test value; R – Spearman's R-value; t – value of t statistics checking the significance of Spearman's R factor
Source: Author's own compilation based on the surveys conducted ($N = 553$).

structural form of the packaging, packaging shape, packaging color, graphic design (i.e. the placement of text, drawings, symbols, etc.), environmental-friendly aspects, packaging functionality (i.e. easy opening, closing and dispensing, as well as durability), quality of workmanship/aesthetic aspects, product security – the safety of the packaging compared to the product (e.g. the lack of negative interactions), effective protection of the product in use, and label information. The obtained results are shown in Table 3.

Table 3. The features of packaging taken into account in the buying process of dermocosmetic products

Specification		Type of packaging material	Structural form of packaging	Packaging shape	Packaging color	Graphic design	Environmental-friendly aspects
Sex	women	2.55 ±1.16	2.73 ±1.13	2.63 ±1.14	2.59 ±1.18	2.66 ±1.18	2.85 ±1.21
Age (years)	15–19	2.51 ±1.25	2.67 ±1.26	2.74 ±1.25	2.77 ±1.27	2.79 ±1.26	2.74 ±1.29
	20–29	2.46 ±1.11	2.74 ±1.16	2.64 ±1.12	2.67 ±1.12	2.79 ±1.09	2.76 ±1.17
	30–39	2.62 ±1.14	2.74 ±1.02	2.62 ±1.05	2.54 ±1.09	2.69 ±1.12	2.92 ±1.15
	40–49	2.51 ±1.15	2.73 ±1.17	2.63 ±1.19	2.56 ±1.26	2.48 ±1.21	2.77 ±1.28
	50–59	2.73 ±1.26	2.69 ±1.21	2.57 ±1.26	2.53 ±1.32	2.63 ±1.27	3.09 ±1.24
	60+	2.47 ±1.12	2.72 ±1.08	2.63 ±1.08	2.44 ±1.13	2.40 ±1.28	2.77 ±1.27
Education	primary	3.08 ±1.56	2.92 ±1.38	2.92 ±1.38	2.92 ±1.31	3.08 ±1.31	3.08 ±1.38
	vocational secondary	2.43 ±1.11	2.63 ±1.15	2.80 ±1.09	2.73 ±1.38	2.53 ±1.38	2.78 ±1.42
	secondary	2.44 ±1.11	2.67 ±1.11	2.64 ±1.15	2.63 ±1.16	2.70 ±1.16	2.78 ±1.14
	higher	2.62 ±1.17	2.77 ±1.14	2.59 ±1.13	2.53 ±1.16	2.63 ±1.16	2.90 ±1.22
Monthly net income for 1 family member (PLN)	up to 1 000	2.40 ±1.35	2.40 ±1.17	2.40 ±1.17	2.20 ±1.23	2.00 ±0.94	2.70 ±1.42
	1 001–1 500	2.71 ±1.24	2.48 ±1.09	2.71 ±1.10	2.42 ±1.20	2.65 ±1.14	3.03 ±1.20
	1 501–2 000	2.36 ±1.22	2.73 ±1.23	2.59 ±1.13	2.57 ±1.22	2.49 ±1.18	2.78 ±1.35
	2 001–2 500	2.59 ±1.11	2.69 ±1.09	2.68 ±1.09	2.77 ±1.18	2.77 ±1.20	2.90 ±1.24
	2 500+	2.58 ±1.15	3.50 ±0.97	3.70 ±0.95	3.30 ±0.97	3.70 ±0.95	4.00 ±1.05
Assessment of own financial situation	very bad	2.00 ±0.82	1.75 ±0.96	2.00 ±0.82	1.75 ±0.96	2.25 ±0.96	2.25 ±0.96
	below average	2.72 ±1.08	2.77 ±1.04	2.95 ±0.97	2.84 ±1.19	2.95 ±1.21	2.95 ±1.19
	average	2.58 ±1.19	2.73 ±1.14	2.67 ±1.17	2.64 ±1.18	2.61 ±1.17	2.86 ±1.27
	above average	2.43 ±1.10	2.67 ±1.11	2.49 ±1.10	2.43 ±1.15	2.62 ±1.17	2.72 ±1.08
	very good	2.69 ±1.28	3.25 ±1.50	3.00 ±1.41	2.75 ±1.26	3.25 ±1.71	3.00 ±1.41
Place of residence	rural area	2.26 ±1.16	2.62 ±1.22	2.59 ±1.18	2.42 ±1.25	2.37 ±1.21	2.62 ±1.21
	town up to 20,000 inhabitants	2.54 ±1.17	2.79 ±1.08	2.66 ±1.20	2.55 ±1.28	2.60 ±1.14	2.78 ±1.25
	town of 21,000–50,000 inhabitants	2.63 ±1.19	2.60 ±1.03	2.68 ±1.10	2.69 ±1.09	2.88 ±1.13	2.90 ±1.18
	city of 51,000–100,000 inhabitants	2.73 ±1.08	2.74 ±1.09	2.58 ±1.14	2.61 ±1.23	2.73 ±1.22	3.13 ±1.13
	city of more than 101,000 inhabitants	2.53 ±1.17	3.00 ±1.45	3.84 ±1.12	3.84 ±1.05	4.25 ±0.88	4.00 ±1.06

Table 3, cont.

Specification		Packaging functionality	Quality of workmanship	Product security	Effective protection of the product in use	Label information
Sex	women	3.72 ±1.11	3.49 ±1.11	3.91 ±1.13	4.05 ±1.04	3.98 ±0.99
Age (years)	15–19	3.49 ±1.21	3.41 ±1.33	3.64 ±1.37	3.97 ±1.20	3.79 ±1.28
	20–29	3.68 ±1.06	3.43 ±1.06	3.82 ±1.18	3.97 ±1.12	4.02 ±0.96
	30–39	3.62 ±1.11	3.53 ±1.11	3.99 ±1.05	4.15 ±0.86	3.96 ±0.95
	40–49	3.92 ±1.14	3.38 ±1.10	4.15 ±1.08	4.19 ±0.96	4.10 ±0.83
	50–59	3.80 ±1.10	3.62 ±1.08	4.01 ±1.05	4.06 ±1.04	3.98 ±1.07
	60+	3.84 ±1.10	3.56 ±1.10	3.68 ±1.15	3.95 ±1.10	3.84 ±1.01
Education	primary	3.92 ±1.16	4.17 ±1.03	3.92 ±1.00	4.00 ±0.95	3.58 ±1.00
	vocational secondary	3.93 ±1.05	3.63 ±1.15	3.75 ±1.26	4.15 ±1.14	3.98 ±1.05
	secondary	3.61 ±1.10	3.40 ±1.11	3.85 ±1.13	3.93 ±1.11	3.92 ±1.02
	higher	3.76 ±1.11	3.50 ±1.09	3.97 ±1.13	4.13 ±0.97	4.03 ±0.96
Monthly net income for 1 family member (PLN)	up to 1 000	2.70 ±1.49	2.50 ±1.27	3.10 ±0.99	3.80 ±1.23	3.40 ±1.65
	1 001–1 500	3.39 ±1.15	3.03 ±1.14	3.29 ±1.35	3.55 ±1.34	3.16 ±1.37
	1 501–2 000	3.77 ±1.08	3.41 ±1.20	3.80 ±1.21	4.02 ±1.16	4.00 ±1.06
	2 001–2 500	3.87 ±1.11	3.61±1.06	4.05 ±1.04	4.16 ±0.96	4.02 ±0.99
	2 500+	3.50 ±1.08	3.60 ±1.17	2.80 ±1.23	2.90 ±1.29	2.90 ±1.45
Assessment of own financial situation	very bad	3.25 ±1.71	2.75 ±0.96	3.50 ±1.29	3.50 ±1.29	1.75 ±0.96
	below average	3.53 ±1.22	3.14 ±1.19	3.51 ±1.22	3.88 ±1.29	3.63 ±1.22
	average	3.76 ±1.12	3.53 ±1.13	3.90 ±1.15	4.04 ±1.05	3.95 ±1.00
	above average	3.74 ±1.02	3.51 ±1.00	3.99 ±1.08	4.10 ±0.97	4.18 ±0.81
	very good	3.00 ±1.63	3.00 ±1.41	3.25 ±1.71	2.75 ±1.06	3.00 ±1.31
Place of residence	rural area	3.61±1.20	3.46 ±1.00	3.71 ±1.21	4.01 ±1.06	3.92 ±1.04
	town up to 20,000 inhabitants	3.64 ±1.00	3.52 ±1.06	3.79 ±1.24	4.10 ±1.02	3.91 ±1.22
	town of 21,000–50,000 inhabitants	3.74 ±1.09	3.56 ±1.08	4.13 ±0.93	4.04 ±0.97	4.06 ±0.83
	city of 51,000–100,000 inhabitants	3.83 ±1.03	3.54 ±1.11	4.11 ±0.99	4.17 ±0.97	4.00 ±0.96
	city of more than 101,000 inhabitants	4.12 ±1.14	3.41 ±1.05	3.28 ±1.11	2.83 ±1.32	2.75 ±1.27

Source: Author's own compilation based on the surveys conducted ($N = 553$).

Based on the 2017 survey results, it can be inferred that the effective protection of the product in use, label information and product security are the most important packaging elements taken into consideration while purchasing a dermocosmetic product. These three are followed by packaging functionality and quality of workmanship/aesthetic aspects. Less attention is paid to the environmental-friendly aspects, structural form,

graphic design, packaging shape, color and type of the packaging material. The preliminary research, carried out by the author on a group of 150 female respondents in 2015 [Malinowska 2016], also revealed that the most important packaging features were effective protection of the product, the packaging functionality, label information, product security and quality of workmanship/aesthetic aspects. Less attention was also paid to the environmental-friendly aspects, form and shape of the packaging and packaging material.

The age of the respondents had a statistically significant influence on the importance of such features of the dermocosmetic packaging as the structural form and functionality of the packaging. When buying dermocosmetics, younger consumers (under 40) paid more attention to the structural form of the packaging, whereas older consumers (over 40) were more interested in the functionality of the packaging. Monthly net income per family member in the families of the respondents had a statistically significant influence on how important the safety of the packaging was to them, compared to the product (product security). An increase in the level of the income meant that respondents paid more attention to product security. However, for respondents with the highest level of income, this feature was less important when buying the dermocosmetic. The financial situation of the surveyed consumers had an essential influence on their different assessments of the importance of the shape of the dermocosmetic packaging, product security and information included on it. For respondents who assessed their financial situation as very bad, the shape of the packaging and information included on it were less important, whereas consumers who assessed their financial situation as average and above average paid more attention to the product security (safety of the packaging compared to the product). Education and place of residence did not have an essential influence on the declared importance of the individual features of product packaging in the buying process for a specific dermocosmetic. The assessments of the significance of the packaging features were similar to one another in individual groups differing in education levels and places of residence.

Both surveys from 2015 and 2017, confirmed that dermocosmetics packaging is not an important purchase determinant for female respondents, but it is closely connected to the safety of dermocosmetics. The respondents pay attention to product security – the safety of the packaging compared to the product (i.e. the lack of negative interactions), effective protection of the product in use, and label information. On the other hand, although eco trends in the market are observed, the consumers of dermocosmetics do not pay attention to environmental-friendly aspects or type of packaging material.

CONCLUSION

Although dermocosmetic packaging is not one of the major purchase determinants, its close connection to the perception of a dermocosmetic's safety cannot be ignored. While searching for a specific product, the consumer looks for a characteristic packaging which, in the case of dermocosmetic products, carries a number of significant messages. The consumer pays attention to the effective protection of the dermocosmetic in use, label information and product security (like the lack of negative interactions). These are important elements, as women with skin problems want to feel safe while using dermocosmetics. They want also to be informed about uses and properties of a product that they apply to their skin. This kind of information is included in the dermocosmetic product packaging, influencing its perception and the attitude taken by consumers with respect to the packed product, and hence their buying decisions.

The conducted survey allowed to obtain data on the importance of particular features of dermocosmetic packaging. Summarizing the analysis of the conducted study, there is a need for finding and designing new forms of marking, together with graphic solutions adjusted to consumers' expectations. Packaging of dermocosmetics can be an effective tool of market communications only if quickly-changing needs and expectations of consumers regarding its functions are met. The results of the research can be used by cosmetic companies, especially marketing departments, in designing and introducing new products to the market that meet consumers' expectations. Correct adjustment of markings placed by the manufacturers is necessary if they want to effectively use dermocosmetic packaging as a medium of information in marketing communications.

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ROLA OPAKOWANIA DERMOKOSMETYKU W DECYZJACH ZAKUPOWYCH KONSUMENTÓW

STRESZCZENIE

Celem pracy była identyfikacja roli opakowania jednostkowego jako determinanty zakupu dermokosmetyków oraz ocena wpływu poszczególnych jego elementów oraz cech na postrzeganie produktów i decyzje nabywcze konsumentów. Przeprowadzono wywiady indywidualne kwestionariuszowe bezpośrednie wśród konsumentek deklarujących regularne zakupy dermokosmetyków w aptekach. Badanie wykazało, że chociaż opakowanie dermokosmetyku nie jest główną determinantą zakupową, nie można lekceważyć jego ścisłego związku z postrzeganiem bezpieczeństwa dermokosmetyku. W trakcie zakupów konsumentki postrzegają i analizują takie główne elementy składowe i cechy opakowań jednostkowych dermokosmetyków, jak: możliwość skutecznego zabezpieczenia produktu podczas jego użytkowania, informacje na opakowaniu oraz bezpieczeństwo opakowania względem produktu.

Słowa kluczowe: dermokosmetyki, opakowania, decyzje zakupowe, konsumenci

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DIFFERENCES IN THE COST OF CAPITAL: THE CASE OF FOOD COMPANIES FROM EMERGING AND DEVELOPED EUROPEAN ECONOMIES

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ABSTRACT

The research aims to assess the cost of capital according to the WACC methodology across the food industry companies. The study also investigates the primary financial indicators for company position on the market as total assets, total revenues, and total equity. The study was conducted among 35 European countries from a sample of 1,274 records. The research period covers the years 2015–2018. The results of the survey underline the current asymmetric information problems in WACC food companies' assessment between European emerging and developed economies. The emerging markets were characterized by a higher level of the cost of equity and debt. The cost of debt among companies from emerging economies was related to total assets value and revenues, which proves the importance of the size of enterprises in relation to their market assessment.

Key words: cost of capital, WACC, cost of debt, cost of equity, European food companies, emerging and developed economies

JEL codes: L22, L11, E32

INTRODUCTION

The cost of capital is an important parameter of any capital decisions – everyone who invests their funds in a company or provides capital calculates on this basis the predicted benefits. From a company's point of view, the cost of capital represents the income that a particular investment brings to the owners. For the aim of the analyses, the most often used methodology is a weighted average cost of capital (WACC). It is a popular measure for both firms and investors and plays a central role in finance theory. The issue of measuring the cost of capital has been analysed since Modigliani's and Miller's pioneering research in the 1950s [Modigliani and Miller 1958]. Modigliani and Miller first proposed the definition of the average cost of capital before the tax-deductibility. According to theory assumptions, the capital structure achieves its optimum at the minimum level of the WACC. The theory approach assumed that minimalizing the WACC will maximize the value of firms. Further development of the capital structure theory concerns the impact of taxes. Companies that maximize the share of debt can decrease the WACC level [Budhathoki and Rai 2020], due to the tax shield effect. The practical cost of capital references was developed by Damodaran [1994] and Madden [1998] and it was related mostly to the firm's valuation studies.

The cost of capital is defined as a minimum rate of return that a company should offer its investors to

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induce them to buy stocks. The WACC, in comparison with the rate of return on capital, allows evaluating the investment effectiveness by revision of how the company is creating its value. It also allows establishing the competitive position of the enterprise. Furthermore, the WACC method appoints the market value of a firm [Mari and Marra 2019].

Capital structure theory suggests that more relevant information on the market is associated with a lower cost of capital; thus, it reduces transaction cost and estimation of risk. Under information asymmetry, some companies may influence the availability of external financing by changing the information policy [Suto and Takehara 2017]. However, the imperfect markets with high information asymmetry will impact on the higher costs of capital and scarcer financing [Coman 2011]. According to Armstrong et al. [2011], the markets with perfect competition do not notice the effect of information asymmetry on the cost of capital. These studies were the basis for the division of the sample into emerging and developed economies markets. This criterion of grouping underlined the cost of capital determinants that Szczepankowski [2007] relates to production capacity, time preferences for consumption, risk, inflation, and the degree of limited capital resources.

The aim of the paper is the assessment of the cost of capital among food companies from emerging and developed European countries. The conducted analyses also revised the impact of the size and scale of operation on the WACC level of companies from the food industry (firms specifics control variables). The paper contributes to the discussion of the agency and information asymmetry theory among capital structure theories and signs into international business research across intra-industry characteristics.

THE WACC ROLE IN FINANCIAL AND INVESTMENT DECISIONS

The weighted average cost of capital is widely used in investment and financial decisions, both by managers and potential investors. This methodology is widely used in:

- discounting cash flows from investments,
- discounting the company's average income for establishing the value of the company,
- assessment of the impact of the capital structure on the enterprise value,
- determining the lowest acceptable rate of return for new investments,
- economic added value calculation [Habib 2006].

The cost of capital also represents an operational and financial risk of the company [Rady et al. 2019] and the assessment of the results of long-term investment and financial decisions made by the company that could be compared to the profits expected by shareholders. The WACC is also a measure that assesses the use of assets rather than the sources of their financing. Thus, companies exert WACC for project accept/reject decisions while investors use it for their over-valued/under-valued judgment. The WACC also identifies the value that the company is expected to pay to its security holders to provide funding for its assets.

THE WACC DIFFERENCES ACROSS ECONOMIES AND INDUSTRIES

Financial markets in emerging economies are not assessed as being so efficient in terms of liquidity, the number of players, and the role of public authorities. Due to financial market imperfections, emerging economies are characterized by a higher cost of equity. The country risk, especially in emerging markets, affects asset valuation [Soeriowardojo 2010].

The WACC method is more comparable when it concerns the same segment or industry. Then the results identify how the market is efficient among a particular industry that has similar risk determinants [Copeland et al. 2005]. In the case of cross-country comparisons, the difference could be a consequence of the portfolio structure held by investors, which will impact the expected equilibrium returns and the financial policies of companies [Rezende et al. 2019].

The WACC of younger firms is higher than that of mature firms [Garcia et al. 2016]. Also, small firms have limited capital market access and severe asymmetric information problems [Frank and Shen 2016]. Thus, large and small firms often make different choices about creating corporate policy as related to different capital structure theories.

The barrier of estimating the cost of capital concerns the methodology issues of calculating the cost of equity [Franc-Dąbrowska and Kobus 2012, Franc-Dąbrowska et al. 2018, Pawlonka 2018, Pawlonka and Franc-Dąbrowska 2018]. The cost of equity has proven to be the more troublesome component of the WACC. Among practitioners and researchers, the standard valuation of the cost of equity capital in using the capital asset pricing model (CAPM) method to calculate the wacc is challenging, mostly across emerging markets [Barthelemy et al. 2012]. Calculation of the beta for a company or an entire industry in an emerging market is subjected to very high uncertainty and instability [Barthelemy et al. 2012, Rady et al. 2019]. Emerging markets provide high investment opportunities, but also bring higher risk, which will be included in the cost of equity capital [von Jenner 2008].

The younger markets with shorter history are characterized by a higher cost of capital. Furthermore, the cost of equity calculated on the CAPM method basis does not fully integrate the risk in emerging markets associated with potential economic and financial shocks. Additional risks and uncertainties are related to currency issues, inflation pressure and tax reforms [Fernandez 2010]. What's more, in many emerging markets, long-term government bonds are not appropriately quoted and do not reveal the real operating risk [Okere et al. 2010, Rady et al. 2019].

RESEARCH MATERIAL AND METHODOLOGY

The study concerns food companies listed on European stock exchanges. The research sample includes 1,274 observations in a four-year study period (2015–2018) for 35 countries in which food companies were listed during the investigated period. The companies included in the sample need to be listed during two years of observation. The total number of companies were varied in the research period from 303 in 2015 to 329 in 2017. This researched period relates to the available time-series data in Eikon database – Thomson Reuters (TR). The sample was divided into two groups: emerging and developed economies, according to the IMF economies division in 2018. The following countries are classified as developed economies: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. The following countries were included in the emerging economies group: Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Macedonia, Poland, Montenegro, Serbia, Romania, Russia, and Ukraine. The study uses the ex-post data for the cost of capital.

The WACC methodology includes a two-step calculation of the cost of equity-based on the capital asset pricing model and the cost of debt. According to the WACC TR methodology, each category of capital was proportionately weighted. All sources of capital, including equity stock, preferred stock and debt, were included in the calculation of TR. The cost of equity represents the return a firm theoretically pays its equity investors. It was calculated by multiplying the equity risk premium of the market with the beta of the stock plus an inflation-adjusted risk-free rate. The cost of debt represents the marginal cost to the company of issuing new debt. It is calculated by adding the weighted cost of short-term debt and weighted cost of long-term debt based on the one-year and ten-year appropriate credit curve. Beta used in CAPM calculation represents how much stock moves for a given move in the market (based on the covariance of the security price movement to the market's price movement).

The WACC for a company represents the minimum return that a company must earn on an existing assets base to satisfy its creditors, owners, and other providers of capital. It is calculated using the following formula:

$$R_{WACC} = \frac{E}{V} K_E + \frac{D}{V} K_D (1 - t_C) + \frac{P}{V} K_P$$

where:
E – the value of equity,
D – the company's debt,
P – the company's preferred stock,
V – total capital ($E + D + P$),
K_E – the cost of equity,
K_D – the cost of debt,
K_P – the cost of preferred stock,
t_c – corporate tax.

Three financial values were included in the study: total assets, total revenues, and total equity. They are the most often used indicators that present the company position on the market and firm-level characteristics [Bozec et al. 2014].

Based on the capital structure theory the following hypotheses were tested:

- H1: The cost of capital varies between companies in emerging and developed markets.
- H2: The equity cost of capital varies between companies in emerging and developed markets.
- H3: The debt cost of capital varies between companies in emerging and developed markets.
- H4: The WACC of food companies depends strongly on the size of a company, equity, and total revenues, which represent the financial indicator of the company on the market.

For the H1, H2 and H3 hypotheses verification, the U Mann–Whitney test was applied. This test was used for investigating differences between the highlighted groups of economies. The U Mann–Whitney is equivalent to the classic Student's t-test for independent groups. It relies on ranking results of a dependent variable (from smallest to more significant) in the studied groups and then comparing two groups. To analyse the H4 hypothesis, a nonparametric correction was made. The Spearman rank correlation test does not carry any assumptions about the distribution of the data compared to the Pearson correlation (r).

RESEARCH RESULTS

Food companies vary from other industries by the business cycle, investors' behaviour, and institutional environment [Zabolotnyy and Wasilewski 2019]. The food industry is characterized by slower adjustment to the production cycle and operation conditions of an agro-natural basis related to natural properties of plant and animal growth. The figure represents the sector of the food industry group according to the NACIS classification. The biggest number of companies listed on European stock exchanges relay to manufacturing companies (79.2%), the second-highest are companies that were classified with their major activity as agriculture, forestry, fishing and hunting (16.8%).

Table 1 presents the descriptive statistics of WACC results. In the investigated sample, the bigger groups constituted for developed economies – 892 observations and 382 – were representing emerging economies in capital markets. The WACC for the food companies sample amounts to 4.55%, while the median was lower only by 0.23%. The equity cost capital was higher than the debt cost and amounted to 5.55%, while the debt was equal to 2.06%. The cost of debt was characterized by a higher variation than equity capital, which amounts to 96.46%. It shows the different share of debt in the investigated sample. In the case of developed economies, the WACC level was lower (4.16%) than in emerging economies (5.50%). The main component that influences that difference was the cost of equity, which was higher in emerging economies and amounted to 6.85% (6.37% for median). In the case of the developing economies, the cost of the equity was lower and amounted to 4.98% on average and 4.64% median value. Due to the stage of financial market development, the cost of debt was more moderate in the developed economies group of companies. It amounted to 1.72%, while in the emerging, it was equal to 2.86%. However, the variation in the cost of debt was higher in the group of companies

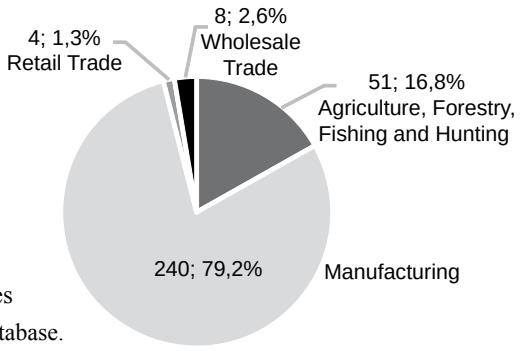

Fig. The NACIS sector structure of companies

Source: Author's own elaboration based on Eikon database.

Table 1. Descriptive statistics of WACC across developed and emerging economies in 2015–2018 (%)

Detailed		*N*	Mean	Median	25 quartile	75 quartile	Standard deviation	Coefficient of variation
Total	Weighted Average Cost of Capital	1 274	4.55	4.32	3.02	5.82	3.10	68.11
	WACC Cost of Equity	1 244	5.55	5.24	3.52	7.13	3.59	64.72
	WACC Cost of Debt	1 274	2.06	1.66	0.48	3.19	1.98	96.46
Developed economies	Weighted Average Cost of Capital	892	4.16	3.87	2.52	5.50	3.21	77.34
	WACC Cost of Equity	862	4.98	4.64	3.08	6.56	3.51	70.48
	WACC Cost of Debt	892	1.72	1.21	0.38	2.60	1.81	105.32
Emerging economies	Weighted Average Cost of Capital	382	5.50	4.95	4.12	6.40	2.61	47.40
	WACC Cost of Equity	382	6.85	6.37	4.79	8.01	3.45	50.38
	WACC Cost of Debt	382	2.86	2.85	1.58	3.85	2.15	75.19

Source: Author's own elaboration based on Eikon database.

from developed economies (105.32%) compared to emerging economies (75.19%). It indicates different possibilities of shaping debt involvement in the capital structure and the effect of the tax shield on the WACC level.

Table 2 presents the descriptive statistics for WACC's main components. According to TR data, the equity risk premium notices a similar level in the case of developed and emerging economies companies that operate in the food industry. However, the beta

Table 2. Descriptive statistics of equity risk, beta and market capitalization in 2015–2018

Detailed		*N*	Mean	Median	25 quartile	75 quartile	Standard deviation	Coefficient of variation (%)
Total	WACC Equity Risk Premium (%)	1 244	5.50	6.00	5.00	6.00	1.67	30.43
	Beta	1 274	0.58	1.00	0.00	1.00	0.64	111.14
	Historic Mkt Cap, 5 Yr Avg (million EUR)	895	3 850.87	140.86	32.82	703.79	18 948.00	492.05
Developed economies	WACC Equity Risk Premium (%)	862	5.54	6.00	5.00	6.00	1.51	27.27
	Beta	892	0.49	0.00	0.00	1.00	0.63	128.61
	Historic Mkt Cap, 5 Yr Avg (million EUR)	609	4 626.50	128.64	34.21	685.69	21 094.23	455.94
Emerging economies	WACC Equity Risk Premium (%)	382	5.40	5.00	4.00	7.00	1.99	36.83
	Beta	382	0.77	1.00	0.00	1.00	0.61	79.60
	Historic Mkt Cap, 5 Yr Avg (million EUR)	286	2 199.26	160.17	29.93	703.79	13 150.08	597.93

Source: Author's own elaboration based on Eikon database.

indicator expresses a higher level among companies listed in emerging economies on capital markets. The average beta was 0.77. The food companies on developed economies stock have higher average capitalization that amounted to 3,850 million EUR; however, the median value was much lower. Capitalization was significantly varied mainly in a group of companies from emerging economies (597.93%).

The U Mann–Whitney test results (Table 3) confirmed the significant differences between emerging and developed economies according to total WACC, WACC cost of equity, and WACC cost of debt.

Table 4 shows the correlations between WACC, cost of equity, and debt to total assets, total equity, and total revenue. All correlation ratios were significant in the case of developed economies; however, the strength of WACC relation to assets, equity, and revenues was relatively weak. The highest level of correlation was noticed in the cost of equity capital and total assets and total revenues (0.3289 and 0.3309). In the case of the developed economies group, the correlation was significant, however weak. The correlation between the cost of debt to total assets and total revenues amounted respectively to 0.2178 and 0.2068.

CONCLUSION AND DISCUSSION

The conducted research confirms the existing information asymmetry barrier between companies listed on European capital markets. In addition, food sector companies in emerging markets are characterized by higher volatility of quotations compared to developed

Table 3. U Mann–Whitney test results – differences between developed and emerging economies

Detailed	*U*	*z*	*p*	*N*1	*N*2
Weighted Average Cost of Capital (%)	112 230.0	–9.6629	0.000000	892	382
WACC Cost of Equity (%)	104 374.5	–10.3110	0.000000	862	382
WACC Cost of Debt (%)	113 857.0	–9.3925	0.000000	892	382

Source: Author's own elaboration based on Eikon database.

Table 4. Spearman's rank-order correlation

Detailed		Total assets	Total equity	Total revenue
Total	Weighted Average Cost of Capital	0.2141*	0.1960*	0.1938*
	WACC Cost of Equity	0.2224*	0.1701*	0.1920*
	WACC Cost of Debt	0.25638	0.1398*	0.2225*
Developed economies	Weighted Average Cost of Capital	0.2915*	0.2827*	0.2891*
	WACC Cost of Equity	0.3289*	0.3099*	0.3309*
	WACC Cost of Debt	0.2943*	0.2077*	0.2592*
Emerging economies	Weighted Average Cost of Capital	0.0706	0.0598	0.0448
	WACC Cost of Equity	0.0605	–0.0531	–0.0041
	WACC Cost of Debt	0.2178*	0.0461	0.2068*

*$p < 0.05$.

Source: Author's own elaboration based on Eikon database.

economies. One of the reasons for this result is the age of investigated companies. Therefore, companies' lifecycle theory predicts that the WACC will tend to fall over the lifecycle and will prolong [Mueller 2003]. Thus, the WACC of younger firms is higher than that of mature firms [Garcia et al. 2016]. The study results support stated hypothesis H1, H2, H3, according to which the total WACC, equity, and debt distinguish the food companies on emerging and developed markets. The study was based on one main criterion of division: the state of economic development. Thus, it does not include the broad variety of factors that influence the cost of debt on different markets.

The WACC level was significantly diversified between emerging and developed economies. It carries a riskier approach to estimate the return on investment by investors. The WACC of companies from developed economies was influenced by the relationship between the cost of equity and the level of assets and revenues. Among the investigated industry from an emerging market, the WACC was determined by the cost of debt also related to the level of total assets and revenues. The H4 hypothesis was thus only partly confirmed. The study results also affirmed the results of Salehi et al. that information asymmetry is positively associated with debt and equity financing and thus influences the WACC level [Salehi et al. 2014]. An efficient market which reflects all available information in the current equity price, will enable companies to decrease the WACC level. This was also confirmed in Suto and Takehara studies [2017]. Thus, it is especially important in the case of smaller and younger firms with a limited scale of operation. Frank and Shen [2016] also underlined this issue.

Further research should include the diversification of the WACC level among the food industry according to cross-country analysis and macro-level determinants (like labour market, level of unemployment, and economic growth).

The limitation of the study is short time-series data and a limited – at this point – number of variables considered in the analysis. The research was conducted on a large group of entities, so it was not possible to make individual adjustments related to all factors influencing the cost of debt, for example, the level of the interest rate.

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ZRÓŻNICOWANIE KOSZTU KAPITAŁU PRZEDSIĘBIORSTW SPOŻYWCZYCH WŚRÓD WCHODZĄCYCH I ROZWINIĘTYCH GOSPODAREK EUROPEJSKICH

STRESZCZENIE

Przeprowadzone badania miały na celu ocenę poziomu i zróżnicowania kosztu kapitału zgodnie z metodologią WACC w podmiotach branży spożywczego wśród europejskich gospodarek wschodzących i rozwijających się. W artykule uwzględniono ponadto główne wyznaczniki finansowe podkreślające pozycję firmy na rynku (suma aktywów, całkowite przychody i całkowity kapitał własny). W badaniach wykorzystano dane empiryczne 1274 obserwacji z 35 krajów europejskich. Okres badawczy obejmował lata 2015–2018. Uzyskane wyniki badań podkreślają znaczenie asymetrii informacji w ocenie działalności podmiotów branży spożywczej, przy wykorzystaniu metodologii WACC. Wyniki badań wskazały na istotne statycznie różnice między europejskimi gospodarkami wschodzącymi i rozwiniętymi ze względu na koszt kapitału. Rynki wschodzące charakteryzowały się wyższym poziomem kosztów długu i kapitału. Koszt długu przedsiębiorstw z gospodarek wschodzących był powiązany z ich wartością aktywów ogółem i przychodów, co świadczy o znaczeniu wielkości przedsiębiorstw wobec ich oceny rynkowej.

Słowa kluczowe: koszt kapitału, WACC, koszt długu, koszt kapitału własnego, europejskie firmy spożywcze, gospodarki wschodzące i rozwinięte

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COMPETITIVENESS OF POLISH ORGANIC FARMS OF DIFFERENT SIZES ACCORDING TO FADN DATA

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ABSTRACT

The article analyses the productivity and competitiveness of Polish organic farms of different sizes, as well as their potential, production intensity and the costs. The analysis covers the period of 2013–2017. Information that was used in this study came from FADN farms and was included in the publications *Technical-economic parameters according to agricultural farm groups participating in the Polish FADN* from the years 2013–2017. Two methods were applied: a descriptive method with the use of tabulated summaries and a comparative method. In 2013–2017 the production potential, productivity and competitiveness of Polish ecological farms depended on their size. The largest farms with 50 ha of farmland turned out to be the most competitive, whereas those with 30–50 ha of farmland were found to be able to withstand competition. Farms that produce ecological products whose area is up to 30 ha were found uncompetitive despite subsidies.

Key words: area, productivity, competitiveness, production potential, organic farm, ecological crops, Poland
JEL codes: Q12, D2, D24, D3, D31, O1

INTRODUCTION

"Organic production is a general system of farm and food production management based on the most environment friendly practices, high level of biological diversity, natural resource protection, high standard of animal breeding and production consistent with the needs of some consumers whose preferences include manufacturing with the use of natural substances and processes" [Council Regulation (EC) No 834/2007]. A growing demand for ecological products caused a continuous increase in the number of organic farms in Poland, in 2004–2013. The situation changed in 2014, which was the beginning of a drop both in the number of organic farms and farmlands. In 2013–2017 the number of organic farms was: 26,598; 24,829; 22,277; 22,435 and 20,257 respectively, whereas the farmland area for organic products: 657,902; 580,730; 536,579 and 494,979 ha [Zdrojewska (Ed.) 2017]. The functioning of ecological farms depends on economic factors such as: economic profitability of production, its competitiveness as compared to conventional production and dependence of the farm on subsidies. Competitiveness of a farm is determined by its potential including the area of land, resources, finances and human resources. Competitiveness is a key factor for a farm to exist for a longer time. It provides a farm not only with the ability to keep functioning but also develop [Józwiak (Ed.) 2014, Nachtman 2015]. Competitiveness involves gaining an income that would allow the farm to cover current costs from its own resources and net costs of investments. Competing and remaining on the market makes it possible for a farm to provide an income higher than its own production input costs – if it is lower they can try to adjust to new farming conditions or stop the activity and use the resources in a different way [Kleinhanss 2015].

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It was assumed that competitiveness of organic farms can be determined, among other ways, by the area of farmland used for organic crops. Therefore, the aim of the study was to assess productivity and competitiveness of Polish organic farms with different area size of farmland.

MATERIAL AND METHODS

Information obtained from organic farms which kept Polish FADN accounts, included in the publications *Technical-economic parameters according to groups of agricultural farms in 2013–2017*, was analysed. The analysis covered farms grouped according to area of farmland in ha: 5–10, 10–20, 20–30, 30–50 and over 50 ha. Farms up to 5 ha were not included due to the fact that they were subject to the Polish FADN only in 2013–2014. To provide assessment of farm potential the following information was used: agricultural land – AL (ha), total labour input per 100 ha AL (AWU), own labour share in overall labour expenditure (%), total assets (thousands PLN), overall capital (thousands PLN per 1 ha AL), index of technical devices measured by the value of machines and equipment in thousands PLN per employee (AWU). The analysis also included production costs measured by total costs per 1 ha AL (PLN) and costs involved in 1,000 PLN of production. Production efficiency of farms is expressed by productivity indices that refer production to the input of particular factors: farmland area, total input of labour and assets.

An index of competitiveness (*Wk*) was used for assessment of farm competitiveness. The value $Wk \geq 1$ means full coverage of own production costs with income, whereas, $Wk < 1$ means their partial coverage.

$$Wk = Dzgr / (Kwz + Kwp + Kwk)$$

where:
Dzgr – income from an agricultural farm,
Kwz – alternative cost of own land,
Kwp – alternative cost of own labour,
Kwk – alternative cost of own capital (without own land).

Following Kleinhanss [2015], a more detailed classification of competitiveness index was accepted, where:
- *Wk*1 – negative income from the farm,
- *Wk*2 ($0 \leq Wk < 1$) – partial coverage of own production factor costs,
- *Wk*3 ($1 \leq Wk < 2$) – full coverage of own production factor costs,
- *Wk*4 ($Wk \geq 2$) – double and greater coverage of own production factor costs.

If *Wk* value is in the interval $1 \leq 2$, farms are able to withstand competition, when it is $Wk \geq 2$, farms are fully competitive.

Competitiveness of the analysed organic farms was also viewed as their ability to develop, defined by the income from management, income parity and net investment rate. The share of subsidies in the income was analysed, as well. The following methods were applied: a descriptive method with the use of tabular summaries and a comparative method. Arithmetic means of the analysed features from 2013–2017 were used.

RESULTS AND DISCUSSION

Production potential of organic farms which are subject to the Polish FADN was related to their size. In 2013–2017, the area of farmland of a medium farm from the group of farms 5–10, 10–20, 20–30, 30–50 and over 50 ha, was respectively: 8.1, 14.6, 24.7, 39.1 and 91.6 ha AL (Table 1). Labour input per 100 ha AL of farms with larger area, largely based on hired workers, was lower than that of smaller farms using their own labour force. The value of technical devices was higher along with an increase in the farm size (Table 1). Labour inputs, decreasing along with an increase in the farm size, were compensated by an increase in technical devices. Along with an increase in the farm size the value of assets per farm was higher, whereas the capital per 1 ha of farmland decreased[1]. It was similar for farms of 20–30 and 30–50 ha (being respectively: 14.2 and 14.4 thousand PLN) – Table 1.

[1] The value of a farm capital covers values of: livestock, permanent crops, melioration equipment, buildings, machines and devices and working capital. It does not include sums or other rights that could be separated from the value of land [Bocian et al. 2017].

Table 1. Production potential of ecological farms with different area of farmland in 2013–2017

Specification	Farms according to area in ha				
	5–10	10–20	20–30	30–50	over 50
Total utilised agricultural area (ha)	8.1	14.6	24.7	39.1	91.6
Total labour input per 100 ha AL (AWU)	19.3	12.2	6.9	5.0	2.7
Share of own work in total work expenditure (%)	89.5	87.8	89.6	82.4	70.4
Total assets (thous. PLN)	384.6	506.0	781.3	1 233.3	2 088.3
Farm capital per 1 ha AL (thous. PLN)	23.8	16.9	14.2	14.4	8.9
Value of machines and devices per 1 AWU (thous. PLN)	28.9	39.8	60.1	89.1	128.8

Source: Author's own study based on [Goraj et al. 2015, 2016], Bocian et al. [2017, 2018, 2019].

Production of small organic farms was more intensive. Production intensity measured by total costs per 1 ha of farmland decreased along with an increase in the farm area. Another dependence was connected with costs borne for production worth 1,000 PLN. They were similar for farms 5–10 and 10–20 ha and 20–30 and 30–50 ha. The lowest costs were found for the largest farms (area above 50 ha), slightly higher costs were found for farms 5–10 and 10–20 ha, whereas farms whose costs were higher than the output value were farms of 20–30 and 30–50 ha. The farms differed in land productivity, labour and assets. The highest land productivity, that is, 6,216 and 4,016 PLN per 1 ha, was found for farms 5–10 ha and 10–20 ha, respectively. For farms above 20 ha it was much lower (for farms 20–30, 30–50 and 50 ha it was: 2,436; 2,565 and 2,800 PLN, respectively). Another dependence applied to labour productivity. Production per one full-time employed person increased along with an increase in the farm area. It was three times higher in the largest farms (area 50 ha), and more than three times higher in farms 5–30 ha, whereas in 30–50 ha farms it was almost twice higher. Productivity of assets was found to be the highest for the smallest and the largest farms. Amount of 1,000 PLN located in assets of 5–10 ha farms provided 131 PLN worth of production, whereas 123 PLN worth of production was provided by 50 ha farms. A slightly lower productivity of assets (116 PLN) was characteristic of farms with 20–30 ha, the lowest was found for farms with 20–30 and 30–50 ha of farmland (which was 77 and 82 PLN, respectively) – Table 2.

Table 2. Production intensity, production costs and efficiency of organic farms with different area of farmland in 2013–2017

Specification	Farms according to area in ha				
	5–10	10–20	20–30	30–50	over 50
Total costs per 1 ha of UAA (PLN)	5 244.0	3 432.3	2 557.9	2 677.9	2 337.3
Total costs per thous. PLN total output (PLN)	853.0	855.5	1 056.2	1 055.7	837.6
Total output per 1 ha UAA (PLN)	6 216	4 016	2 436	2 565	2 800
Total output per one full-time person (thous. PLN)	32.2	33.0	35.1	51.7	102.1
Total output for thous. PLN assets (PLN)	131	116	77	82	123

Source: Author's own study based on [Goraj et al. 2015, 2016], Bocian et al. [2017, 2018, 2019].

Developmental possibilities of organic farmlands seem to be dependent on the level of generated income and granted subsidies [Runowski 2009, Drygas et al. 2017]. In 2013–2017 organic farms whose production costs were the highest (20–30 and 30–50 ha) were characterized by the highest share of subsidies in the income; the lowest share was found for farms with 5–10 and 50 ha of farmland, whereas for farms with 10–20 ha it was slightly higher (the figure).

Organic farms with an area above 50 ha were found to be competitive (competitiveness index 2.1), whereas those whose area was 30–50 ha AL were found to be able to withstand competition (competitiveness index 1). Lower than one competitiveness index was characteristic of farms up to 30 ha, which indicates lack of competitiveness ability. Thus, farms smaller than 30 ha could not be considered to be potentially developmental in 2013–2017. "Competitiveness of farms can be understood as the ability to develop in specific economic conditions. It is measured by the following factors: income parity, income from management and net investment rate" [Mirkowska and Ziętara 2015, p. 51, Ziętara 2014, Sobierajewska and Ziętara 2017]. Ecological farms and farms with the ability to withstand competition had positive income from management, whereas it was negative for farms without competitive ability.

The level of own labour remuneration depended on the farm competitive ability. In farms able to withstand competition (30–50 ha AL) it was 1.5 times higher than the mean remuneration in the national economy, whereas in competitive farms (above 50 ha AL) it was 3.6 times. According to Miś and Zając [2017] "agricultural production by ecological methods in a region with farms of diversified areas causes an income growth and is farmers' source of income which contributes to improvement in their financial situation and living standards". However, the research carried out in 2013–2017 for ecological farms of different size, keeping accounts according to the Polish FADN, proves that among the farms which do not have a competitive ability, only those achieved their own labour remuneration whose area was 20–30 ha, whereas smaller farms did not even achieve parity remuneration of own work. Similar results were obtained by Nachtman [2015] from her research on ecological farms in 2010–2013. The results of the research also proved that ecological farms whose size was up to 30 ha of farmland achieved incomes that could not compensate even the costs of their own labour. Only farms above 30 ha could implement extended reproduction of their assets as, apart from other factors, development of farms depends on financial costs borne by them for reproduction, extension, and modernization of their assets [Józwiak 2012, Czubak and Sadowski 2014, Grzelak 2015, Sass 2017]. The surveys carried out in 2013–2017 also confirmed that competitive ecological farms and those able to withstand competition were characterized by a positive net investment rate, whereas it was negative for farms without competitiveness (Table 3).

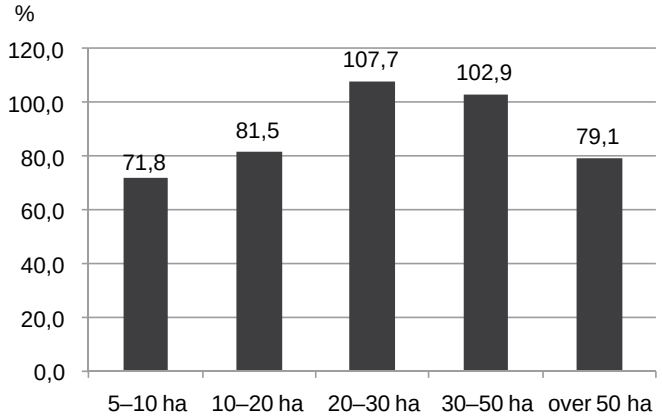

Fig. Share of subsidies in the income of organic farms with different area of farmland in 2013–2017

Source: Author's own study based on Goraj et al. [2015, 2016], Bocian et al. [2017, 2018, 2019].

Table 3. Competitiveness of ecological farms depending on size of their area in 2013–2017

Specification	Farms according to the size of area in ha				
	5–10	10–20	20–30	30–50	over 50
Competitiveness index	0.5	0.7	0.8	1.0	2.1
Competitive ability	lack of competitive ability			ability to withstand competition	competitive
Income from management and risk (PLN per farm)[a]	–26.20	–20.74	–14.40	3.04	104.40
Income parity[b]	0.6	0.8	1.0	1.5	3.6
Net investment rate[c]	–67.3	–26.5	–20.8	22.5	10.0

[a] Management income is the difference between farm income and the costs of using own production factors (labour, land and capital).

[b] Income parity is the ratio of farm income per unit of own work (FWU – family work unit = 2,120 hours of own work in a year) to the average wage in the national economy. The average net wage in the national economy based on the calculations of the Agricultural Accountancy Department of Institute of Agricultural and Food Economics – National Research Institute (Instytut Ekonomiki, Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy – IERiGŻ-PIB) in 2013–2017 amounted to: 29,798; 30,915; 31,960; 33,135 and 34,743 PLN, respectively by area size.

[c] Net investment rate – net investment to depreciation ratio expressed in %.

Source: Author's own study based on Goraj et al. [2015, 2016], Bocian et al. [2017, 2018, 2019].

Nachtman and Żekało [2006] and Miś and Zając [2017] observed that small areas of farmland that belong to individual farms are an important factor limiting the possibilities of development of organic farming in Poland. The results of research show that competitiveness of farms depends on the production scale represented by the size of their area, and small farms cannot seek chances for success by switching to ecological production methods. Recently, ecological farming has undoubtedly been boosted by subsidies to ecological production. It is worth focusing on the largest organic farms. Subsidies to ecological farming encouraged the farm owners to switch to ecological production methods. A comparison of labour input of particular farms shows that the largest organic farms were characterized by low labour consumption caused by simplified organization of production. Thus, the results of the study confirm to some degree that organic farming subsidies after 2004 supported switching to production of goods which were not necessarily in demand by consumers. This shows that sometimes a system of subsidies can lead to development of an undesired situation.

CONCLUSIONS

The study has shown that in 2013–2017 the production potential, production efficiency and competitiveness of Polish agricultural farms depended on the size of their area.

1. The value of a farm's assets was higher along with an increase in the size of its area. The largest farms quite significantly based their activity on hired workers, whereas smaller farms used their own labour resources. Labour outlays decreasing with a growth in the farmland area were compensated by an increase in technical devices.
2. Production intensity decreased along with an increase in a farm's area size. Production costs exceeding its value were found for farms with area equal to 20–50 ha, whereas the lowest costs were reported for the largest farms, above 50 ha.
3. Labour efficiency increased along with an increase in the farm area size. Productivity of land and assets had a different course. The highest was characteristic of smaller area farms, whereas the lowest were found for the small farms whose area was 20–30 ha.

4. The largest farms with an area above 50 ha were found to be competitive, those whose area was 30–50 ha were found to be able to withstand competition. The analysis showed that farms smaller than 30 ha were not competitive, despite being provided with subsidies.
5. Management income of competitive farms and those able to withstand competition was positive, whereas it was negative for farms which did not have competitive ability. In competitive farms, own labour remuneration was 3.5 times higher than the average gross salary in the national economy, whereas it was 1.5 times higher in farms able to withstand competition. Among farms without competitive ability, own labour remuneration on the parity level was achieved by 20–30 ha farms, whereas the remaining farms did not even reach parity payment of own labour.
6. Net investment rate of competitive farms and those able to withstand competition was positive, whereas it was negative for farms without competitive ability.

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KONKURENCYJNOŚĆ POLSKICH GOSPODARSTW EKOLOGICZNYCH O RÓŻNEJ WIELKOŚCI OBSZAROWEJ W ŚWIETLE DANYCH FADN

STRESZCZENIE

Analizowano efektywność oraz konkurencyjności polskich gospodarstw ekologicznych o różnej wielkości obszarowej. Ocenie poddano także ich potencjał, intensywność oraz koszty produkcji. Badaniami objęto lata 2013–2017. Posłużono się informacjami z gospodarstw prowadzących rachunkowość Polski FADN, zawartymi w publikacjach *Parametry techniczno-ekonomiczne według grup gospodarstw rolnych uczestniczących w Polskim FADN* w latach 2013–2017. Zastosowano metody: opisową z wykorzystaniem zestawień tabelarycznych oraz porównawczą. W latach 2013–2017 potencjał produkcyjny, efektywność i konkurencyjność polskich gospodarstw ekologicznych uzależnione były od ich wielkości obszarowej. Gospodarstwami ekologicznymi konkurencyjnymi okazały się gospodarstwa obszarowo największe, powyżej 50 ha UR, zdolnymi zaś do konkurencji o powierzchni 30–50 ha UR. Gospodarstwa prowadzące produkcję ekologiczną na powierzchni do 30 ha UR pomimo uzyskiwanych dopłat nie miały zdolności konkurencyjnej.

Słowa kluczowe: wielkość obszarowa, efektywność, konkurencyjność, potencjał produkcyjny, gospodarstwo ekologiczne, uprawy ekologiczne, Polska

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IMPACT OF HOTEL CLASSIFICATION IN POLAND ON THE QUALITY OF SERVICES RENDERED

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ABSTRACT

A hotel facility classification system makes it possible to standardise the quality of hotel services, and should guarantee hotel compliance with predefined requirements and criteria. In order to determine the impact of a hotel's rating in Poland on the quality of services it offers, the authors conducted a survey which covered a sample of 226 respondents. Based on the study, it was established that the classification system affects the quality of services provided by the classified properties, and that consumers of hotel services are aware of the standards and amenities which the hotels they choose should offer. However, it is important to indicate that nearly half of the respondents noted that a hotel's category does not always guarantee that the appropriate standard required by law is being maintained.

Key words: hotel, categorisation, quality of services, consumer, Poland
JEL codes: D12, L83

INTRODUCTION

A hotel facility which hopes to succeed on the market must meet the increasing needs and requirements of hotel guests. Growing consumer expectations shape the quality of services which are offered by the properties. The above-mentioned quality level is also determined and affected by the requirements and standards that are mandatory for hotels belonging to a particular category. The classification system in Poland has been created to distinguish the level of quality of the services rendered. Classification may be perceived as a basic determinant of quality standards in the hotel industry as well as a vital administrative and legal element. It is defined as "the rating of objects of a particular type into groups according to previously established criteria applied to determine their standard" [Nawrocka and Oparka 2007]. In this context, classification is also regarded as an important element in the protection of consumer rights due to the fact that the client, based on the hotel category, is aware of what he or she should expect from a particular facility. It is also important to note that classification is a source of information about a specific quality standard of the services which the hotel provides. Hotel guests, when choosing a given venue, have specific requirements and expectations, and the failure to meet them often leads to guest dissatisfaction. Thus, the quality of services provided is one of the most important factors that distinguish a particular hotel from competing properties. The basis of the success of any hotel company is consumer satisfaction, which is the starting point for building trust and lasting relationships with clients.

Keen competition on the hotel services market, constantly increasing customer expectations and the

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desire to meet them to the highest possible degree have led to decisions from an increasing number of entrepreneurs who provide hotel services to undergo the classification procedure [Blaszke and Skotarczak 2015]. Information concerning the scope and quality of services is very important for clients before they make the decision to stay at a given property [Sala 2019]. Hence, classification is used, among other reasons, to:

- impact the level of services provided by forcing the level to be increased or maintained through setting a minimum standard which has to be observed;
- facilitate the assessment process of the quality of services by implementing provisions and standards that allow customers to compare the actual state of the hotel with the generally applicable criteria;
- protect consumer interests by helping to enforce the provision of services at an appropriate level, previously agreed and confirmed by an administrative decision concerning the standard of a particular facility;
- improve business transactions and economic turnover [Borkowski and Wszendybył 2007];
- develop commercial and service contacts between the guest and the hotelier, without the need for a detailed description of the facility [Borkowski and Wszendybył 2007], which allows customers to choose the right hotel without the need for a detailed analysis of the facility's equipment or amenities [Pawlicz 2011].

The category of a hotel facility informs the potential consumer about the quality standard of services provided in a given tourist enterprise. It is used by guests and tour operators as valuable information, and it allows the hotel to improve its image. When choosing a hotel, the consumer is guided by, among other things, its category, including the number of stars and the prices offered [von Liebfried 2006]. It is important for the facility's classification to best meet the requirements of a significant share of hotel buyers [Sidorkiewicz and Pawlicz 2015, Jasinskas et al. 2016], and for the classification method to be a transparent process [Sidorkiewicz and Pawlicz 2015].

THE OBJECTIVE AND RESEARCH METHODS

The objective of the study was to analyse legal regulations regarding hotel classification in Poland and assess respondents' perception of the impact of hotel classification in Poland on the quality of services provided by the hotels. The authors formulated the following research hypotheses:

1. In the respondents' opinion, the classification of hotels has a significant impact on the level of quality of services provided in a particular facility.
2. One of the main factors determining a consumer's choice of hotel facility is the type of category of the hotel.
3. Consumers using hotel services declare that they have knowledge about the standards and hotel facilities in a particular category.
4. According to respondents, the number of stars achieved by the hotel is an absolute indicator of quality.

As part of the primary research, the authors used survey questionnaires to examine the opinions of users of hospitality services in Poland. The research tool used in the study was a survey questionnaire, which was constructed using a Google form. The form was made available on the Internet at the beginning of May 2020. The researchers applied the purposeful sampling method. The research sample was made up of 226 respondents who used hotel services in Poland. 77.4% of the survey participants were women, and 22.6% were men. The largest group, i.e. 51.8% of all respondents, included individuals aged 18–28. The second largest group were people aged 29–39 (37.7%). The next groups consisted of respondents aged 40–50 (8.0%) and 51–60 (2.7%). Only two people (0.9%) were representatives of the 60+ age group. The vast majority of the sample declared having higher education (73.5%), while almost one-fourth of the respondents (23.9%) indicated having a secondary education level. The smallest number of study participants were people who completed vocational schools (1.8%) or those who declared having primary education (0.9%). Almost half of all respondents (47.8%) were individuals who declared that their financial situation was good. In second place, about one-third of respondents (29.2%) indicated that their material situation is average.

Respondents who took part in the study were diversified with regard to their place of residence. People living in cities with over 500,000 inhabitants (39.8%) constituted the largest group. Every fourth respondent (24.3%) lived in towns of other sizes, and every fifth (19.9%) lived in a village.

SYSTEM OF CLASSIFICATION OF HOTEL FACILITIES IN POLAND IN THE CONTEXT OF LEGAL REQUIREMENTS

The aim of introducing classification regulations was to maintain or continuously improve the standards of services offered by hotel facilities. The regulations contain provisions that specify the minimum requirements which need to be fulfilled by a property. Offering services that are below established standards is unacceptable. As a result, the quality of services stipulated in the regulations cannot be lower, but it may and even should be higher [Firlej and Spychalska 2015].

Currently in Poland, the categories and types of hospitality are specified in the Act of 29 August 1997 on hotel services and services of tour leaders and tourist guides, as well as in the Regulation of the Minister of Economy and Labour of 19 August 2004 on hotel facilities and other facilities where hotel services are provided. The regulation specifies the requirements regarding furnishings and equipment in facilities, the qualifications of hotel staff and the scope of services – including catering services – offered by a particular property.

Each hotel facility operating in Poland needs to undergo the classification procedure. In order to be categorised, the hotel owner must submit an application for a specific category, pay a certain fee (the higher the rating – number of stars – the greater the amount required), and then invite the accreditation commission whose task is to assign an appropriate category. If a particular hotel facility has not been able to be classified in a given category, or if the category of the establishment does not meet the requirements specified in the law, then the owner of the facility is obliged to submit an application to the voivode (province governor) for granting the appropriate category to the hotel [Borkowski and Wszendybył 2007]. It is important to note that it is possible to offer hospitality services without being granted the right to use a specific category provided that the property does not use proprietary names, i.e. hotel, motel, tourist house, guest house, hostel, youth hostel, camping and camping site. Thus, it is possible to distinguish two separate groups of hotel facilities. The first includes facilities which are interested in using the proprietary names indicated above. In such a case, they need to undergo an appropriate classification process. The second group consists of other facilities, namely, properties offering hospitality services which do not call themselves "hotels". In this case, the authorities that register such entities are representatives of local administrations, i.e. municipality and communal offices. These types of facilities may have a different designation, such as an inn, a holiday resort or "hotel services" as the law does not prohibit this. The same register also covers agritourism facilities [e-Hotelarz.pl 2011].

The Resolution of the Minister of Economy and Labour of 19 August 2004 on hotel facilities and other facilities where hotel services are provided stipulates the minimum requirements concerning the quality of the services related to hotel ratings. The provisions cover the following areas:

- external elements of the site/facility, e.g. lighting;
- internal furnishings and equipment of the hotel, e.g. elevators, air conditioning, water supply, heating, sewerage;
- reception service and catering objects, e.g. minimum space, the number of toilets available and toilet appliances;
- the minimum size of hotel rooms, lighting, furnishings and facilities, hygiene and sanitary appliances;
- the minimum range of hotel services provided, e.g. wake-up service at the guest's request;
- the minimum requirements for the qualification of the hotel staff.

The greater the number of stars a particular hotel has, the more it is required to meet the higher requirements for its guests, both in terms of land development/site arrangement, the size of the rooms, and the qualifications of the hotel staff. As a result, consumers can choose their desired level of service based on the information related to a particular category. The cost of a room also often influences this decision [Firlej

and Spychalska 2015]. The requirements set out in the classification regulations relate primarily to technical, performance and operational parameters as well as the scope of the hospitality offer [Dominik and Drogoń 2009]. The provision of additional services is not only dependent on the entrepreneur's decision, but also on the requirements of the said regulation concerning the facilities in which hotel services are provided[1]. Hotels below the four-star standard are not required to offer additional services. Nevertheless, many hotels are expanding their offer with these types of services. Small facilities with fewer than 100 rooms, which are located along national roads, in city centres or on the outskirts of cities, provide only accommodation and catering services. According to the regulation, four- and five-star hotels are required to provide conference services, select spa & wellness services, as well as numerous other services [Regulation of the Minister of Economy and Labour of 19 August 2004]. Luxury hotels provide the widest range of additional services. They are very diverse, but the most popular include business tourism services, recreation services and leisure time animation, wellness & spa, gaming and gambling services, beauty salons, and car rental as well as services associated with retail sales [Sala 2019].

The fact that administrative authorities have a number of measures and courses of action regarding hotel services at their disposal is a factor which may directly affect the quality of services provided by entrepreneurs. The risk connected with receiving a decision imposing a change in their classification or a suspension in their provision of hotel services means that hoteliers must ensure the level of quality, maintain the standard of the facility or carry out activities aimed at raising its category, expand the scope of additional services and guarantee the protection of hotel guests. Although undergoing a process of classification is not a mandatory act, the category of a facility is an important marketing element, since it supports the hotel's advertising initiatives and it enhances its prestige [Tulibacki 2009].

HOTEL CLASSIFICATION AND THE QUALITY OF THE SERVICES PROVIDED – ASSESSED BY SURVEYS

In the survey, respondents were asked to declare which category of hotels they used most frequently when travelling in Poland. According to their answers, the most frequently chosen hotels were three-star hotels (32.3%). This answer was indicated by slightly more men (39.2%) than women (32.3%). Four-star hotels were a close second (29.6%). One-star hotels turned out to be the least frequently selected hotels (0.9%). In the studies conducted by Jabłczyńska and Kopczyk in 2015, respondents also chose three-star hotels (29.3%) most frequently. It is important to note that the number of hotels in Poland is still growing. In 2019, the group of all hotels which were assigned a specific category included 2,507 properties, out of which 1,318 were three-star hotels and 559 were two-star hotels (Table 1). There were 76 five-star hotels. In addition, there were 128 hotels whose classification procedure was in progress at the time. In recent years, there has also been an increase in the share of economy hotels in Poland, which shows that the number of hotels with a lower rating is growing[2]. This may result from the fact that lower-cost facilities may be characterised by high efficiency in economically challenging times. Pursuant to categorisation requirements, these hotels may offer minimum catering facilities, which allows them to significantly increase their efficiency, as catering services are very cost-intensive [Chroboczyńska 2020].

Survey participants were asked whether they are aware of the amenities and standards which must be provided by a facility when they are selecting a hotel with a specific standard of service, as reflected by the number of stars assigned in a given category. Almost half of the respondents (45.1%) declared that they rather knew the basic requirements regarding the hotel rating. Such an answer was provided by more men (60.8%) than women (40.6%) and more people with

[1] See more: K. Stępniak (2010). Usługi dodatkowe w obiekcie. Retrieved from http://www.horecanet.pl/uslugi-dodatkowe-w-obiekcie [accessed 27.04.2020].

[2] Local Data Bank of Statistics Poland (Bank Lokalnych Danych GUS). Retrieved from https://bdl.stat.gov.pl/BDL/dane/podgrup/tablica [accessed 20.06.2020].

Table 1. The number of hotels in individual categories in 2019 in Poland and the hotel category which is most frequently chosen by respondents (%)

Specification		Number of hotels in individual categories in 2019[a]	The hotel category which was most frequently chosen by respondents[b]		
			total [N = 226]	gender	
				women [N = 175]	men [N = 51]
Hotel category	one-star hotel	36	0.9	1.1	0.0
	two-star hotel	559	5.3	5.7	3.9
	three-star hotel	1 318	32.3	30.3	39.2
	four-star hotel	418	29.6	30.3	27.5
	five- or five plus-star hotel	76	4.4	3.4	7.8
Respondents' declaration: "I don't pay attention to the hotel category"		–	27.4	29.1	21.6

Source: [a] Based on the Local Data Bank of Statistics Poland (Bank Lokalnych Danych GUS), retrived from https://bdl.stat.gov.pl/BDL/dane/podgrup/tablica [accessed 20.06.2020]; [b] authors' own work.

higher education (50%) than with primary, vocational and secondary education (31.7%). On average, every fourth respondent (27.4%) stated that they are definitely aware of the amenities required in a hotel with a specific rating. In this case, women (30.3%) declared having such knowledge more frequently than men (17.6%). Only 3.1% of respondents indicated that they are definitely not aware of what they should expect or are entitled to in a given hotel facility (Table 2).

The survey examined the factors which affect choice of services of a given hotel to the largest and the smallest degree, as indicated by the surveyed population (the figure). The location of the hotel turned out to be a factor with the highest rating (an average of 4.46). Another factor which had a significant influence on the respondents' selection of a particular facility was the cost of accommodation per day (average 4.38) as well as the opinions expressed

Table 2. Assessment of respondents' knowledge of the standards and amenities of the selected hotel in a particular category (%)

Specification	Total [N = 226]	Gender	
		women [N = 175]	men [N = 51]
Definitely yes	27.4	30.3	17.6
Rather yes	45.1	40.6	60.8
Neither yes nor no	11.9	11.4	13.7
Rather no	12.4	13.7	7.8
Definitely no	3.1	4.0	0.0

Source: Authors' own work.

The assessment was carried out according to a five-point scale, where 1 means very little impact and 5 represents very high impact.

Fig. Selected factors affecting the respondents' choice of a hotel

Source: Authors' own work.

by other people (average of 4.04). The possibility of organising a special event at the hotel (an average value of 1.77) and conference facilities (average of 1.76) were the factors with the lowest scores in the presented ranking. The number of stars achieved by the hotel received only an average of 2.87, taking 9th place among all 14 factors mentioned in the research. This means that a hotel's category is not a decisive factor in terms of respondents choosing a particular facility.

In the studies conducted by Jabłczyńska and Kopczyk [2015], respondents were asked which of three factors is the most important when selecting a hotel. First, survey participants indicated the price for accommodation (62.4%), then the standard of the hotel (30.1%), and finally the services it offered (7.5%). Thus, the findings indicate that the price of a room is a very important factor among people using hotel services. Nevertheless, in the respondents' opinion, the standard of the hotel is also a relevant criterion when selecting a particular facility. In turn, studies carried out by Gołąb-Andrzejewska [2014] suggest that, when choosing a hotel, respondents were most often guided by the location and quality of service (a total of 54% of all answers).

Almost half of the respondents (48.7%) said that the classification of hotels rather affects the quality of services (Table 3). On average, every fifth respondent (19.9%) stated that the rating strongly affects the quality of the services offered by the facility. This answer was more often indicated by men (29.4%) than women (17.1%). Only 10.2% of all survey participants pointed out that the rating rather or definitely does not affect the quality of the services provided by the hotel. It can, therefore, be concluded that in the opinions of a vast majority of respondents, the system of hotel classification in Poland affects the quality of services rendered by the properties. The research conducted by Cichocka and Krupa [2016] shows that the quality of hotel services was most often associated with a hotel with a large number of stars (average rank of 3.45) and a wide range of services (average rank of 3.44).

Survey participants were asked if they thought the number of stars assigned to a hotel in Poland was an absolute indicator of quality. The largest share of

Table 3. Respondents' opinion on the impact of hotel classification in Poland on the quality of services provided (%)

Specification	Total [$N = 226$]	Gender	
		women [$N = 175$]	men [$N = 51$]
Definitely yes	19.9	17.1	29.4
Rather yes	48.7	49.7	45.1
Neither yes nor no	21.2	21.1	21.6
Rather no	7.5	9.1	2.0
Definitely yes	2.7	2.9	2.0

Source: Authors' own work.

the respondents in the study (30.5%) said that rather not, but a slightly smaller group – on average, every fourth respondent i.e. (25.7%) – declared that in his or her opinion the number of stars is rather an absolute indicator of the quality of hotel services. The authors also examined whether the level of quality of services provided in the hotel affects the respondents' satisfaction. Half of them (50.9%) declared that quality is a decisive factor in terms of satisfaction with their stay at a hotel. Fewer respondents (48.2%) stated that quality is important to them, but it is not the main factor determining their satisfaction level. Only 0.9% of all respondents said that the quality of services did not matter to them.

In order to examine the factors which have the greatest impact on the quality of hotel services, respondents were asked to rate several factors on a five--point scale, where 1 indicated no impact and 5 represented a very high impact (Table 4). According to the respondents, the factors which had the greatest impact on their perception of the quality of the services included: taking care of the cleanliness of the rooms (the average rating on the five-point scale was 4.69), meeting guests' expectations (an average value of 4.56), acceptance of payment cards (average of 4.50) and the price corresponding to the quality of services (the average of 4.50). All four factors were rated slightly higher by women than by men. None of the women participating in the study described taking care of the cleanliness in rooms as a factor which would be perceived as irrelevant. Conference facilities and equipment (an average of 1.92) and the wake-up service (average of 1.85) turned out to be the least significant factors affecting the respondents' final assessment of hospitality services.

Survey participants were also asked if they would be able to pay extra for the services rendered by a hotel with a higher category if they had the guarantee that all services would be provided at the highest level. Most often, respondents declared that rather yes (44.2%) and definitely yes (25.2%). Only 2.2% of all respondents stated that they would not have paid extra for a hotel representing a higher category. The findings presented above suggest that nearly 70% of all respondents would be willing to pay an additional fee for a higher category hotel in order to receive services at the highest level. It can, therefore, be concluded that respondents value high-quality services.

The survey participants also stated that they had experienced situations where the number of stars which a particular hotel located in Poland had was not in line with the standard of the services offered by the facility. As many as 43.8% of respondents declared that they have already experienced such situations. The remaining share of the respondents declared that they have not had such an experience (40.3%), or they did not remember it (15.9%). The respondents pointed to some shortcomings which they noticed in the hotel, even though the hotel should offer specific facilities or a range of services associated with a particular category. The most common deficiencies mentioned by the survey participants were related to

Table 4. Impact of selected factors on respondents' final assessment of their stay according to gender

Specification	Total [$N = 226$]				Gender							
					women [$N = 175$]				men [$N = 51$]			
	rank avg[a]	% share			rank avg[a]	% share			rank avg[a]	% share		
		1&2	3	4&5		1&2	3	4&5		1&2	3	4&5
Taking care of room cleanliness	4.69	0.9	5.3	93.8	4.76	0.0	3.4	96.5	4.43	3.9	11.8	84.3
Meeting expectations	4.56	0.8	5.3	93.8	4.57	0.6	5.1	94.3	4.55	2.0	5.9	92.2
Price corresponding with the quality	4.50	2.2	6.6	91.9	4.53	2.2	6.3	91.5	4.39	2.0	7.8	90.2
Payment cards accepted	4.50	3.1	7.1	89.8	4.53	2.3	6.9	90.9	4.39	5.9	7.8	86.2
The quality of staff service	4.42	0.9	10.6	88.5	4.45	0.6	9.7	89.7	4.31	2.0	13.7	84.3
Internet access	4.25	8.4	10.2	81.4	4.23	8.0	11.4	80.6	4.33	9.8	5.9	84.3
Additional bathroom equipment, e.g. hairdryer	3.94	11.1	16.8	72.1	3.93	10.9	16.0	73.1	3.96	11.8	19.6	68.7
24/7 reception service	3.91	11.9	19.0	69.1	3.82	13.7	20.0	66.3	4.20	5.9	15.7	78.4
Air conditioning in the room	3.73	14.2	23.9	62.0	3.61	14.9	27.4	57.7	4.14	11.7	11.8	76.4
Luggage storage	3.43	24.8	21.7	53.6	3.50	21.7	22.9	55.4	3.22	35.3	17.6	47.1
Laundry and ironing service	2.09	63.7	22.1	14.2	2.03	64.0	24.0	12.0	2.29	62.7	15.7	21.6
Conference facilities and equipment	1.92	71.3	15.0	13.7	1.90	70.3	16.6	13.1	1.98	74.5	9.8	15.7
Wake-up service	1.85	70.0	22.1	8.0	1.88	67.4	24.0	8.6	1.76	78.4	15.7	5.9

The assessment was carried out with the use of a five-point scale, where 1 means very little impact and 5 represents very high impact.

Source: Authors' own study.

the furnishings and equipment available in the room, air conditioning, inadequate room size, patchy dress of staff, no room cleaning service during the guest's stay, and no elevators in the hotel. In addition, the respondents pointed to untidy spaces and incompetent hotel staff.

SUMMARY AND CONCLUSIONS

The classification of hotels in Poland is an important administrative and legal instrument that affects the quality of the services they offer. Each hotel in the country must meet certain minimum classification requirements to be assigned a particular category in the ratings. Thanks to the hotel classification system, the potential consumer knows what to expect from a given hospitality facility. Based on the analysis of the findings presented in the study, two of the four research hypotheses formulated in this article were confirmed. The first hypothesis states: *In the respondents' opinion, the classification of hotels has a significant impact on the level of quality of services provided in a given property*. Almost 70% of survey participants' responses confirmed this statement. Only a 10.2%

share of the respondents said that the classification of hotels does not affect the quality of services. The second confirmed hypothesis indicates that: *Consumers using hotel services declare that they know the standards and amenities of a hotel belonging to a specific category*. The vast majority of respondents (72.5%) can be regarded as informed consumers of hotel services. Only 15.5% of all respondents declared that when selecting a hotel with a specific number of stars, they are not aware of the standards and amenities which the hotel should offer. The hypotheses that could not be confirmed in the present study include: *One of the main factors determining the choice of hotel by the consumer is the type of category it represents* and *In the opinion of respondents, the number of stars possessed by the hotel is an absolute indicator of quality*. The location of the hotel, the price for accommodation and the opinion of other people turned out to be decisive factors in terms of the respondents' choice of a particular hotel they would like to stay in. In the opinion of the surveyed population, the hotel category is a relatively insignificant factor: in this case, the average rating on a five-point scale amounted to 2.87. In addition, nearly half of the respondents (45.1%) stated that the hotel category is not an absolute indicator of the service quality, and that, on average, every fourth respondent (23.9%) was not able to give a clear and unequivocal opinion on the subject. Hotel classification turned out to be an absolute indicator of quality in the opinion of only 30.0% of the respondents.

Based on the conducted research, the authors arrived at the following conclusions:

1. In the opinion of the respondents, hotel classification in Poland impacts the quality of services provided, but it is not their absolute determinant. The main factor in choosing a hotel is not its category, but rather the location and price for accommodation.
2. The vast majority of people using hotel services are aware of the standards and amenities which the hotel facility of a specific category they selected should offer. At the same time, almost half of the respondents notice certain shortcomings and state that the hotel category has not always been a guarantee of the appropriate standard required by law.

Taking into account the findings presented in the article and the conclusions drawn by the authors, it is important to state that the research results should not be regarded as representative of the entire population of Polish consumers using hotel services. The findings of the present study only allow the authors to show and analyse the real consumer behaviour and motives of individuals choosing a specific hotel during a trip. To sum up, it should be emphasised that even though, taking into account the size of the sample, the presented research is just a diagnostic survey, the obtained results confirm that the constantly growing customer requirements and increased competitiveness of the market make the quality of hotel services an indispensable factor determining both the success of a hotel enterprise and consumer satisfaction. Thus, this is also the reason that the provisions concerning the requirements related to hotel classification should always be strictly observed.

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WPŁYW KATEGORYZACJI HOTELI W POLSCE NA JAKOŚĆ ŚWIADCZONYCH USŁUG

STRESZCZENIE

System kategoryzacji obiektów hotelarskich umożliwia ujednolicenie jakości usług hotelarskich i gwarantuje klientowi spełnienie odgórnie określonych wymagań i kryteriów. W celu określenia wpływu kategoryzacji hoteli w Polsce na jakość oferowanych usług przeprowadzone zostało badanie ankietowe, w którym udział wzięło 226 osób. W ich wyniku potwierdzono, iż system kategoryzacji wpływa na jakość świadczonych usług, a konsumenci usług hotelarskich są świadomi, jakie standardy i udogodnienia powinien posiadać wybrany przez nich obiekt. Jednakże również prawie połowa badanych dostrzega, że kategoria hotelu nie zawsze jest gwarantem odpowiedniego, wymaganego prawem standardu oferowanych usług.

Słowa kluczowe: hotel, kategoryzacja, jakość usług, konsument, Polska

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DIVERSITY OF POLISH REGIONS IN THE LEVEL OF TECHNICAL INFRASTRUCTURE DEVELOPMENT

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ABSTRACT

The study aims to identify spatial diversity and possible concentrations of 16 Polish regions regarding their infrastructure development levels in the period of 2005–2018. Measuring development of technical infrastructure requires the use of several variables due to its multidimensional character. It justifies the use of multivariate analysis. Based on the method of Hellwig's development measure, three groups of regions were defined. Five of the analysed regions did not change their position in the 2018 ranking as compared to 2005. These were regions from the top three: Śląskie, Dolnośląskie and Małopolskie (south-western Poland), as well as two regions in the class with the lowest level of technical infrastructure development: Warmińsko-Mazurskie and Podlaskie (north-eastern Poland). Although the leader of both rankings, Śląski region, took the most favourable values in 2018 concerning density and quality of roads, density of railway lines or green areas in towns, as a typically industrial, mining-related, intensely urbanized region is has needed to cope with a serious problem with air pollution, relating from the smallest amount of gas pollution retained or neutralized. In the other side, the two weakest regions were characterised by valuable environmental conditions (Warmińsko-Mazurskie) and a large share of agricultural area (Podlaskie). These natural and economic conditions may, on the one hand, prevent the development of technical infrastructure (e.g. road construction in Natura 2000 areas), and on the other hand, maintenance of such infrastructure could be unprofitable for both local government units and its users.

Key words: technical infrastructure, development potential, regional development, multivariate comparative analysis, Poland

JEL codes: O18, C30

INTRODUCTION

Infrastructure in the broad sense is one of the factors traditionally indicated in development theories. It is of particular importance, for example, in the context of ensuring conditions for the diffusion of socio-economic development, assumed in the polarization-diffusion model [Drejerska 2010, Mucha-Leszko and Kąkol 2010, Kołodziejczyk 2014, Churski 2015, Nowaczyk 2018]. Moreover, Zarębski and Godlewska-Majkowska in their research [2013] define the infrastructure as one of four microclimates of the taxonomic indicator of the potential investment attractiveness of European Union countries. What is more, Nadolny [2019] points to the multithreaded concept of regional development and the importance of infrastructure in this context.

The greatest importance in regional and local development is attached to the transport infrastructure [Chciałowski 2018]. According to Rietveld [1989], upgrading of transport infrastructure has a strong impact on production as well as household consumption. It leads to a reduction of cost and time of transportation and travel [von Thünen 1826]. Therefore, it may give rise to substantial redistribution effects among economic groups and regions [Górz and Kurek 1999, Zwolińska-Ligaj and Ciechańska 2012, Rokicki 2014, Satoła 2015,

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Kaczmarek 2017, Bul 2018, Ozimek et al. 2019]. Button [1998] notes that although investments in road infrastructure may have primary multiplier implications combined with some secondary effects in terms of longer term maintenance, if the facility principally serves transit traffic there is unlikely to be a great deal of value added.

Similarly, if it serves trade flows into and from the region then the implications for an area's local GDP will depend on the region's comparative and competitive advantages [Sharp 1980, Button 1998]. The level of infrastructure development determines regional and local development [Kapusta 2012, Pomianek 2016].

AIM AND METHOD

The aim of the paper was to show spatial diversity and possible concentrations of 16 Polish regions regarding the infrastructure development level. The multidimensional character of the infrastructure justifies the use of multivariate analysis. Based on the method of Hellwig's development measure [Hellwig 1968, Nowak 1990], a synthetic measure was constructed, enabling ranking of the regions according to their level of development of technical infrastructure. The variables mentioned in Table 1 were taken for

Table 1. Variables applied in the analysis

Symbol	Variable	Unit	Type[a]
*X*1	Density of total public roads	km per 100 km^2	S
*X*2	Density of expressways and highways	km per 100 km^2	S
*X*3	Density of roads with improved hard surface	km per 100 km^2	S
*X*4	Share of poviat and municipal unsurfaced (ground) roads in the total length of these roads	%	D
*X*5	Road accidents	number per 100 thous. residents	D
*X*6	Density of railway lines in total	km per 100 km^2	S
*X*7	Density of standard-gauge railway lines[c]	km per 100 km^2	S
*X*8	Share of dwellings in cities equipped with central heating[b]	%	S
*X*9	Population using the water supply system as a percentage of the total population[b]	%	S
*X*10	Population using the sewage system as a percentage of the total population	%	S
*X*11	Population using the gas supply system as a percentage of total population	%	S
*X*12	Population using wastewater treatment plants as a percentage of total population[c]	%	S
*X*13	Industrial and municipal wastewater treated as a percentage of wastewater requiring treatment[b]	%	S
*X*14	Dust pollution retained or neutralized in pollution abatement equipment as a percentage of he pollution generated[b]	%	S
*X*15	Gas pollution retained or neutralized in pollution abatement equipment as a percentage of the pollution generated	%	S
*X*16	Area of parks, lawns and residential green areas as a percentage of the total area[c]	%	S
*X*17	Telephone main lines	number per 100 thous. residents	S
*X*18	Enterprises from the non-financial sector with broadband Internet access[b]	%	S

[a] S – stimulant, D – destimulant.
[b] Quasi-constant variables excluded from further analysis.
[c] Variables excluded from further analysis due to large statistically significant correlation with other variables.

Source: Author's elaboration based on the Local Data Bank of the Statistics Poland (Bank Danych Lokalnych GUS).

construction of the measure. Five variables ($X8$, $X9$, $X13$, $X14$ and $X18$) were quasi-constant and therefore they were excluded from further analysis. Then, to find the variables that presented large statistically significant correlation, Pearson's linear correlation coefficient was used. Due to the high level of correlation between the selected variables, $X7$, $X12$ and $X16$ were rejected. The data for the analysis was taken from the Local Data Bank of Statistics Poland (Bank Danych Lokalnych GUS) for 2005 and 2018. As data for 2005 were not collected for the $X15$ variable, the data for 2006 were used in the analysis.

The Hellwig development measure (d_i) usually takes values in the range [0; 1]. The closer the object (a region) is to the pattern (the standard), the higher the measure value is [Hellwig 1968, Panek and Zwierzchowski 2013, Pomianek 2019]. Two parameters of the taxonomic measure were used to classify regions according to the level of development of technical infrastructure, i.e. the arithmetic mean ($\overline{d_i}$) and standard deviation (S_{d_i}). The examined objects (regions) were divided into three groups differing in terms of the degree of development of the tourism function. The following classes were defined:

- Class 1 (high level of infrastructure development) – $d_i > \overline{d}_l + S_{d_i}$ (regions at a distance from the pattern exceeding $\overline{d}_l + S_{d_i}$);
- Class 2 (medium level of infrastructure development) – $\overline{d}_l - S_{d_i} < d_i \leq \overline{d}_l + S_{d_i}$ (regions at a distance from the pattern ranging $\overline{d}_l - S_{d_i}$, $\overline{d}_l + S_{d_i}$);
- Class 3 (low level of infrastructure development) – $d_i \leq \overline{d}_l - S_{d_i}$ (regions at a distance from the pattern not exceeding $\overline{d}_l - S_{d_i}$), where: d_i is a value of synthetic measure calculated by Hellwig's method, $\overline{d}_i$ is the arithmetic mean of d_i, and S_{di} is the standard deviation of d_i.

Two rankings were constructed based on the above-mentioned method (for 2005 and for 2018).

RESULTS AND DISCUSSION

Sixteen regions of Poland (NUTS 2 level) were ranked according to Hellwig's development measure. Two regions were classified in the class with a high level of technical infrastructure development in 2005: Śląskie and Dolnośląskie. Twelve regions were classified in the class with an average level of development, while the last two places belonged to the class with a low level of technical infrastructure development: Warmińsko-Mazurskie and Podlaskie (Table 2).

Five of the analysed regions did not change their position in the ranking in 2018 compared to 2005. These were regions from the top three: Śląskie, Dolnośląskie and Małopolskie, as well as two regions in the class with the lowest level of technical infrastructure development: Warmińsko-Mazurskie and Podlaskie. Another five regions moved up in the ranking during the period under study. Mazowieckie region moved from the 6th to the 4th position, but the greatest positive shifts (by three positions) were characteristic of the following regions: Podkarpackie (from 12th to 9th) and Świętokrzyskie (from 14th to 11th). In six regions there was a drop in the ranking in 2018 compared to 2005. The largest negative change was observed in the Zachodniopomorskie region (by four positions from 9th to 13th). Łódzkie region recorded a drop by two places to 12th position in 2018. In the regions: Opolskie, Wielkopolskie, Pomorskie and Lubelskie, the decrease was by 1 position, with the Lubelskie region moving to the last position in the class with an average level of technical infrastructure development. Comparing the values of the d_i Hellwig's measure, informing about the region's adjustment to the theoretical pattern of development, ten regions improved their results in 2018 related to 2005.

Regions with the highest level of technical infrastructure development (Dolnośląskie and Śląskie) were located in the south-western part of Poland. Opolskie region, located between these two, was 4th in the ranking in 2005, and 6th in 2018. Małopolskie region, neighbouring to Śląskie region, was 3rd in both rankings. Moreover, the 5th (2005) and 6th (2018) positions were occupied by Wielkopolskie region, adjacent to Dolnośląskie region. Therefore, a certain concentration of regions with a high level of development and regions with very good positions in the rankings in the group with an average level of technical infrastructure development can be noticed (the figure).

Table 2. Comparison of two rankings of the level of technical infrastructure development in 2005 and in 2018 according to the Hellwig's measure

Region (NUTS 2)	Year				Change in the ranking position in 2018 compared to 2005	Class (2005 and 2018)
	2005		2018			
	position	d_i	position	d_i		
Śląskie	1	0.660	1	0.665	no change	1 – high level of development
Dolnośląskie	2	0.540	2	0.512	no change	
Małopolskie	3	0.435	3	0.452	no change	2 – medium level of development
Opolskie	4	0.375	5	0.376	–1	
Wielkopolskie	5	0.303	6	0.374	–1	
Mazowieckie	6	0.299	4	0.388	+2	
Pomorskie	7	0.297	8	0.307	–1	
Kujawsko-Pomorskie	8	0.295	7	0.315	+1	
Zachodniopomorskie	9	0.278	13	0.233	–4	
Łódzkie	10	0.236	12	0.235	–2	
Lubuskie	11	0.233	10	0.290	+1	
Podkarpackie	12	0.210	9	0.290	+3	
Lubelskie	13	0.188	14	0.162	–1	
Świętokrzyskie	14	0.180	11	0.242	+3	
Warmińsko-Mazurskie	15	0.125	15	0.070	no change	3 – low level of development
Podlaskie	16	0.090	16	0.058	no change	

Note: Positive changes in the ranking position were marked with grey colour.

Source: Author's calculation.

On the other hand, there was also a concentration of regions with a low level of technical infrastructure development (Warmińsko-Mazurskie and Podlaskie) – in the north-eastern part of Poland. The neighbouring Mazowieckie region considered on a regional scale – was an area with a relatively very good level of infrastructure development (4th position in the 2018 ranking), but research conducted on a local scale [Chrzanowska et al. 2013] indicate high differentiation of this area, i.e. a high level of socio-economic development of the capital city of Warsaw and its suburban area as well as a low level of development of peripheral areas of the region.

Table 3 presents average values of the variables for three development classes and for Poland. The average values of thirteen variables assumed the most desirable values in Class 1 in 2018. What is more, the area of parks, lawns and residential green areas as a percentage of the total area was also on the highest average level in Class 1 – but in both

Fig. Spatial distribution of Polish regions by classes of technical infrastructure development in 2005 and 2018 according to the Hellwig's measure

Source: Author's calculation.

analysed years. On the other hand, the average number of telephone main lines per 100 thousand residents was the highest in Class 1 but in 2005.

The share of dwellings in cities equipped with central heating as well as industrial and municipal wastewater treated as a percentage of wastewater requiring treatment took the highest values in the low-developed infrastructure class in 2018. The best average result for gas pollution retained or neutralized in pollution abatement equipment as a percentage of the pollution generated was observed in 2018 in regions of Class 2.

The leader of both rankings, Śląski region, took the most favourable values in 2018 for as many as six variables: density of expressways and highways, density of roads with improved hard surface, share of poviat and municipal unsurfaced (ground) roads in the total length of these roads, density of railway lines (in total and standard-gauge) as well as area of parks, lawns

Table 3. Average values of selected technical infrastructure indicators for the development classes in 2005 and 2018

Symbol	Indicator	Class 1		Class 2		Class 3		Poland	
		2005	2018	2005	2018	2005	2018	2005	2018
*X*1	Density of total public roads (km per 100 km^2)	157.7	161.4	124.0	137.4	93.3	112.3	122.0	135.8
*X*2	Density of expressways and highways (km per 100 km^2)	0.86	2.31	0.26	1.15	0.01	0.69	0.26	1.19
*X*3	Density of roads with improved hard surface (km per 100 km^2)	116.5	130.9	73.7	92.4	46.0	57.3	72.7	90.1
*X*4	Share of poviat and municipal unsurfaced (ground) roads in the total length of these roads (%)	22.3	16.7	37.8	31.2	49.9	49.5	38.1	32.1
*X*5	Road accidents (number per 100 thous. residents)	122.2	72.5	123.0	83.6	117.1	73.2	126.0	82.5
*X*6	Density of railway lines in total (km per 100 km^2)	13.1	12.2	6.4	6.1	4.2	4.2	6.5	6.2
*X*7	Density of standard-gauge railway lines (km per 100 km^2)	13.1	12.2	6.2	6.1	4.2	4.2	6.3	6.2
*X*8	Share of dwellings in cities equipped with central heating (%)	79.2	83.1	84.9	88.5	88.7	91.6	83.9	87.7
*X*9	Population using the water supply system as a percentage of the total population (%)	92.0	95.4	85.5	91.8	87.1	92.8	86.1	92.1
*X*10	Population using the sewage system as a percentage of the total population (%)	66.7	77.4	57.0	69.3	61.1	69.5	59.2	70.8
*X*11	Population using the gas supply system as a percentage of total population (%)	62.2	61.9	49.2	49.9	35.5	35.4	51.7	52.1
*X*12	Population using wastewater treatment plants as a percentage of total population (%)	70.8	81.1	58.0	72.5	66.0	72.8	60.2	74.0
*X*13	Industrial and municipal wastewater treated as a percentage of wastewater requiring treatment (%)	92.1	90.9	92.2	97.3	97.3	97.7	91.2	95.2
*X*14	Dust pollution retained or neutralized in pollution abatement equipment as a percentage of the pollution generated (%)	99.6	99.8	99.0	99.6	97.6	99.0	99.5	99.8
*X*15	Gas pollution retained or neutralized in pollution abatement equipment as a percentage of the pollution generated (%)	59.1	59.5	36.3	67.3	5.9	15.4	49.7	66.7
*X*16	Area of parks, lawns and residential green areas as a percentage of the total area (%)	0.50	0.50	0.16	0.18	0.10	0.10	0.20	0.20
*X*17	Telephone main lines (number per 100 thous. residents)	331.8	110.3	295.7	103.1	295.4	74.5	308.3	106.2
*X*18	Enterprises from the non-financial sector with broadband Internet access (%)	78.1	96.0	77.0	94.9	77.8	92.8	77.5	95.0

Note: The most favourable values of the indicators were marked with grey colour.

Source: Author's calculation.

and residential green areas as a percentage of the total area. It is a typically industrial, mining-related, intensely urbanized region, hence the high density of railways and roads enabling rapid movement of people and goods is justified. Parks and green areas in cities are the result of the implementation of local brownfield revitalization programs. Unfortunately, the lowest among Polish regions share of dwellings in cities equipped with central heating and the smallest amount of gas pollution retained or neutralized in pollution abatement equipment as a percentage of the pollution generated, places the Silesia region in the first place in terms of air pollution.

The last in the ranking, the Podlaskie region, was distinguished in 2018 by the highest share of dirt (ground) local public roads (54%), the lowest density of railways of both types (3.8 km per 100 km^2), the lowest share of households connected to the gas network (28.5%), and – together with the regions: Warmińsko-Mazurskie, Lubelskie, Świętokrzyskie and Podkarpackie – the lowest share of parks, lawns and residential green areas as a percentage of the total area in the cities (0.1%). Podlaskie region (next to Lubelskie region) is a typically agricultural region. Similarly, Warmińsko-Mazurskie region, characterised by the lowest density of roads with improved hard surface compared to the rest of the country and Europe, is distinguished by the richness of the natural environment, i.e. varied terrain, lakes (around 2,600), dense forest complexes (forest cover at the level of 30) and clean air. About 46% of the region's area is covered by legally protected areas, including those of international importance (Natura 2000).

CONCLUSIONS

The analysis shows two concentrations of regions regarding the level of technical infrastructure development. Regions with the highest level (Dolnośląskie and Śląskie) and three other regions with quite high results of Hellwig's measure (Wielkopolskie, Opolskie and Małopolskie) were located in the western and south-western part of Poland. Another group of regions, those with a low level of technical infrastructure development (Warmińsko-Mazurskie and Podlaskie), was located in the north-eastern part of Poland.

Infrastructure development is a slow and complex process. Investments are usually long-term, and their impact on the environment, economy and local community is not immediate and not always positive. The two regions with the high level of technical infrastructure development presented the most desirable values of as many as 15 out of 18 analysed variables. Although the leader of both rankings, Śląski region, took the most favourable values in 2018 concerning density and quality of roads, density of railway lines as well as green areas in towns, as a typically industrial, mining-related, intensely urbanized region it has needed to cope with a serious problem with air pollution, relating from the smallest amount of gas pollution retained or neutralized. In the other side, the two regions from the last positions in the rankings, with the lowest level of technical infrastructure development, were characterised by valuable environmental conditions (Warmińsko-Mazurskie) and a large share of agricultural area (Podlaskie). These natural and economic conditions may, on the one hand, prevent the development of technical infrastructure (e.g. road construction in Natura 2000 areas), and, on the other hand, maintenance of such infrastructure could be unprofitable for both local government units and its users.

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ZRÓŻNICOWANIE POLSKICH REGIONÓW ZE WZGLĘDU NA POZIOM ROZWOJU INFRASTRUKTURY TECHNICZNEJ

STRESZCZENIE

Opracowanie ma na celu określenie zróżnicowania przestrzennego i możliwych skupień 16 regionów Polski pod względem poziomu rozwoju infrastruktury w latach 2005–2018. Mierzenie rozwoju infrastruktury technicznej wymaga użycia kilku zmiennych ze względu na jej wielowymiarowy charakter. Uzasadnia to zastosowanie analizy wielowymiarowej. Określono trzy grupy regionów z zastosowaniem metody miary rozwoju Hellwiga. Pięć spośród analizowanych regionów nie zmieniło swojej pozycji w rankingu w 2018 r. W porównaniu do 2005 r. były to województwa zajmujące trzy pierwsze lokaty w rankingach: śląskie, dolnośląskie i małopolskie (w południowo-zachodniej Polsce), oraz dwa w klasie o niskim poziomie rozwoju infrastruktury technicznej: warmińsko-mazurskie i podlaskie (w północno-wschodniej Polsce). Chociaż lider obu rankingów województwo śląskie w 2018 r. wykazywało najkorzystniejsze wartości w zakresie gęstości i jakości dróg, gęstości linii kolejowych oraz miejskich terenów zieleni, musiało sobie radzić z poważnym problemem zanieczyszczenia powietrza, gdyż jest regionem typowo przemysłowym, górniczym, intensywnie zurbanizowanym. Dwa regiony o najniższych lokatach w rankingach charakteryzowały się zaś cennymi warunkami przyrodniczymi (województwo warmińsko-mazurskie) i dużym udziałem użytków rolnych (województwo podlaskie). Takie uwarunkowania przyrodniczo-ekonomiczne mogą z jednej strony uniemożliwić rozwój infrastruktury technicznej (np. budowa dróg na obszarach Natura 2000), a z drugiej utrzymanie takiej infrastruktury może okazać się nieopłacalne zarówno dla jednostek samorządu terytorialnego, jak i dla jej użytkowników.

Słowa kluczowe: infrastruktura techniczna, potencjał rozwojowy, rozwój regionalny, wielowymiarowa analiza porównawcza, Polska

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FACTORS INFLUENCING STUDENTS' CHOICES AND DECISION--MAKING PROCESS: A CASE STUDY OF POLISH STUDENTS STUDYING IN A BRITISH HIGHER EDUCATION INSTITUTION

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ABSTRACT

The main aim of this paper is to investigate the factors which influence students when deciding to study abroad. The case study is based on Polish students studying in the British higher education system (UK HE) and the paper examines these students' choices and their decision-making process when selecting their university studies. The literature review suggests that there are two types of factors influencing students' decision-making process: push factors, which operate within the home country, and pull factors, meaning that students are attracted by the host country and encouraged to study there. Polish students constitute a significant group of EU students who study in the UK and yet there are very few studies on this particular group. The results from this qualitative research on Polish students studying in a selected British university indicate that, contrary to a number of other studies, pull factors could be more important in influencing Polish students' decision-making process regarding studying abroad.

Key words: international students, Polish students, UK HE, decision making process, push factors, pull factors, choice

JEL codes: I2, I23, M1, M10, M16, M3, M30, M31, M37

INTRODUCTION

The last few years have witnessed a dramatic surge in international student mobility [King and Sondhi 2018, Javed et al. 2019, Nghia 2019]. Looking from the European perspective, membership in the European Union creates a number of opportunities, including staff and student mobility options for citizens of the member countries [Di Pietro 2020]. This gives young people not only a chance to study the entire selected programme in a chosen university in the EU, but also to benefit from European exchange programmes that allow them to study in a host institution for one or two semesters in order to experience a different environment and gain international experience.

The United Kingdom is one of the most popular destinations for students from all over the world, and although it will no longer be an EU member at the end of 2020, the country is still open to welcome overseas students. Omoruyi and Rembielak [2019] state that the UK higher education institutions are recognised as the second largest destination for international students

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Table. Top EU sending countries (number of students)

Country	2018–2019	2017–2018	2016–2017	2015–2016	2014–2015
Italy	13 965	13 985	13 455	12 135	10 525
France	13 675	13 660	13 560	12 525	11 955
Germany	13 475	13 545	13 735	13 425	13 675
Spain	10 330	9 630	8 820	7 840	7 040
Greece	9 920	10 135	10 045	9 790	10 130
Romania	9 740	8 655	8 110	7 200	6 590
Republic of Ireland	9 625	9 600	10 070	10 245	10 905
Cyprus	8 865	9 360	9 145	9 330	9 745
Poland	8 380	7 545	6 585	5 655	5 245
Bulgaria	6 020	6 040	6 585	6 195	6 255

Source: HESA [2020b].

after the USA. It is also a top choice for EU students, and number one for Polish students. Every year the number of Poles beginning their studies in the UK is growing approximately by a thousand (the table). It is predicted that the number of EU students coming to the UK may decrease due to Brexit, but the biggest challenge currently is COVID-19.

HIGHER EDUCATION AS A SERVICE AND PUSH–PULL FACTORS IN THE DECISION MAKING PROCESS

Higher education (HE) being a service, shares similar characteristics to many other services, such as intangibility, inseparability, perishability, and variability [Kotler and Armstrong 2015]. The globalisation of markets and internationalization of HE brings students more choice in terms of selecting HE providers. Demand for education, particularly higher education, has traditionally been driven by expectations of its ability to increase economic and social status of the graduate [Mazzarol and Soutar 2002], but the actual choice of country and institution in which to study can be influenced by many factors. One factor may be a country of origin effect (CoO) [Lee et al. 2016, Mc Leay et al. 2020]. Some researchers [McMahon 1992, Mazzarol and Soutar 2002, Maringe and Carter 2007, Buchanan 2014, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020] attempt to explain the global pattern of international student flow by identifying a combination of push–pull factors that encourage students to study overseas [Nghia 2019].

When deciding on their HE provider, students face a number of alternatives which are available to them not only locally but also internationally. This makes their decision-making process even more complex. The traditional decision making process is conceptualised as a five stage process involving: identification of a problem needing to be solved, the search for information, an evaluation of alternatives, making the purchase decision, and finally evaluating it [Kotler and Fox 1995, Moogan et al. 2002, Cubillo et al. 2006, Germeijis and Verschueren 2007, Maringe and Carter 2007, Kotler and Armstrong 2015, McLeay et al. 2020]. However, Mazzarol and Soutar [2002] propose dividing international student's decision making process into three stages:

– Student's initial decision to study abroad rather than in their home country, usually influenced by a series of push factors within the home country which encourage them to leave and study overseas.

- Researching the international HE market and selecting a country to study in, usually influenced by a combination of pull factors which make a particular country an attractive place to study.
- Deciding which particular HE provider to select from, influenced by pull factors which make a particular institution more appealing than its competitors.

Push factors can be explained as those that exist within the home country of a student and influence a student's final decision to undertake study overseas. In terms of push factors, Mazzarol and Soutar [2002], Maringe and Carter [2007], Baloch et al. [2018], Nghia [2019] and McLeay et al. [2020], point at a lack of access to higher education among many developing countries, for example in Asia and Africa; historical or colonial links between the home and host countries, a commonality of language, availability of science or programmes based highly on technology, geographical proximity, and perceptions of the tertiary education system available in the home country. Also important are the levels of economic wealth in the home country, especially GNP growth rate [Lee and Tan 1984, Agarwal and Winkler 1985, McMahon 1992, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, McLeay et al. 2020], the education opportunities available in the home country and the expected benefits of studying abroad [Agarwal and Winkler 1985, McMahon 1992, Baloch et al. 2018, McLeay et al. 2020].

Pull factors instead operate within the host country and host institution to make them relatively appealing to international students. In terms of host country, McMahon [1992] distinguishes such factors as: relative size of home country economy compared to host country, host's national political interests in the home country through foreign assistance or cultural links, economic links between source and host, and host nation's support of international students via scholarships. Other authors stress the importance of such factors as: international recognition of the host country [Binsardi and Ekwulugo 2003, McLeay et al. 2020], international education experience [Lin 1997, Maringe and Carter 2007, Baloch et al. 2018, McLeay et al. 2020], use of government promotion agencies [Mazzarol 1998, Maringe and Carter 2007, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], and image [Paramerawan and Glowacka 1995, Yavas and Shemwell 1996, Landrum et al. 1998, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020]. In the case of non-EU students, significant factors could be legal stability regarding visas [Maringe and Carter 2007, McLeay et al. 2020] and ease of university entrance and immigration procedures, which encourage students to study abroad [Binsardi and Ekwulugo 2003, Maringe and Carter 2007, McLeay et al. 2020].

Pull factors can also operate at a host institution level. Such factors could include: institution's reputation for quality [Hooley and Lynch 1981, Lin 1997, Mazzarol et al. 1997, Mazzarol 1998, Mazzarol and Soutar 2002, Soutar and Turner 2002, Cubillo et al. 2006, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020], market profile [Mazzarol 1998, Mazzarol and Soutar 2002, Cubillo et al. 2006, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], range of courses, alliances or coalitions [Hooley and Lynch 1981, Mazzarol 1998, Mazzarol and Soutar 2002, Soutar and Turner 2002, Cubillo et al. 2006, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017] including off-shore teaching programmes [Mazzarol 1998, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], staff expertise [Lin 1997, Mazzarol 1998, Mazzarol and Soutar 2002, Soutar and Turner 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, McLeay et al. 2020], degree of innovation [Mazzarol 1998, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], use of information technology [Mazzarol 1998, Mazzarol and Soutar 2002, Rashid and Raj 2006, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], resources, size of the alumni base and promotion and marketing efforts [Mazzarol 1998, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, McLeay et al. 2020], presence of students from students' home country [Mazzarol et al. 1997, Lin 1997, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Buchanan 2019, McLeay et al. 2020], customer focused organisational culture [Mazzarol 1998], use of government promotion agencies [Mazzarol 1998, Maringe and Carter 2007, Rem-

bielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], image [Paramerawan and Glowacka 1995, Yavas and Shemwell 1996, Landrum et al. 1998, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020], inclusion of accommodation [Maringe and Carter 2007], library facilities [Quereshi 1995, Price et al. 2003, Cubillo et al. 2006], and availability of computers [Price et al. 2003, Cubillo et al. 2006].

Apart from push and pull factors, there are other factors which are found within the students themselves, such as: overall level of knowledge and awareness of host country [Mazzarol et al. 1997, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Buchanan 2019, McLeay et al. 2020], recognition of host's qualifications in the home country [Mazzarol 1996, Mazzarol et al. 1997, Cubillo et al. 2006, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020], wanting to become a 'leader' in a field [Maringe and Carter, 2007], Referrals or recommendations from parents, relatives friends and other gatekeepers [Hooley and Lynch 1981, Mazzarol et al. 1997, Maringe and Carter 2007, Cubilllo et al. 2006, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020], cost issues including social costs such as travel, crime, racial discrimination [Mazzarol et al. 1997, Binsardi and Ekwulugo 2003, Cubillo et al. 2006, Maringe and Carter 2007, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020], presence of students and others from students' home country [Mazzarol et al. 1997, Maringe and Carter 2007, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, Buchanan 2019, McLeay et al. 2020, Di Pietro 2020], availability of part time work [Mazzarol et al. 1997, Binsardi and Ekwulugo 2003, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017] and work after the course [Lin 1997, Turner 1998, Soutar and Turner 2002, Binsardi and Ekwulugo 2003, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017], perception of physical and study climate and lifestyle [Mazzarol et al. 1997, Lin 1997, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018, McLeay et al. 2020], geographical proximity [Mazzarol et al. 1997, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017, Baloch et al. 2018], ethnocentrism and cultural proximity as well as socio-economic level [Cubillo 2006].

In order to recruit and retain students in what is an increasingly competitive environment many HEIs are increasingly adopting a more consumer-oriented approach [DeShields et al. 2005, Rashid 2007] especially bearing in mind that the era of 'universal free higher education' is long over. Studies have shown that many factors influence students' decision-making process but satisfied students may communicate with their peers and return to the alma mater for further study [Gruber et al. 2010].

NUMBER OF POLISH STUDENTS IN UK HE INSTITUTIONS

The addition of 10 new members to the European Union on 1 May 2004 (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, Slovenia) brought considerable changes for UK universities, as students from the new member states gained easier access to EU education in countries other than their own. This was particularly significant in the case of Polish students. According to the Universities and Colleges Admissions Service (UCAS) data in 2003 (just before Poland entered the EU), only 85 students from Poland were studying in the UK. One year later the situation had changed completely – in 2004, British universities admitted 499 students from Poland, and in 2005 they admitted 1,034 students. The overall number of Polish students in the UK was 8,380 as of 2018/2019 [HESA 2020a].

METHODOLOGY

The research was conducted prior to finalization of Brexit and involved five focus groups, with eight participants in each, totalling 40 Polish students studying in one of the northern UK universities. In terms of the demographic nature of the participants, 32 were enrolled in undergraduate programmes and eight were postgraduates. The majority of the programmes were business or language-related. Twenty eight partici-

pants were female and 12 were male. The age range was between 20 and 35. The majority of students had family networks that had already been established in the UK, and only some of them were studying and living in the UK on their own.

FINDINGS

According to the participants of the focus groups there are many reasons why they chose the UK as their study destination.

Push factors

Polish economy versus British economy

At the starting point of the discussion, participants of the focus groups explained the reasons why they had decided not to study in Poland. Surprisingly, only a minority pointed at the economic situation in Poland, which had prompted their parents to leave the country and consequently move the whole family permanently to the UK. When faced with making a decision where to study, students decided to stay close to their mother, father, and siblings.

One student stated: "After my dad was made redundant when his company closed down, for many months he couldn't find a job in Poland. The only breadwinner for our family was my mum, and it was really hard for us to live. After a number of family discussions the decision was made to move to the UK. First my dad moved, and once he settled in my mum decided we should all go there to live together. We have always been very close. I went to secondary school there and when the time came to choose my university it was out of question that I would leave the UK as I wanted to stay close to my family and friends."

Another student also supported it by saying: "So many people were leaving Poland in 2004, and my family saw better financial prospects in the UK so we packed and moved. Also my parents' sisters and brothers joined us, so now we are all here. I couldn't imagine studying away from my family so it was obvious I would choose a British university."

However, some students made a decision to leave Poland and their families in order to earn money abroad and then to study: "After I finished high school I was not sure what I wanted to study, as I had very many ideas. So I spoke to my friends, some of whom had already lived in the UK, and I decided to try various jobs before I knew what I want to do in the future. As I realised that I would earn peanuts in Poland if don't have an MSc, I thought the UK offered me more than my country. I packed and moved to live with my friends. I spent four years working in a factory making sandwiches and then I decided it was time for me to move further. By that time I had also improved my language skills so I felt confident I could study in the UK. Now I am a happy student of Finance and Accounting."

Lack of innovations in Polish institutions

When we discussed the reasons why students chose British institutions, the main push factor that was pointed out by Polish students was that Polish universities were not very innovative in terms of programme offerings, whereas British universities gave them flexibility in combining various modules so that they could study what they were really interested in. This is in line with several studies [Mazzarol 1998, Mazzarol and Soutar 2002, Rembielak et al. 2009, Rembielak 2015, Rembielak et al. 2017].

"I looked at the offer at Polish universities and I saw that the modules they offered students to study were really boring. I wanted something more exciting and I could only find it in the UK."

"After I finished my secondary education, I went to study at the University of Poznań. I studied Economics there for one semester only. Unfortunately, I was not happy with this programme and I decided to move to the tourist industry, as this was my interest. So I continued my education at the University in Poznań and I successfully completed one year, but I was not content with the course of studies, with the way it was taught. I started to search for other opportunities and as one of my friends had already been studying here I found out a lot about the way of life here, the university, so I used her help. Then I applied via UCAS."

"I finished a BA at the University in Kielce in English Studies, and after that I decided that I don't want to stay in my city any more, I want to go to some different place. I came to England just for the holidays to my cousin to Manchester, and after two months

I decided that it would be a great idea to study English in an English-speaking country, which would improve my English language skills. On the other hand when I started researching the offer from Polish universities I was not happy with the modules I would be studying, as it seemed to me that I would be studying about writing, etc. and that once I come to England this will come natural and I would be concentrating on studying how to teach. It would be theory and practise at the same time, which encouraged me."

Low level of customer service in Polish higher education institutions

Some students who had already had experience with Polish universities were not very happy with the customer service the institutions offered to them. They did not like the fact that in Poland the contact between student and lecturer was very formal and they felt their needs were not fully understood. This is in line with research by Mazzarol [1998] and Mazzarol and Soutar [2002].

"I had experience with a Polish university and I think that in Poland the contact between student and lecturer is more like between a Master and a student, whereas here it is more like friends. He/she accepts that you can have a different point of view or that even maybe you know more than him/her in certain areas, which I think is great. Discussions with students are very helpful and make you feel more involved in the studies as you know that somebody listens to you and it is important what you say."

"I agree with everything she said. I've had exactly the same experience. What is very important to me is that if I have a problem, I know that I can go to a lecturer and I can speak about it."

Favouring of British education by Polish businesses and expected benefits of studying abroad

Many students also stressed the fact that the Polish job market favoured graduates with British education qualifications at the expense of those with Polish qualifications. The image of the British education system is very positive in Poland, and is considered to deliver very high quality instruction. So UK graduates are very competitive in the Polish market due to the fact that their knowledge and expertise are expected to be really outstanding. This is in line with studies by Mazzarol [1996], Mazzarol et al. [1997], Cubillo et al. [2006], Rembielak et al. [2009], Rembielak [2015], Rembielak et al. [2017], Baloch et al. [2018], Buchanan [2019], McLeay et al. [2020]. Moreover, it is assumed that the English language proficiency of those graduates will be high, which definitely is an asset in collaborating internationally.

"If you graduate from a British university it is definitely better for you to find a prestigious job in Poland. Employers value you higher as they know you speak fluent English and you have more practical experience. You see, it is very hard in Poland to get practical experience when you are a student as you have so many hours of lectures and tutorials that it is physically impossible. You study a lot of useless stuff. In the UK you study what is needed for your job and usually you have at least one day free per week, which allows you to work."

Willingness to leave parents and become independent

Some students also stressed the fact that they wanted to leave their parents and 'learn to be an adult', which can be considered both as a push factor and a student factor. They also stressed the importance of being able to work part-time when studying at the same time. This is in line with studies by Mazzarol et al. [1997], Binsardi and Ekwulugo [2003], Rembielak et al. [2009], Rembielak [2015], Rembielak et al. [2017].

"I have always been close to my family and they had a lot of influence on my life and decisions. I started to feel a bit scared that as a single child I would never grow up so I thought the further away from my parents I move the better lesson of life I would get. My parents were really concerned at the beginning but they always supported me and understood my choice. I learned a lot in the UK both as a student and as a person. What was also important to me was I could work part time and earn my money."

Pull factors

Multicultural aspect

When discussing what prompted students to study in the UK, the majority of them stated that the main reason was that they wanted to experience multicultural

studies, and they believed they could only get that in the UK or the USA. However, since the UK is closer to Poland and the opportunities to study there as a citizen from another EU country are much easier, the choice was obvious. This is in line with Mazzarol et al. [1997] and Lin [1997].

"This diversity was one of the things which attracted me to come to study here because I found our Polish society as kind of homogenous. There are not many foreign people in Poland. I was missing this element in Poland. I was missing this kind of diversity and openness, other people, other cultures, religions, and so on. And hence I was excited to come here to experience it. I love to have people from all over the world in my class as it enriches me a lot. I believe it is amazing to share my opinions with some other people from other countries, culture or background, it opens your mind. You can learn a lot of things from these diversities and I do find it positive."

Geographical proximity

The majority of students pointed to the fact of a relatively short distance for travel between Poland and the UK. They claimed that the changes within the EU encouraged more people to migrate for work, which influenced travel companies to extend their offerings of cheap transport. This made the UK a very attractive place to study in, as it was very convenient for students to travel between Poland and the UK at a relatively small financial cost. This is in line with research by Mazzarol and Soutar [2002].

"For me this was the only country I considered. It was because of the changes in the European Union, which made it easy for me to come here, and study without problems, as we had an equal chance with all the other EU citizens, and also because it's the closest English-speaking country."

Language proximity

Although Poland is not an English-speaking country, it is spoken as a second language by the majority of young people, as it is mandatory to study English at primary and secondary school. It is also encouraged to raise children as bilingual, so from a very early age they get acquainted with the Polish and English language, and both of them become like a mother tongue to them. This makes the UK a very attractive place to study as students do not find it difficult to communicate and study in English.

Image

The image of the UK as a reliable and friendly country and British HE institutions as providing a high-level quality of service is a very important pull factor for Polish students. It was stressed by all of the participants in the focus groups. This is in line with studies by Paramerawan and Glowacka [1995], Yavas and Shemwell [1996], Landrum et al. [1998], Baloch et al. [2018], Buchanan [2019], and McLeay et al. [2020]. The UK is perceived as a very interesting country, with a multicultural society, interesting culture, traditions, and customs.

The high quality of British universities was stressed by many students not only in relation to its perception through the eyes of Polish people, but also worldwide. Obtaining solid British qualifications was perceived as a 'passport' to a global career. This is in line with research by Hooley and Lynch [1981], Lin [1997], Mazzarol et al. [1997], Mazzarol [1998], Soutar and Tourner [2002], Mazzarol and Soutar [2002], Cubillo et al. [2006], Rembielak et al. [2009], Rembielak [2015], Rembielak et al. [2017], and McLeay et al. [2020].

"I know of people who studied in British universities and then went back to Poland. They got very good jobs in teaching because the employer sees that that person studied in England and that he/she must have lived there and dealt with culture, and it looks really nice on the CV. Also if I want to stay here I heard that it is better to have a British degree. And also in different countries, if I want to go to Japan and teach they will accept me because I studied in England, so it gives you an international recognition."

"It's like a passport for a good work. If I want to get a good job in Germany in my field, I think it would be seen better, and I feel that I am starting from a good position."

The availability of internships, sandwich courses, which are on offer at British universities, are valued by students and prospective employers. This provides students with another distinctive feature which makes them competitive in the market.

"British universities offer internships so you really get practical experience and when you start a job you don't feel scared, as you are familiar with the system. This is something that is hard to get in Poland."

The majority of students also stressed the importance of appropriate teaching methods applied by staff. They really appreciated the practical approach and teaching by examples.

"I have always wanted to study in the UK as I heard a lot about the British education and I liked the way they teach here – the practical approach. That was my image of the British education."

Student loans

The majority of respondents were encouraged to study in the UK by student loans and bursaries. They felt that as EU members they could get the same financial support as British students and this encouraged them to prove they were worth the investment from the government. They also appreciated the universities' activities, such as loyalty bursaries, which was one of the factors contributing to their decision to choose a particular HE institution. This is in line with McMahon [1992] and Rembielak et al. [2009], Rembielak [2015], Rembielak et al. [2017], McLeay et al. [2020].

"The other very important factor was the European Union student loans, which really helped me financially. I also work, in a hotel, but the loan was extremely helpful. The fact that I can study and work at the same time also encouraged me to come here, and the employers here are very helpful to students, my contract is very flexible and if I have exams I just don't have to come to work."

"What also encouraged me was the excellence scholarship which I was given, it was 1,000 pounds less to pay, so I only paid 2,000. This was a great incentive."

"I got the loyalty bursary after one year and it was a great opportunity."

University programmes, the educational system and university facilities

The majority of Polish students pointed at the fact that they really appreciated the flexibility the programmes gave them, the choice of elective modules, and the fact that the master's degree programme runs for one year only, whereas in Poland it takes two years.

Most of the respondents appreciated the high level of university facilities, such as classrooms, the choice of books in the library, its opening hours and facilities, computers and all the IT equipment, and university accommodations. This is in line with research by Quereshi [1995], Price et al. [2003], Cubillo et al. [2006] and Maringe and Carter [2007].

"I am very satisfied. I like the library. I spend a lot of time there. I think it is good to have a lot of useful books there so I don't have to worry and I can access them."

"I agree, and the service is great, also the online access to the library. I can renew my books without even leaving my room. Staff in the library are very friendly, professional and helpful."

Many of the respondents stressed also the importance of the actual programmes being offered by the university and also the importance of league tables, which is in line with research by Hooley and Lynch [1981], Mazzarol [1998], Soutar and Turner [2002], Cubillo et al. [2006], Rembielak et al. [2009], Rembielak [2015], Rembielak et al. [2017], McLeay et al. [2020].

CONCLUSIONS

Globalisation has had a significant influence on the development of competition within the higher education sector. Enlargement of the European Union in 2004 brought many changes to member countries – old and new. The opening of borders and free movement between nations helped a lot of young people move to other EU countries to obtain a solid education. Polish students very quickly adapted to the new environment. When making decisions about what and where to study they were influenced by many factors, which either existed in their home country (push factors) or operated within the host country and host institution (pull factors). Results obtained from focus groups of Polish students studying at a British university showed a rather small significance of push factors in their decision making process – instead, a lot of pull factors played a very important role.

The respondents found the multicultural aspects of the UK very attractive. They wanted to have a broader perspective and felt that exposure to people representing various countries and cultures could help them open their minds. Although Poland and England do not closely border each other, the airline connections are so good that it makes the physical distance insignificant. And though there is no commonality of language between the two countries, the Polish educational system supports learning foreign languages and studying English is mandatory for all Polish pupils, so the English language is not a significant barrier.

One of the most important factors is the desire to obtain better knowledge in their area of study. Polish students feel that this can be obtained in the UK. They have a very positive perception of the UK as a country and of British HE institutions as providers of a high quality service which is valued worldwide.

Polish students have a free education system in Poland, but as they are aware that they are entitled to a number of scholarships and bursaries, they quite often choose the UK to study. Students feel that even if they still have to make some financial sacrifices, this makes a good investment for the future. They feel that obtaining an education in the UK will open their possibilities of making a career anywhere in the world. They are also convinced that once they go back to Poland, having graduated from a British university will make them more competitive in comparison to their colleagues who studied home.

The results of the research show that the reputation of a particular programme, university, and its staff, was a very important factor for students when selecting a HE provider. The responses indicate clearly that the university facilities, such as accommodations, library, and IT are very important factors for the prospective students.

Findings from this research indicated that pull factors are more important in recruiting Polish students to British universities than push factors.

Limitations

The research was conducted before the implementation of Brexit and before the COVID-19 pandemic. It would be interesting to see how these two factors affect Polish students' decisions to study abroad or just in the UK. As there is also a high probability that British universities will deliver all their programmes online in the 2020–2021 academic year, it would also be interesting to explore how this will affect students' recruitment to these countries.

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CZYNNIKI WPŁYWAJĄCE NA WYBORY STUDENTÓW I PODEJMOWANE PRZEZ NICH DECYZJE: STUDIUM PRZYPADKU POLSKICH STUDENTÓW STUDIUJĄCYCH W BRYTYJSKIEJ INSTYTUCJI SZKOLNICTWA WYŻSZEGO

STRESZCZENIE

Głównym celem tego artykułu jest zbadanie, które czynniki mają wpływ na podejmowanie decyzji studentów o studiach za granicą. Studium przypadku stanowią Polacy studiujący w brytyjskich uczelniach wyższych. Dokument analizuje proces podejmowania decyzji przez tych studentów w zakresie wyboru studiów uniwersyteckich. Przegląd literatury sugeruje, że istnieją dwa rodzaje czynników, które wpływają na ten proces: wypychające (ang. *push*), które działają w kraju pochodzenia, oraz przyciągające (ang. *pull*), co oznacza, że studenci są „przyciągani" przez kraj przyjmujący i zachęcani do studiowania tam. Polacy stanowią dość znaczną część studentów z UE uczących się w Wielkiej Brytanii, ale jest bardzo mało badań na tej konkretnej grupie. Wyniki badań jakościowych na Polakach studiujących na wybranym uniwersytecie brytyjskim wskazują, że w przeciwieństwie do wielu innych badań czynniki przyciągające mogą mieć większy wpływ na podejmowane decyzje polskich studentów w zakresie uczenia się za granicą.

Słowa kluczowe: studenci zagraniczni, polscy studenci, brytyjskie instytucje szkolnictwa wyższego, proces podejmowania decyzji, czynniki wypychające, czynniki przyciągające, wybór

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SHEEP MEAT PRODUCTION IN AUSTRIA AND POLAND – SIMILARITIES AND DIFFERENCES

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ABSTRACT

The aim of the article was to compare sheep meat production in Austria and Poland. The level of sheep population in both countries was similar. The sources of the materials were a literature review and data obtained from Statistics Austria and Statistics Poland. The research period concerned the years 1992–2018. Methods of data analysis were used, such as constant dynamics indicators, Gini coefficient and Lorenzo curve, Pearson correlation coefficients. A number of differences were found, e.g. in the direction of changes in the size of the sheep population, the scale of total slaughtering and industrial slaughtering, the share of self-supply in total meat production, traditional consumption of lamb during holidays, the average carcass weight of sheep, prices of lamb meat, interdependence of the sheep population with changes in economic parameters. The similarities concerned the level of concentration of the sheep population and their regional slaughtering, prejudices regarding the consumption of lamb, the share of lambs in slaughtering and meat production, the productivity of meat obtained from the slaughter of sheep.

Key words: sheep production, slaughter of sheep, lamb meat, lamb price
JEL codes: Q10, Q11, Q13, Q18

INTRODUCTION

Historically, sheep have played an important role as a versatile species, but since the mid-19th century their importance in Europe has been steadily diminishing [Sandgruber 2002]. Examples of such countries are Austria and Poland. In Austria, the main product obtained from sheep was meat, followed by milk. This is due to the structure of maintained sheep (only 15% were dairy sheep) [Greimel et al. 2002]. The importance of wool was insignificant, as the revenue from its sale covered only the costs of shearing sheep. In Austria, however, sheep play an important role in maintaining the landscape, which is characterized by a high proportion of mountains and meadows. Around 85% of all sheep were kept in the high, low and submontane Alpine areas [Patzelt 1987, Hambrusch and Kirner 2008]. The problem in Austria was the decreasing area of hay pastures in subsequent years where sheep were grazing [Guggenberger et al. 2014]. The regular grazing of sheep on mountain slopes helps to prevent shrubs from entering, strengthens the slopes by kneading the animals' hooves and thus maintains an open cultural landscape. The beautiful landscape in turn is important for tourists visiting the country [Nöbauer 2014].

Sheep production in Poland reached its peak in the 1980s, when the sheep population was around 5 million. The introduction of the market economy had a negative impact on agriculture, especially on sheep production. The most important reason for the lack of profitability

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in this activity was the liquidation of subsidies for wool and the drop in prices of this raw material on world markets [Niżnikowski 2003]. As a result of these changes, meat became the most important product obtained from sheep, while wool lost its importance [Niżnikowski 2011]. Many sheep farmers have taken up more profitable agricultural activities, with only a few sheep producers remaining on the market. As a result, attempts have been made to halt the decline and rebuild the sheep population. The Programme for Improving Fertility and the Programme for Improving the Sheep Population until 2010 developed by the Ministry of Agriculture and Rural Development were implemented [Niżnikowski 2005]. However, their objectives were not achieved, as the budget for the Biological Progress Fund, from which subsidies for sheep producers were paid, was systematically reduced [Berdychowska et al. 2004].

Sheep production in Poland is defined as an activity complementary to other agricultural activities. However, sheep compete in feed with cattle and goats. The sheep have characteristics that make them predisposed to grazing on permanent grassland on poor and difficult to reach soils, which gives them an advantage. Mountain areas are a natural place for breeding sheep, but this activity is carried out throughout the country [Musiał and Musiał 2016]. In the Podlasie region, sheep farm permanent grassland on class V and VI soils. In Wielkopolska, these animals make excellent use of by-products and feed of lower quality, e.g. from sugar beet production. In general, many production systems and technologies are used [Borys 2006, Szymanowska et al. 2014].

The aim of the article was to compare sheep meat production in two countries: Austria and Poland. The level of sheep population in both countries was similar. The comparison will concern aspects related to the meat use of sheep, i.e. industrial and total slaughtering, meat production, meat prices and links between sheep production and selected parameters in agriculture and economy.

MATERIALS AND METHODS

The sources of the materials are literature reviews and data obtained from Statistics Austria and Statistics Poland. The research period was varied. The sheep population was presented in a longer period of time in order to show the changes and tendencies occurring. Data on total slaughterings, meat production, meat productivity and meat prices concern the years 2007–2018. The paper uses methods of data analysis, such as constant dynamics indicators, Gini coefficient and Lorenzo curve, Pearson correlation coefficients. These methods are suitable for analyzing this type of data. The results were presented using descriptive, tabular and graphical methods.

RESEARCH RESULTS AND DISCUSSION

The production of lamb meat depends on a number of factors, such as the way the animals are fed, the breed and the productivity of the slaughterhouse. The most important factor is the number of sheep. Between 1992 and 2018, the Austrian sheep population remained relatively stable, similar to that of the 1940s (Fig. 1). The lowest number of sheep in this country was in 2002 (304,000 sheep), and the highest number in 2018 (406,000 sheep). During the period considered, there were, of course, decreases and increases which lasted several years. In the last four years, the number of sheep in Austria has increased from the period under consideration. The sheep population in Poland in 1992 was still very high (1.5 million head). However, this was a legacy of the previous economic system. The number of sheep kept in Poland fell dramatically and in 1999 the number of sheep kept in Poland equaled the level in Austria. The decrease in the number of sheep in Poland continued, but was not so great. The lowest level was achieved in 2014 (201,000 sheep). From 2015, as a result of the activity of the Chambers of Agriculture, payments have been introduced for animal production, including sheep. In the EU budget perspective (2015–2020), the Ministry of Agriculture and Rural Development included sheep in the production subsidy of EUR 25 per ewe (mother). As a result of this support, the sheep population increased, but the scale of the changes was small. The state of the sheep population in Poland was closely related to the level of support for sheep production [Klepacki 2005, Rokicki 2015, 2017]. In the final year of the analyzed period, there were 267,000 sheep in Poland, which, however, constituted only 18% of the 1992 populations. For comparison, the sheep population in Austria increased by 30% between 1992 and 2018.

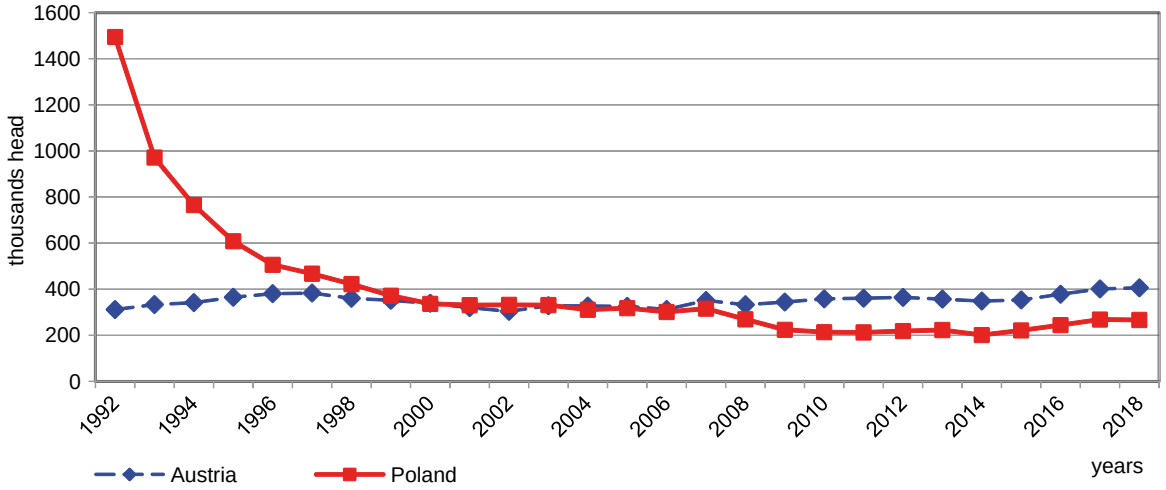

Fig. 1. Population of sheep in Austria and Poland between 1992 and 2018 (stocks on 1 December)
Source: Authors' own study based on Statistics Austria, Statistics Poland.

The Gini coefficient was used to determine the concentration of sheep in the regional approach (Bundesländer and voivodeships). A result close to 1 indicates a very high concentration of livestock, while a result close to 0 indicates a dispersion of animals in many regions. The Gini coefficient calculated for the Austrian sheep population in 2018 from the sample was 0.40 and the estimated coefficient for the population was 0.45. This means an average concentration of the sheep population in several Austrian Bundesländer. Production differentiation is additionally shown by the Lorenzo concentration curve (Fig. 2). In 2008, Gini coefficients were at a similar level, i.e. 0.41 from the sample and 0.46 estimated for the population, respectively. This means that the concentration of sheep in Austria has remained unchanged. Similar calculations were made for the sheep population in Poland. There was a slightly higher concentration of sheep than in Austria. In 2018 the Gini coefficient from the sample was 0.46 (estimated at 0.49), while in 2008 it was 0.47 (0.50). In the case of Poland, there were also no significant changes in the concentration of sheep in voivodeships.

A similar analysis was made for the slaughter of sheep by Bundesländer in Austria and by voivodeships in Poland. In the case of Austria, the Gini coefficient for 2018 was 0.52 for the sample and 0.58 for the estimate, and 0.49 and 0.55 for 2008 respectively. This means a higher concentration of slaughterings in one or more federal states. For Poland, the Gini coefficient for sheep slaughtering in 2018 was 0.44 from the sample and estimated at 0.47, while in 2008 it was 0.51 and 0.54, respectively. This means a decrease in the concentration of slaughters only in a few voivodeships and their distribution to other regions. In the case of slaughter in both countries, this was possible outside the place of purchase of the lambs. The companies in operation bought lambs in many regions and slaughtered them in a slaughterhouse known to them and with which they cooperated. The concentration levels of the sheep population and slaughterhouses in Austria and Poland were at a similar level. In both countries, the concentration ratio was also higher for sheep slaughtering than for cattle. In the countries surveyed there was a relatively stable structure for the parameters surveyed, with very small changes.

In terms of sheep meat consumption, an interesting aspect was the tripling of sheep meat consumption in Austria from around 300 g per capita in 1985 to over 1 kg at the beginning of the 20th century. One of the reasons for this was the immigration to Austria of certain ethnic groups consuming lamb. Despite the fact that the consumption of this meat per capita increased three times, it was still small. However, the importance of beef decreased in the given period, the consumption of poultry meat grew steadily and pork remained at a similar level [Willerstorfer 2012]. In 2017, the consumption of lamb meat in Austria was approximately 1.1 kg per capita. It was a very small percentage compared

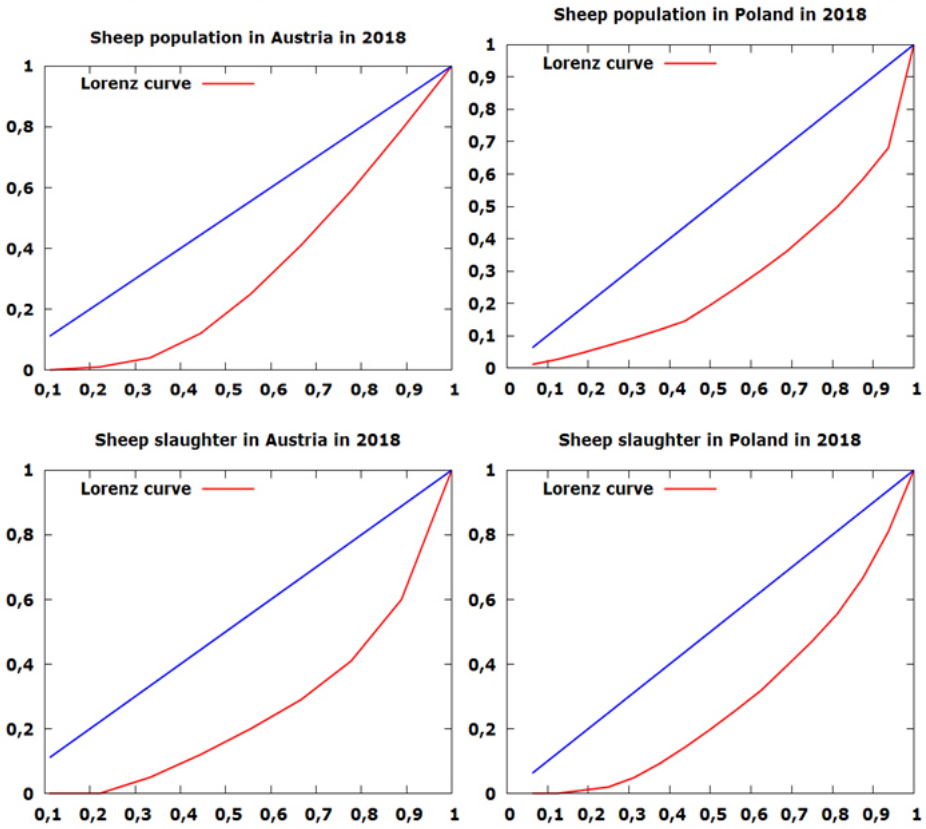

Fig. 2. Lorenzo concentration curves for sheep population and sheep slaughtering in the Austrian Bundesländer and in Polish voivodeships in 2018

Source: Authors' own study based on Statistics Austria, Statistics Poland.

to the total consumption of meat per capita of 64 kg (only meat for human consumption). The domestic consumption of meat in Austria was around 850,000 t. The degree of self-sufficiency was 108% for total meat. Pork dominated with the consumption of 37.2 kg per capita, which corresponds to the level of self-sufficiency of 101%. Beef and poultry were ranked second in terms of consumption per person of 12 kg each and self-sufficiency of 140 and 68% respectively [Grüner Bericht 2018]. For lamb meat, the self-sufficiency rate was only 80%. This situation in sheep production and the expected decline in the volume of beef were good conditions for trade in lamb on the Austrian domestic market. Sheep meat constituted a small percentage of the turnover and meat from young animals was offered. Lamb consumption was low because of its bad image, due to the sheep meat that was offered in previous years. The ordinary consumer does not distinguish between lamb and sheep [Ringdorfer 2003]. Nowadays, around Easter, Austrians eat 230 t of lamb meat. The consumption of lamb meat during the Christmas period [Kattinger 2017] is also very popular.

In Poland, trends in the consumption of lamb meat are similar to those in Austria. Similarly, offering old sheep for sale in earlier periods has led to reluctance on the part of some customers. In addition, lamb meat for Poles is one of the most expensive, so they are more likely to eat pork (40.5 kg in 2017) and poultry (30 kg). Less popular is beef (2.2 kg). In Poland, the total annual consumption of meat per capita was 78.5 kg. Lamb meat was eaten only at 40 g, i.e. within the limits of statistical error. In Poland, there is no tradition of eating lamb meat during major holidays [FAMMU/FAPA 2016, GUS 2018].

In both countries, economic slaughter for the needs of the farmer's family is possible. In addition, some animals were exported to other countries. Especially in Poland, such a situation was frequent. The remaining animals were placed on the domestic market and had to be slaughtered in professional slaughterhouses. In Austria, many more sheep were slaughtered industrially than in Poland (Fig. 3). Similar trends can be observed in both countries. In general, more and more sheep were slaughtered (in Austria, the increase between 2009 and 2018 was 26%, and in Poland as much as 188%), and declines and increases occurred in similar years during the period under consideration. Additionally, in Poland, the importance of live lamb exports was systematically decreasing in favor of meat sales on the domestic market. In Austria, most of the animals were destined for the domestic market. The demand for lamb meat in Austria was very stable.

Industrial slaughterhouse is also broken down by month (Fig. 4). In Austria, increased slaughter rates

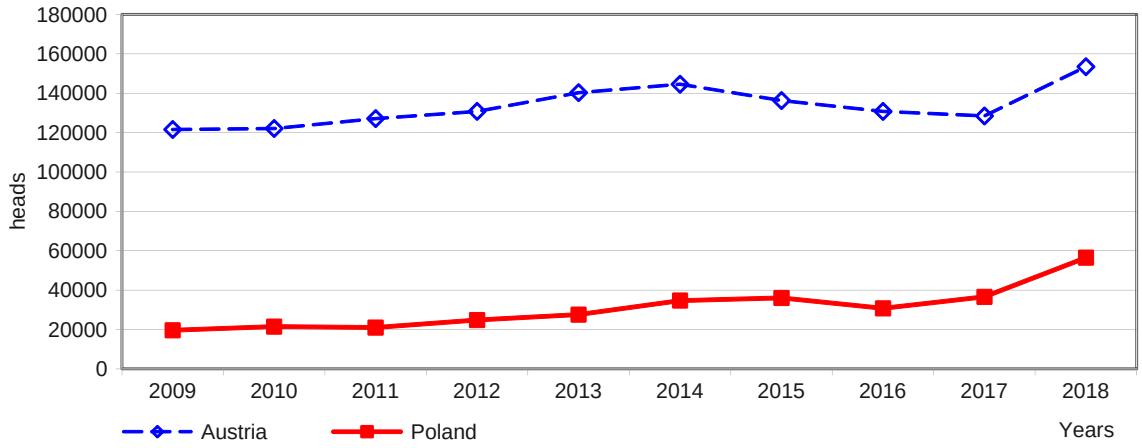

Fig. 3. Industrial slaughter of sheep in Austria and Poland in 2009–2018

Source: Authors' own study based on Statistics Austria, Statistics Poland.

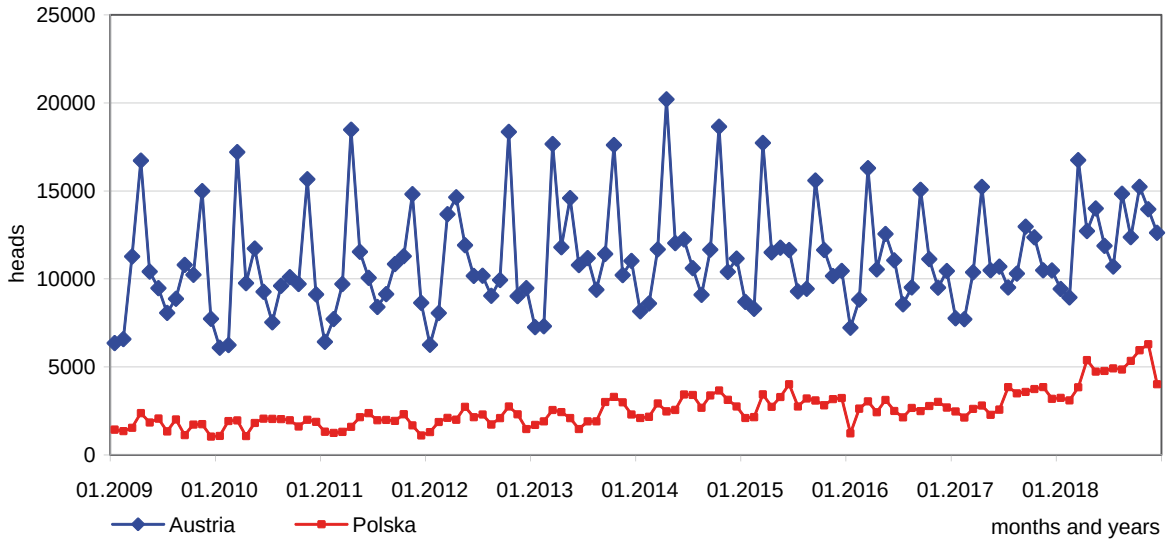

Fig. 4. Monthly industrial slaughter of sheep in Austria and Poland in 2009–2018

Source: Authors' own study based on Statistics Austria, Statistics Poland.

were recorded in the immediate run-up to the major holidays: Christmas and Easter. In Poland, no such regularity was observed. Both countries are very Catholic and celebrate solemnly served holidays. In Poland, however, there is no tradition of eating lamb on holiday days. Interestingly, most slaughters were recorded in the summer months, such as June and July. This may be due to increased consumption of lamb during vacations, directly at the places of rest. Then there is an opportunity to try something different and exquisite.

Taking into account the total number of sheep slaughtered, it was much higher than only the industrial slaughter (Fig. 5). In Austria, half of the sheep were slaughtered outside industrial slaughterhouses, and in Poland the proportion of such sheep was as high as 65%. This high proportion of self-slaughtering testifies to the high consumption of lamb meat by farmers and their families. The statistics on lamb meat consumption are largely determined by them. Meat production was closely correlated with the number of slaughtered animals, which means some stabilization in terms of consumers' market preferences. In both countries, mainly lambs were slaughtered. In Austria, their share in the total number of slaughtered sheep in each year was 75–80% in terms of number of heads and 66–72% in terms of meat production. Similar results were achieved in Poland. Total slaughter of sheep in Austria increased by 20% in terms of number of slaughtered animals and by 17% in terms of meat over the period considered. In Poland, decreases of 50% and 45% were recorded respectively.

To compare consumer markets, information on the average weight of the carcass being slaughtered and the meat yield obtained is also important. In Austria the carcass weight was much higher than in Poland, because in the years under study it ranged from 22.63 to 25.29 kg (Fig. 6). In Poland it was from 12.97 to 14.47 kg respectively. Since the structure of the slaughtered sheep in both countries was around 75% lamb, it can be concluded that the average carcass weight of the slaughtered lambs in Austria was much higher. The animals were fattened to a weight of over 40 kg, which was rare in Poland. For export purposes, lambs weighing even less than 20 kg and most often in the range of 22–25 kg were exported. On the Polish market, lambs weighing 30–40 kg were sold most often. Fattening above 40 kg was less popular. The average meat yield at slaughter was almost identical in both countries, except for the years 2013–2014, when Austria achieved a much higher result (50%).

Another aspect of comparison is the prices obtained for lambs per kg of carcass weight (Fig. 7). Farmers in Austria received significantly higher prices. In addi-

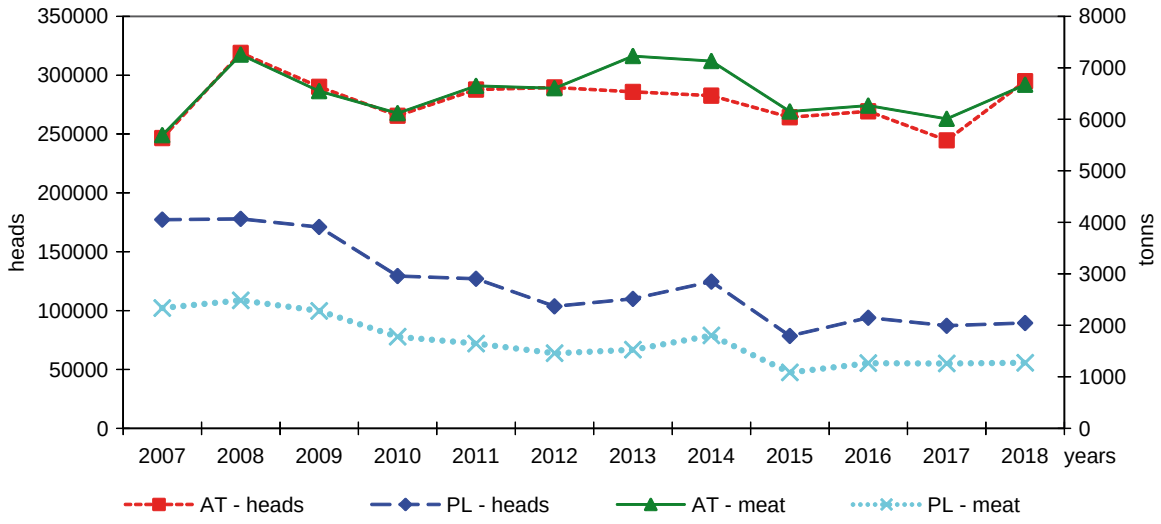

Fig. 5. Total slaughter in pieces and sheep meat production in Austria and Poland in 2007–2018

Source: Authors' own study based on Statistics Austria, Statistics Poland.

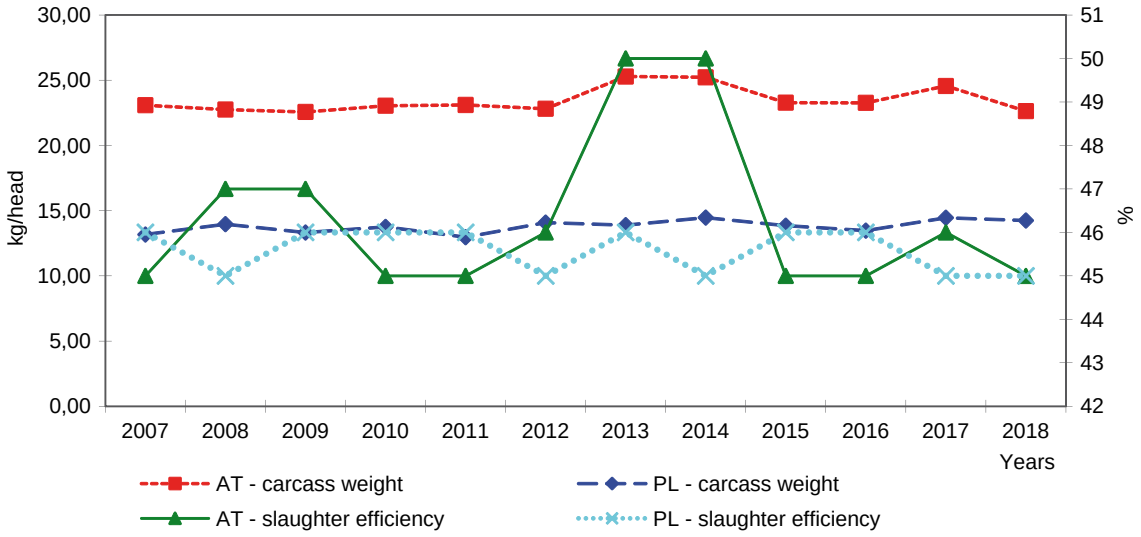

Fig. 6. Average carcass weight and slaughter yield of sheep in Austria and Poland 2007–2018
Source: Authors' own study based on Statistics Austria, Statistics Poland.

tion, in Austria prices were actually rising steadily. In Poland, since 2012, there have been alternating periods of declines and increases. As a result, the difference between prices per kg of carcass in Austria and Poland increased. The smallest difference was EUR 1.21 in 2011 and the largest was EUR 2.09 in 2017. The average price per kg of lamb carcass in Austria during the period considered increased by 24% and in Poland by 26%. However, the difference did not decrease, but deepened, due to a different starting point. Prices in a given country are usually adjusted to the capabilities of the society. However, in the case of good quality but expensive lamb meat, it is difficult to ascertain the adjustment of the price to the wealth of domestic consumers' portfolios.

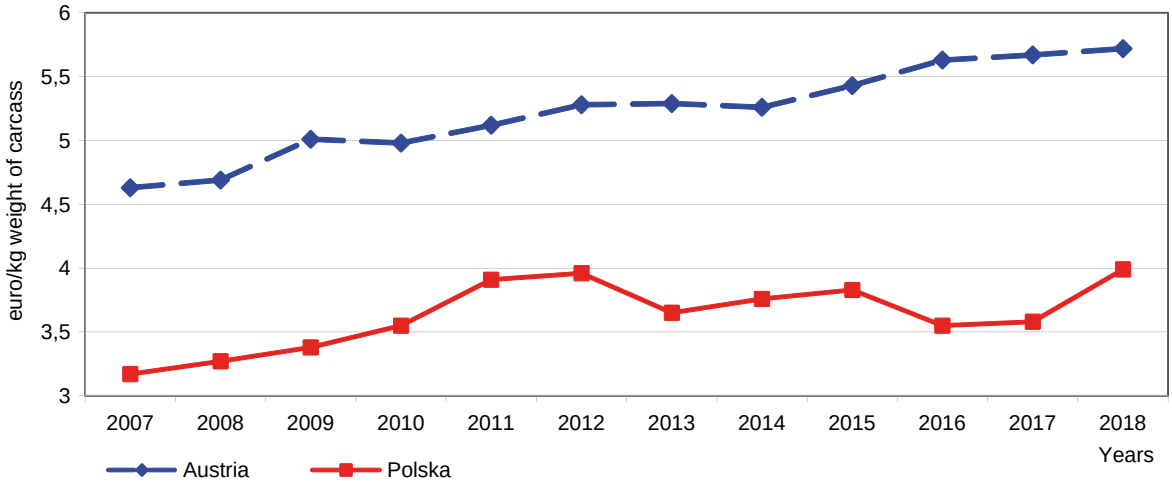

Fig. 7. Average annual prices of meat from heavy lambs in Austria and Poland in 2007–2018
Source: Authors' own study based on Statistics Austria, Statistics Poland.

Pearson's linear correlation coefficient was used to determine the correlation between sheep population, meat production and number of slaughterings of sheep and economic parameters. The tests were carried out separately for Austria and Poland. The analysis period covered the years 1999–2018. Table 1 presents the results and shows the *p*-value. The significance threshold was set at $p = 0.05$. The tests carried out confirmed that the values *X* and *Y* were correlated at the given materiality level. Significant correlations were marked with bold in the text.

A strong positive correlation was found between the size of the sheep population and economic parameters in Austria. In the case of Poland, there was a negative correlation. In both countries the economic parameters were systematically improving, but in Poland the number of headcount decreased and in Austria the number of headcount increased. The situation was strongly influenced by the appropriate conditions for sheep farming, mainly in the economic sphere. In both countries, the stocking density changed in the opposite direction to that of the sheep population, but only the results in Austria were relevant. In this country, cattle competed for access to grassland. In Poland, some of the meadows were unsustainable (on arable land), which made it possible to adapt the area to the needs of production. An analysis of the relationship between the sheep population and other agricultural parameters was also considered. The number of sheep per 100 ha of UAA was correlated with the number of head, while in the case of grassland, e.g. in Austria, the area remained relatively constant. The level of plant fertilization would also be a misleading parameter. Austria had a high percentage of organic farms that did not use artificial fertilizers. The same was true for plant protection measures. Therefore, these parameters were not analyzed after the substantive assessment. Correlation of meat production and number of slaughtering with economic and agricultural parameters was significant only in Poland. The lack of significant results for Austria may be due to the fact that fewer lambs are used for meat during the growing period of the herd.

There is no tradition of eating lamb in Poland and Austria. With greater promotion of this type of meat, domestic demand may increase, which will increase the sheep population. In Austria, the sheep population and lamb meat production will increase very slowly. In Poland, it is expected to maintain the existing state [Rokicki 2017, Grüner Bericht 2018].

CONCLUSIONS

The sheep population in Austria and Poland in the last dozen or so years has been at a similar level, but in Austria a slight increase in the population of these animals can be observed, while in Poland a decrease can

Table 1. Pearson's linear correlation coefficients between sheep population and economic parameters

Tested parameters	Pearson's linear correlation coefficients			
	Austria		Poland	
	R	*p*	*R*	*p*
Correlation coefficients between the sheep population and				
GDP	0.797	0.001	–0.802	**0.001**
GDP per capita	**0.781**	**0.001**	**–0.798**	**0.001**
Final consumption of households	**0.790**	**0.001**	**–0.825**	**0.001**
Final consumption of households per capita	**0.770**	**0.001**	**–0.825**	**0.001**
Export of goods and services	**0.760**	**0.001**	**–0.726**	**0.001**
Import of good and services	**0.778**	**0.001**	**–0.748**	**0.001**
Stocking density per 100 ha UAA	**–0.594**	**0.006**	–0.235	0.319

Source: Authors' own study based on Statistics Austria, Statistics Poland.

be observed. The level of sheep population concentration in both countries was similar (Gini coefficient was around 0.40–0.47), i.e. these animals were kept in higher numbers in several Austrian Bundesländer or Polish voivodeships respectively. The concentration was slightly higher in the case of sheep slaughtering, because Gini coefficients in both countries in 2018 were in the range of 0.44–0.52. The concentration of slaughtering decreased in Poland and increased in Austria. Differences in the concentration of the sheep population and the number of slaughterings resulted from the purchase of lambs from several regions by purchasing entities and slaughtering in the cooperating slaughterhouse located in one region.

The annual consumption of lamb meat in both countries was low. In Austria it was about 1.1 kg per capita, and in Poland it was within the limits of a statistical error, i.e. below 100 g. In Austria, there was a tradition of eating lamb meat during Easter, while in Poland there was no such approach. In both countries, there were consumer prejudices against this meat, which can be eliminated by appropriate promotional campaigns.

The level of industrial slaughter indicates the marketability of the animal production in question. In Austria, more animals were marketed. In both countries there were similar changes in the number of slaughters. In the countries surveyed, around 75% of the slaughtered sheep were lambs, which was a very positive aspect. Analyzing the monthly changes, greater seasonality occurred in Austria, where the largest number of slaughters took place in the months immediately preceding the main religious holidays. There was no such concentration in Poland. Meat production was closely correlated with the number of slaughtered animals.

In Austria, larger animals were slaughtered because the average carcass weight was 25 kg, while in Poland it was only 13–14 kg. The standards and expectations of consumers were different. In Poland the maximum expected weight of lamb did not exceed 40 kg – in export to Italy, it was even below 25 kg. In Austria, lambs weighing more than 40 kg were slaughtered. Interestingly, the different carcass weight did not affect the meat yields obtained from these animals. In both cases they amounted to 45–46%.

The prices obtained for lambs per 1 kg of carcass were significantly higher in Austria, where there was a continuous increase in prices, while in Poland the trend was generally increasing, but there were periods of decline. The biggest difference in prices between countries was as much as EUR 2.09 per kg carcass weight. The higher wealth of citizens in Austria also had a significant impact on the price.

Different results were achieved in both countries when comparing the relationship between the sheep population and economic parameters. In Austria, the sheep population increased with the improvement of economic parameters. The economic situation in Poland was good, but the number of sheep was decreasing at that time. Farmers replaced sheep production with more profitable agricultural activities or abandoned agriculture. In Austria, sheep farming production was more closely linked to landscape conservation and therefore developed. Austria was also characterized by a greater stabilization of agriculture.

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PRODUKCJA MIĘSA OWCZEGO W AUSTRII I POLSCE – PODOBIEŃSTWA I RÓŻNICE

STRESZCZENIE

Celem artykułu było porównanie produkcji mięsa owczego w Austrii i Polsce. Poziom pogłowia owiec w obu tych krajach był na zbliżonym poziomie. Źródła materiałów stanowił przegląd literatury oraz dane pozyskane z austryjackiego Bundesanstalt Statistik Österreich oraz polskiego Głównego Urzędu Statystycznego. Okres badań dotyczył lat 1992–2018. Wykorzystano metody analizy danych jak wskaźniki dynamiki o podstawie stałej, współczynnik Giniego i krzywa Lorenza oraz współczynniki korelacji liniowej Pearsona. Stwierdzono występowanie wielu różnic, np. kierunku zmian wielkości pogłowia owiec, skali ubojów ogółem i ubojów przemysłowych, udziału samozaopatrznia w produkcji mięsa ogółem, tradycji spożywania jagnięciny w okresie świąt, średniej masy tuszy owiec, cen mięsa jagnięcego, współzależności pogłowia owiec ze zmianami parametrów gospodarczych. Podobieństwa dotyczyły natomiast poziomu koncentracji pogłowia owiec i ich ubojów w regionach, uprzedzeń dotyczących spożywania jagnięciny, udziału jagniąt w ubojach i produkcji mięsa, wydajności mięsa uzyskiwanej przy ubojach owiec.

Słowa kluczowe: produkcja owczarska, ubój owiec, mięso jagnięce, cena mięsa jagnięcego

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CHANGES IN THE STANDARD OF LIVING IN POLISH HOUSEHOLDS AGAINST THE BACKGROUND OF OTHER EUROPEAN UNION COUNTRIES

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ABSTRACT

The primary aim of the article is to present changes in the standard of living in Polish households against the background of other EU countries. It starts with definitional approaches that distinguish the standard of living category from the quality of life category. The methods of measuring the standard of living of households in the European Union are presented. Next, the living standards of households in EU countries in 2008–2018 are presented. The last part of the study refers to the demand for food – Poland against the background of other EU countries – over the last decade. Quantitative research of income elasticity is also presented. The conclusions show that inequalities in the standard of living in various EU countries result from many factors, especially differences in the level of their development, and their technological and educational opportunities.

Key words: standard of living, purchasing power standard, actual individual consumption, Gini coefficient
JEL codes: B12, B21

INTRODUCTION

When assessing the standard of living in a particular society, it is necessary to take into account many factors, which include both economic and social aspects. The notion of a standard of living is related to a person or household's possibility and degree of satisfying material and non-material needs – this helps determine the quality of life of households. From an economic point of view, household income and expenses emerge as the most important elements in determining the standard of living and its changes. Income stratification, which leads to inequalities across Poland and other EU Member States, is considered to be a significant threat to living standards. The measure applied to assess the above-mentioned inequalities is the value of the Gini index, which has increased in recent years in most Eastern European countries, including Poland, and tends to be stable in Western European countries. Changes in the level of the indicator may result from the relatively low purchasing power parity of average households, even with a rising salary trend. This tendency may be observed in most post-communist countries such as Bulgaria, Romania, Hungary, Greece, Latvia, Estonia and Poland. A marked polarisation of income in individual EU countries implies that there are significant differences in the share of consumer spending and the level of household consumption. The effect of this tendency is to deepen material poverty while also increasing the material wealth of societies. This is also reflected in assessments of levels of satisfaction of needs and quality of life.

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The presented study focuses on the economic dimension of the standard of living in households. Particular attention is paid to income disparities in post-communist countries, i.e. the region which includes Poland, in order to indicate the significant disparities which still exist between the countries of Eastern Europe and the highly developed areas of Western Europe. The primary aim of the article is to present changes in the standard of living in Polish households against the background of other EU countries.

LITERARY REVIEW

Definitions and measures related to the assessment of the standard of living

Measuring the level and quality of life requires researchers to define these concepts in advance. The theoretical basis of research into the level and quality of life is of interest to scientists and academics around the world, representing various fields of knowledge, such as sociology, statistics and economics. There are two basic definitional approaches that distinguish "the standard of living" from "the quality of life". The first approach is based on the classification of groups of needs [Allardt 1989]. Allardt linked the standard of living category to material needs, i.e. with the factor of having. On the other hand, the quality of life category covers non-material needs, characterised by emotional states and a sense of existence (referring to the ideas of loving and being). In presenting the concept of measuring well-being, Allardt pointed out that this measurement should take into account the standard of living and quality of life, using both objective and subjective evaluations. The concept presented by Allardt has been applied by Luszniewicz and Słaby. Luszniewicz defines standard of living as "the degree to which material and cultural needs of households are met by streams of paid goods and services and by collective consumption funds" [Luszniewicz 1982, p. 11]. According to Słaby, "the standard of living is the degree of satisfying material and cultural needs with the existing infrastructure which makes the process of satisfying the needs possible [...], while the quality of life includes all these elements that are related to human existence, being someone, having a family, colleagues and friends" [Słaby 1990, p. 25].

Another common method of distinguishing between the level and quality of life categories is related to measuring the degree of need satisfaction, rather than to the types of needs covered by the measurement. According to this approach, the standard of living is a description of the degree to which needs are satisfied by means of objective assessments, and the quality of life is a subjective evaluation (perception) of the degree of satisfying the needs. However, the areas of life that are covered by these categories and subject to observation and assessment are – or can be – identical. In the case of objective assessments, the needs of the surveyed individuals (individuals, households) are met regardless of their personal valuations in this regard. In the subjective approach, the assessment of the level of to which needs are being met is conducted by the parties involved (individuals, households). It is apparent that the concepts of the standard of living and quality of life are not unequivocal, and their definition depends on the researcher's perspective [Słaby 2007].

The approach to measuring the degree of satisfaction of needs (well-being) is based on two different systems which are applied to evaluate the level of satisfaction of needs and the overall satisfaction with this level. In the first case, we deal with an objective approach, while the second is subjective. This perspective on the research problem discussed in this article can be found, among others, in the studies conducted by OECD [2011], Center for Research and Methodology [Berger-Schmitt and Noll 2000] and in conceptual work carried out in the European Union [Szukiełojć-Bieńkuńska and Walczak 2011].

Another important consideration contained in this paper concerns the method of measuring the standard of living of households in the European Union. Two basic measures are applied in this case, namely: the purchasing power standard (PPS) and actual individual consumption (AIC), which are the basic indicators used to compare the economic situation of people living in households in Poland and other EU Member States. PPS represents a common reference currency unit applied in the EU to convert aggregated economic data in such a way as to enable spatial comparisons through eliminating differences in price levels between the EU Member States. In theory, 1 PPS allows a consumer to buy the same part of a specific basket of

goods and services in every economic area. The PPS exchange rate used for reference purposes in the local currency is determined on the basis of the price level in a given economy in relation to the average price level across the EU.

Actual individual consumption per capita is expressed in PPS units. It is the most important variable that the European Statistical Office (Eurostat) takes into account when determining the overall level of well-being in a given country. The AIC is calculated based on the quantity of products and services purchased by individual households. This measure also takes into consideration the goods received through various types of governmental and non-profit organisations (e.g. health care, education, support for families, etc.). The AIC is of great importance in terms of conducting various statistical analyses and forecasts that cover the area of the entire European Union and the European Free Trade Association (EFTA). This data is important primarily from the point of view of making various external decisions (mainly through Community bodies) and coordinating the work of national statistical offices. The annual analysis of the AIC index aims to unify standard test methods and consolidate general national statistics among the EU Member States.

The assessment of the standard of living in households is associated with the analysis of income inequalities in a particular society. For this purpose, the Gini coefficient is applied. The Gini index is also referred to as the social inequality index, and it is used to measure and express the uneven distribution of household income in numerical values. The Gini index, based on the Lorenz curve, shows the income inequality of a society. This indicator should be interpreted as follows: the higher the value of the index, the greater the income inequality which is recorded in a given country. The Gini index takes a value between 0 and 1 (or if we multiply it by 100, between 0 and 100). If all persons have the same income, the coefficient reaches 0 (homogeneous distribution); the index equals 1 if all but one person have zero income. Thus, the higher the value of the index, the greater the degree of concentration of income and the greater its diversity [CIA 2012].

RESEARCH METHODS AND SOURCES OF INFORMATION

The paper is based on secondary data, gathered from a wide range of sources. It relies on literary review presenting basic definitional approaches of the main concepts. The empirical part of the paper relies on the data report from the EU-SILC survey of 2018, data published by Eurostat and the Statistics Poland (Główny Urząd Statystyczny – GUS). The comparative analysis covers the years 2008–2018 on the basis of the sources mentioned above. The basic indicators used to compare the economic situation of people living in households in Poland and other Member States are the purchasing power standard (PPS) and actual individual consumption (AIC). The disposable income in PPS and AIC is used to estimate the material welfare of households in EU countries. Using the Gini coefficient, an analysis of income inequalities in EU countries was conducted. Finally, the results of food consumption income elasticity from a household perspective for the basis of a comparative analysis for Poland on the background of other EU countries, based on Kehlbacher [2012] and the author's own research. The source of information for conducting this research was data from household budgets collected by Statistics Poland.

STUDY RESULTS

Living standards of households in EU countries from 2008–2018

Disposable income, presented in the purchasing power standard (PPS), helps measure changes in the economic situation of households in Poland and in other EU countries. Disposable income was calculated on the basis of data from a survey carried out in 2018. It refers to the year preceding the survey (from January to December 2017). The reference year for the analysis of changes in disposable income was 2008 and 2015 [Eurostat database 2019].

Wide differentiation in disposable income is observed among EU countries. The highest disposable income in 2018 was earned by eleven countries of the "old" Union (Luxembourg, Austria, Germany, Denmark, the Netherlands, France, Belgium Ireland, Finland, Sweden and the United Kingdom). The difference

between the country with the lowest (Greece) and the highest income (Luxembourg) is PPS 27.5 thousand [Eurostat database 2019]. Post-communist countries, which joined the EU in 2004 or later, had disposable income below the European Union average (Slovenia, Estonia, the Czech Republic, Lithuania and Poland; from 3.4 PPS thousand in the Czech Republic to 7.3 PPS thousand in Latvia in 2018). Romania had nearly two times less disposable income than Poland (Fig. 1).

Looking at trends in disposable income in the EU in 2008-2018, the largest decrease was observed for Greece, The United Kingdom and Cyprus. For those countries that saw an increase in income Poland was fifth, after Luxembourg, Estonia, Malta and Denmark. For changes in disposable income in post-communist countries between 2015 and 2018, the largest increase was recorded in Lithuania (of PPS 2.6 thousand) and Estonia (PPS 2.5 thousand). Countries in which income increased significantly more slowly in this period were: Bulgaria (increase of PPS 0.9 thousand), Hungary (increase of PPS 0.7 thousand), Slovenia (increase of PPS 0.7 thousand), Slovakia (increase of PPS 0.3 thousand). In the middle of the ranking of post-communist countries is Poland and Latvia, which achieved an increase of PPS 1.5 thousand (Fig. 1).

In 2018, disposable income in PPS for Poland amounted to 12,952, which put it 20th among 28 EU countries. Poland was one of 15 countries that had an income below the EU average, and the difference amounted to over PPS 6.5 thousand.

Significant inequalities of disposable income are observed among EU countries, which had an average value of 5.2 thousand PPS in 2018. The income

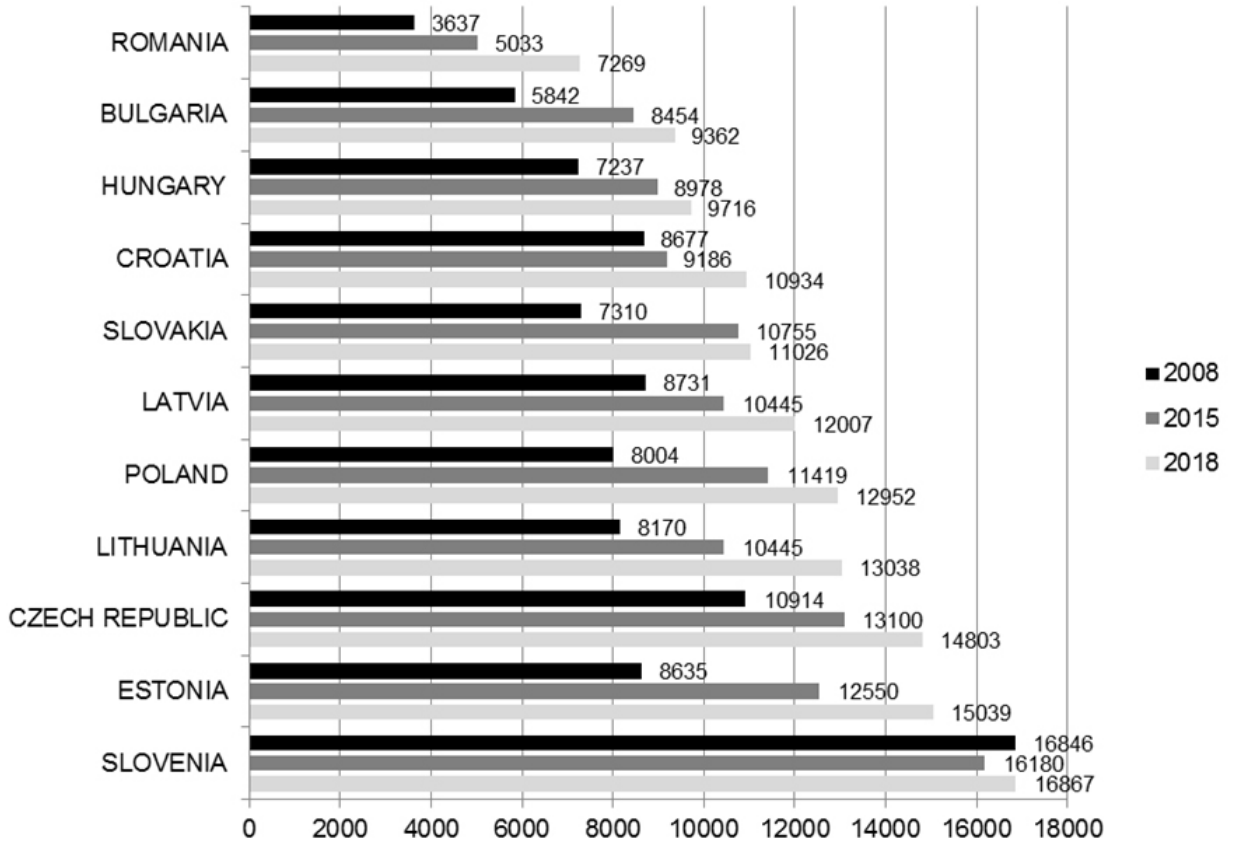

Fig. 1. The amount of disposable income in PPS of the former Eastern Bloc countries for 2008, 2015 and 2018
Source: Statistics Poland [2019] on data published by Eurostat.

quintile share ratio[1] was lower than average value (Slovakia had the lowest value – 3.0, the Czech Republic and Slovakia had a similar value of ratios (3.3 and 3.5, respectively) to 4.8 in Germany, and 4.3 for Poland and Estonia). The largest income inequalities were in Bulgaria (7.7) and Lithuania (7.1) – Figure 1. During the period between 2008 and 2018, two countries recorded significant decreases in the value of the income quintile share ratio: Poland (decrease of 0.8 and 0.6, respectively) and Croatia (decrease of 0.5 and 0.2, respectively), and one country had an increase in both periods: Bulgaria (increase of 1.2 and 0.6, respectively).

It is worth emphasizing that between 2008 and 2015, a significant increase in disposable income inequalities was observed in three Eastern Bloc countries: in Lithuania (of 1.4), in Romania (1.3), and Estonia (1.2). Lithuania had the largest inequalities in average disposable income as expressed by the income quintile share ratio. In each year analysed, the value of this ratio was the highest in Lithuania. The smallest inequalities occurred in the average disposable income in Slovakia and the Czech Republic. In Poland, the average disposable income inequalities can be compared to the levels of its western neighbour – Germany. However, the value of the ratio for Germany oscillates between 4.8 (in 2008 and 2015) and 5.1 (for 2018). In the case of Poland, the value of the ratio is gradually decreasing (5.1 in 2008, 4.9 in 2015, and 4.3 in 2018) – Figure 1.

In some countries of the "old" Union, no significant changes were noted in the periods analysed. These countries include: Austria, Ireland, Finland and France. Luxembourg had an increase of 1.6 between 2008 and 2018. It should also be emphasized that the increase occurred most strongly between 2015 and 2018 (an increase of 1.4). In 2018, Luxembourg obtained a value of the disposable income quintile share ratio close to 6.0, which is characteristic of countries such as Italy and Spain.

The Gini coefficient is most often used in economics to measure how far a country's wealth or income distribution deviates from a totally equal distribution. The studies carried out on income inequalities have contributed to a view that in 2018, a relatively higher level than the EU average (30.9) was characteristic for Luxembourg, with a Gini coefficient of 33.2, and also Italy – 33.4, Spain – 33.2, Greece – 32.3, and Portugal – 32.1. Poland was in the group of 17 countries in which this coefficient was lower than the average value for the EU. Looking at changes in the Gini coefficient in 2008–2018, the largest increase in the countries of the "old" Union occurred in Luxembourg (5.5), Denmark (growth of 2.7). At the same time, the highest decrease in the Gini coefficient was in Portugal, by 3.7 [European Commission 2019].

Among the former Eastern Bloc countries, in 2018 the Gini coefficient was the lowest in the case of income in Slovakia (20.9) and the highest in Bulgaria (39.6). Poland was fourth among these countries in terms of low income inequalities, which means an improvement both compared to 2008 (seventh place) and 2015 (sixth place) – Figure 2. When we follow changes in Gini coefficient in 2008–2018, we observe its increase in three countries of the former Eastern Bloc, indicating an increase in disposable income inequalities, i.e. in Bulgaria (increase of 3.7), Hungary (increase of 3.5) and Lithuania (increase of 2.4). Significant decreases of this ratio in the discussed period (between 2008 and 2018) were seen in: Poland (decrease of 4.2), Slovakia (decrease of 2.8), Croatia and Latvia (decrease of 1.9 in both countries). Further decreases occurred in seven countries, however the largest were in Estonia (decrease of 4.2), Poland and Slovakia (both countries had a decrease of 2.8) and Romania (decrease of 2.3) – Figure 2. Out of 15 countries of the "old" Union, in 2018 eight achieved a Gini coefficient lower than the EU average (30.9). The countries with higher income inequalities than the EU average included the one with the highest income: Luxembourg (PPS 38 thousand; Gini coefficient: 33.2). Countries of southern Europe struggling with socio-economic problems were at the forefront of the countries of the "old" Union with high income inequalities (Gini coefficient: Italy – 33.4,

[1] Income quintile share ratio (inequality of income distribution S80/S20) – ratio of total income received by the 20% of the population with the highest income (top quintile), to that received by the 20% of the population with the lowest income (lowest quintile). In EU-SILC this indicator is calculated for equivalized annual disposable income of households.

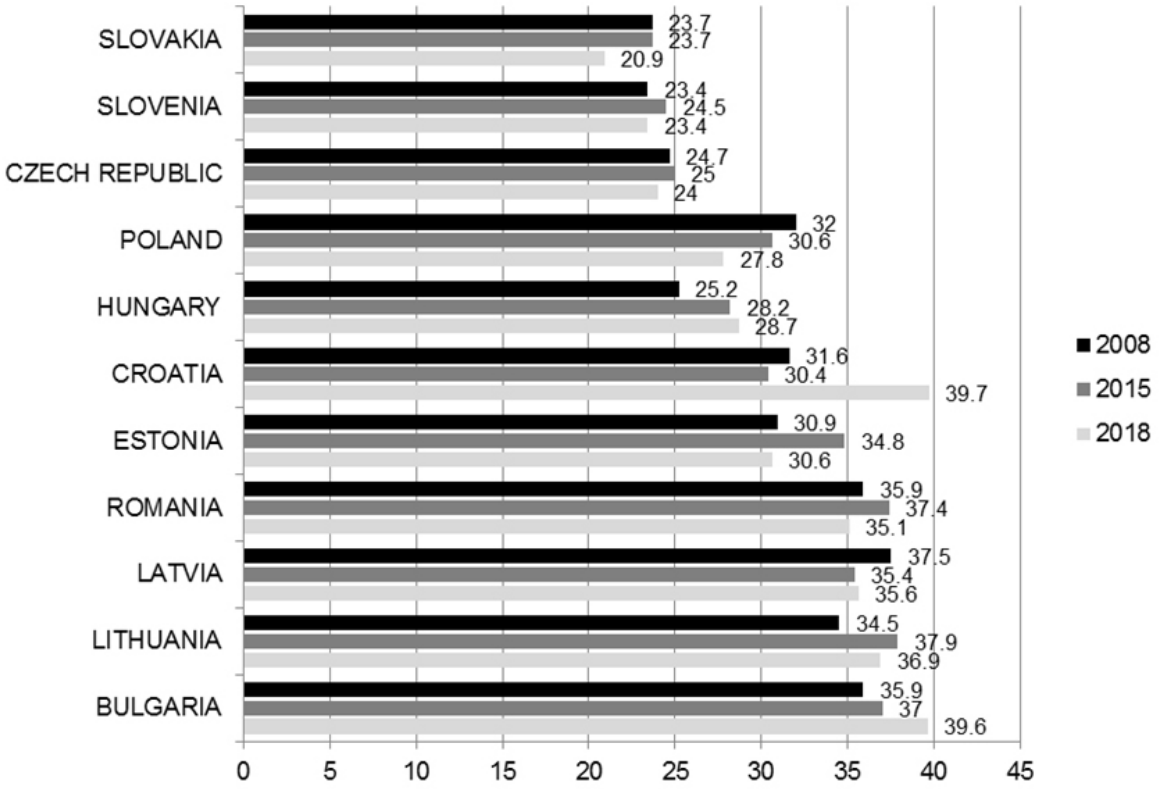

Fig. 2. The Gini coefficient for former Eastern Bloc for 2008, 2015 and 2018
Source: Statistics Poland [2019] on data published by Eurostat.

Spain – 33.2, Greece – 32.3, Portugal – 32.1). However, in 2018, the leader in this group of countries was the United Kingdom (34.2).

Actual individual consumption in the EU as a measure of the material welfare of households

From the point of view of the issues discussed in this article, it is important to examine the relationship between the economic growth rate and the level of consumption. In practice, it consists of determining how a country's economic development affects the wealth of households and how it influences the level of consumption. The analysis carried out in this respect covered the period of 2013–2018 [Szwacka-Mokrzycka 2018] – Table 1. In 2013, the negative consequences of the global crisis of 2008–2009 were still felt in Europe. In Poland, at the beginning of the 2010s, the GDP dynamics also slowed down due to the economic recession, which occurred in the first half of 2013. The situation was caused by a combination of factors, namely: restrictions on private investment due to economic slowdown; more difficult access to credit (credit crunch); restrictive fiscal policy as well as lowering propensity to consume. In the following year, i.e. in 2014, there was a significant improvement in the economic situation of all EU countries, although it is important to note that there occurred a considerable variation in GDP growth rates in relation to 2013. At that time, Poland found itself among the countries with a relatively high level of growth, i.e. 3.4%, in comparison to the previous year. The group with the relatively highest growth level, i.e. above 3%, included Ireland, Hungary, Luxembourg, Malta and the Great Britain. However, a relatively small GDP growth, i.e. below 2%, in 2014, compared to 2013, was observed in Belgium, Bulgaria, Denmark, Germany, Greece, Spain and the Netherlands. The downward trend in Finland, Italy, Cyprus and Crete could not be stopped [Szwacka-Mokrzycka 2018].

It is necessary to point out the wide range of AIC and GDP levels across the EU countries, which differ from the EU average between 53% and 132% (Table 1). The relatively highest rates were achieved by Luxembourg, Germany, Austria, the United Kingdom, Denmark, Finland, and Italy (32–20% above the average for the EU). Whereas the relatively lowest rates belonged to Estonia, Latvia, Romania, and Hungary, 30–40% below the EU average. Poland ranked in the group of countries (the Czech Republic, Greece, Slovakia, Slovenia, Poland), with the rates from 20% to 25% below the EU average [Szwacka-Mokrzycka 2018] – Table 1.

The purchasing power parity of the average household in Poland is low when compared to the overall indicators for the EU region despite the upward trend in wages. As far as the ranking of post-communist countries is concerned, Poland is only ahead of Bulgaria, Romania, Hungary, Greece, Latvia and Estonia. By contrast, the Lithuanians, the Czechs and the Slovaks achieve a higher purchasing power parity than Poland.

Across the Member States in 2018, AIC per capita expressed in PPS varied from 56% of the EU average in Bulgaria to 134% in Luxembourg (Table 1).

The effects accompanying the increased economic growth rate in Poland result from its integration with the EU. The Polish accession to the EU enabled the development and modernisation of the economy due to increased investment size, new technologies, facilitated access to the markets of other member states, greater scale and specialisation of production, improved quality and effectiveness of management. The integration also accelerated the flow of direct foreign investments. Integration processes have a particularly strong impact on trade volumes. The free movement of goods entails not only a customs union and elimination of non-tariff barriers but also improved conditions for Poland's producers-exporters. Both the increased export dynamics and import absorption are results of the accession.

The influence of the integration processes on the transformation of the food economy is long term and stems from the need to adjust to the EU. The incorporation of world economics into globalisation processes led to a polarisation of businesses into transnational

Table 1. Actual individual consumption and gross domestic product in the European Union in 2016 and 2018 (EU-28 = 100, real prices)

Specification	AIC per capita		GDP per capita	
	2016	2018	2016	2018
EU	100		100	
Luxembourg	135	134	269	261
Germany	121	120	123	122
Austria	119	117	128	127
UK	115	113	108	105
Denmark	113	114	127	128
Finland	114	112	110	111
Belgium	114	113	119	117
France	110	107	105	104
Netherlands	111	113	127	129
Sweden	112	108	123	120
Ireland	95	95	176	189
Italy	98	98	97	96
Cyprus	92	94	87	89
Spain	90	90	91	91
Lithuania	85	89	75	80
Portugal	82	83	77	77
Malta	78	80	95	98
Czech Republic	79	82	88	91
Greece	77	77	68	68
Slovakia	68	73	77	73
Poland	74	76	68	70
Slovenia	77	79	83	87
Estonia	72	74	76	82
Latvia	66	69	64	69
Hungary	62	64	68	71
Romania	65	71	59	65
Croatia	61	64	60	63
Bulgaria	54	56	49	51

Source: Authors' own elaboration based on Eurostat Newsrelease 188/2019.

corporations and subcontractors. The transformations of the food economy in Poland have been taking place under the influence of global companies involved in processing and trade.

The standard of living of a country's inhabitants is related to their purchasing power. Looking at the share of expenditures for food in overall expenditures of households in 2005–2018, it can be noticed that the group of countries with the lowest share of food expenditures (in the EU countries) in total expenditures are Austria, Ireland, the United Kingdom, the Netherlands, Germany, Sweden, Denmark, Luxembourg (respectively between 7.3 and 9.5%). Relatively high levels of food expenditures (between 13 and 17% in total expenditures) is characteristic for developing countries such as Estonia, Lithuania, Romania, which have such a situation from 2005–2013 [Eurostat Newsrelease 188/2019]. The countries with a medium share of expenditures on food to total expenditures (between 10 and 12%) include Czech Republic, Hungary, Slovakia, Bulgaria and Poland. In the period 2005–2018, there was a decreasing tendency in the level of food expenditures on total expenditures.

This situation above describes the standard of living and purchasing power of inhabitants. A slow decrease can be observed in the differences between living standards in developed and developing countries [European Commission 2019]. Engel's law holds that in countries characterized by a relatively high standard of living, food expenditures as a share of overall expenditures is rather low. Therefore, an obvious indicator of rising affluence of the inhabitants of the EU – as elsewhere – would be a decrease in the share of food expenditures in total expenditures. This applies to Poland as well, thought the country still spends more of its income on food than do more developed EU countries.

Demand for food – Poland compared to other EU countries

It is important to follow the level of nutritional needs satisfaction to better understand changes in food consumption. There is lot of research on trends in food demand in European countries in the 20th century and the first decade of the 21st century. The background for estimating demand for food was the result of income elasticities. Food demand in Spain from 1964–1989 was examined by Molina [1994]. The results showed that bread, cereals, meat, fish, milk and eggs are necessities, whereas vegetables and fruits are luxuries, though most of the elasticities were close to unity. Several studies have a focus on meat and/or fish demand. Burton et al. [2000] observed variations in meat and fish consumption in Britain since 1960. These changes are contributed to consumer preferences and findings that tastes have changed in recent years in favour of chicken and fish, and against red meats. Likewise, Klonaris found evidence of a gradual change in consumption in the 1980s away from beef, lamb, and mutton towards pork and chicken in Greece [Klonaris 2001].

Looking at retail demand for fish in the UK, Fousekis and Revell [2004] find haddock, salmon, flatfish, shellfish, and smoked fish to be expenditure elastic, implying that income growth will strongly increase demand for these species. Introducing a Bayesian method of estimating multivariate sample selection models, Arnoult and Tiffin [2008] examine food demand in the UK whilst accounting for censoring arising from infrequency of purchase. Their results emphasize the role played by low incomes and socio-economic circumstances in leading to poor diets and also indicate that the presence of children in a household has a negative impact on dietary quality.

When following the results of research in Poland it is apparent that they are very similar to those discussed above (Table 2). While performing the assess-

Table 2. Income elasticities for food in 2010 – Poland versus the European Union

Specification	Income elasticities	
	EU	Poland
Cereals	0.25	0.07
Dairy	0.64	0.56
Fruit & vegetables	0.45	0.31
Meat	0.69	0.20
Oils & fat	0.22	0.14
Other food	0.61	0.35

Source: Kehlbacher [2012], Szwacka-Mokrzycka [2018].

ment presented above, concerning the level of satisfaction of nutritional needs in the first and second decade of the 21st century, it should be stated that the decrease in consumption elasticity factors took place in each of the analysed groups, while the scope of this decrease is diversified. Relatively, the most important decrease of factors in the analysed period took place in the expense group corresponding to satisfying lower-order needs [Kwasek 2015, Szwacka-Mokrzycka 2018]. The same change direction could be noticed for income elasticity factors for food consumption of product groups. The noticed regularity, expressed in a relative decrease in the level of income elasticity factors for nutritional products, constitutes the expression of changes that nutritional needs have undergone over the last dozen years. What is more, it proves a growing level of satisfaction of nutritional needs starting from the 1990s.

It should also be pointed out that there has been a lasting diversification of household behaviours. These differences include, on one hand, the households of employees and on the other, of pensioners. In the first household group, relatively low elasticity factors were observed in the years 2003–2015, while in the second group, relatively high income elasticity factors for expenses and consumption were noticed. The diversification of food consumption patterns in presented household is no longer as important as in the 1990s, but it would be difficult to support the thesis on consumption patterns of the households of employees and pensioners getting gradually closer to one another.

From average elasticities computed over all product aggregation levels, the demand for cereals and oils and fats appears to be less responsive to price and income than the demand for meat, dairy products and fruits and vegetables, which themselves are less responsive to income than the demand for other food products. This ranking of food products is not surprising since the consumption of "necessities" is generally less responsive to income changes than that of "luxury" foods [Tyers and Anderson 1992, Szwacka-Mokrzycka 2018]. Additionally, elasticities estimated on more disaggregated data (product level) tend to be higher in absolute terms than those estimated for broader product categories (aggregate product level). This might be attributed to substitution possibilities between disaggregated products, which reduce the average own price responses of product aggregates [Eales and Unnevehr 1988]. It is worth mentioning that there is lack of direct comparability of data due to the varied selection of representatives for the aggregate in international comparisons, such as: dairy, meat, fruits and vegetables, and cereals.

CONCLUSIONS

A comparative analysis of the standards of living in Poland against the background of the remaining EU countries indicates that there still exist discrepancies between the levels of economic growth within the European Union. Inequalities in the standards of living among EU countries result from differences in their levels of development, their technological and educational opportunities as well as the conditions and functioning of their labour markets. Most post-communist countries, including Poland as a EU Member State, managed to reduce the level of inequalities in living standards as a result of socio-economic changes which occurred in the period considered in this article. However, this does not mean that the situation has improved for all social groups in European countries, as the inequality analysis did not take into account different types of households. The researchers have carried out in-depth analyses to examine the situation of the Polish population. The findings of the research show that in the case of certain households, employees and pensioners in particular, such inequalities have increased and deepened. This indicates the need to analyse inequalities regarding the standard of living and consumption, also from a microeconomic perspective.

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ZMIANY W POZIOMIE ŻYCIA GOSPODARSTW DOMOWYCH W POLSCE NA TLE POZOSTAŁYCH KRAJÓW UNII EUROPEJSKIEJ

STRESZCZENIE

Celem przewodnim pracy jest przedstawienie zmian zachodzących w poziomie życia polskich gospodarstw domowych na tle pozostałych krajów UE. Punktem wyjścia rozważań jest przedstawienie definicji stanowiących podstawę rozróżnienia między poziomem a jakością życia. Następnie zaprezentowano metody pomiaru poziomu życia przyjęte w UE. Kolejna część opracowania prezentuje poziom życia gospodarstw domowych w latach 2008–2018. Ostatnia część artykułu przedstawia zmiany w popycie na żywność w Polsce na tle pozostałych krajów UE na przestrzeni ostatniej dekady według współczynników elastyczności dochodowej. W konkluzji zwrócono uwagę na zróżnicowanie poziomu życia w krajach UE jako rezultat wielu czynników, w szczególności różnic w poziomie rozwoju, a także uwarunkowań technologicznych i edukacyjnych.

Słowa kluczowe: poziom życia, standard siły nabywczej, wskaźnik rzeczywistej konsumpcji indywidualnej, współczynnik Giniego

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THE STRUCTURE OF AN INTEGRATED INTERNET MARKETING COMPLEX, BASED ON THE MARKETING-MIX CONCEPT

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ABSTRACT

This research describes the main approaches of digital marketing models based on the marketing mix concept. It outlines the main components of various models, such as: "5W" Internet marketing complex of Mosley-Matchett; "8P" e-marketing mix of researchers at the National Taiwan University (Chen); "6C" set of elements for an effective website by Chaffey, Mayer, Johnston, Ellis-Chadwick; "4S" web marketing complex of Constantinides; "4Ps+$P^2C^2S^3$" digital marketing complex (e-marketing mix) created by Kalyanam and McIntyre; "3C+I" digital marketing mix of Pastore and Vernuccio; "SIVA" client-oriented information model of Dev and Schultz; "2P+2C+3S" digital marketing complex presented by Otlakan. The study presents a comparative analysis of the characteristics of these models, and the pros and cons for using each them as part of an integrated Internet marketing strategy. The study also creates a structure of Integrated Internet marketing tools based on the marketing mix concept which includes two blocks of components: key elements found in the traditional "4P" model and adapted to the Internet environment, and the elements "$2P^2C^2S^2$": Personalization & Privacy, Personnel & People, Customer Service, Community, Synergy & Scope. The authors formulate a definition of Internet marketing and Integrated Internet marketing, based on the built structure of integrated Internet marketing of Kalyanam and McIntyre.

Key words: Internet marketing (IM), integrated Internet marketing (IIM), marketing mix, 4P, synergy
JEL codes: D12, F61, L86, M15, M31

INTRODUCTION

The key to marketing theory is the doctrine of the marketing mix – a set of regulated and controlled marketing tools that a company uses to meet its needs and achieve its goal for the desired response of the target market [Romaniv 2017].

The concept of the marketing mix, in its most famous version of "4P", has passed all the stages of evolution characteristic in theories of marketing, and is a constant subject of discussion among scientists and practitioners alike. Undoubtedly, "4P" is an important element in marketing theory and practice. Apparently, the economic mechanism has undergone numerous changes since the president of the American Marketing Association, Borden, first coined the term in a speech at a meeting of the Association of American Marketers in 1953. McCarthy then grounded the concept of the "4P" marketing mix in 1960 as a set of factors that managers use as a tool to achieve their marketing goals [Pogoreluy 2016].

As noted by researchers Kalyanam and McIntyre, the marketing mix is a collection of thousands of trace elements grouped together to simplify the activities of the marketing manager [Kalyanam and McIntyre 2002]. Is this mixture valid in a digital context or not? The question is whether it will be possible and convenient to expand the number of elements included in

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the structure, or whether it will be necessary to completely abandon this model and create a new one.

The goal of this article is to consider the scientific approaches to the components of the marketing mix, identify the pros and cons of each model, and identify those components that will characterize a more modern integrated marketing system.

MATERIAL AND METHODS

The commercialization of the Internet has led to the emergence of a virtual business model that is involved in various types of commercial and non-commercial online activities. In this regard, marketing scholars and practitioners face several unique challenges, but at the same time, there is a chance for: greater customer empowerment; new forms of communication and interaction; reduction of communication time constraints; increased global customer accessibility; higher degree of market transparency; and difficulties in maintaining competitive advantage [Romaniv 2017].

The lack of interactivity and personalization, the lack of strategic elements and the inability to create and collaborate with communities are among the most commonly mentioned weaknesses of the classic marketing mix. Therefore, the traditional marketing mix should be complemented by new tools in the field of Internet marketing.

According to Mosley-Matchett, a successful online presence is based on a website that should be developed based on a "5W" marketing mix: (1) who – target audience/market, (2) what – content, (3) when – terms and updates, (4) where – searchability, (5) why – unique sales and deals [Mosley-Matchett 1997].

Pastore and Vernuccio proposed the "3C+I" model: community, connectivity, content, and interface, in which the "4P" model is integrated into the online environment [Pastore and Vernuccio 2004]. Here contextualization means adaptation to a different environment, to the online context.

Researcher Chen assumes the importance of the environment and the ability of the model to interact with the external environment. This view was previously substantiated by researchers at the National Taiwan University. Chen substantiates the model "8P", in which four elements are traditional "P" (product, price, place, promotion) and the other four are: precision, payment systems, personalization, push and pull [Chen 2006]. He notes such features of "8P", namely that: the process of selecting the target segment should be accurate; the management of database systems must be perfect; payment systems must be secure and understandable for customers; the interface should be flexible and able to adapt to the needs of users; it is advisable to find a compromise between active communication policy and user requirements.

In addition to marketing tools that include the traditional "4P", there are new models justified by different authors. A group of researchers led by scientist Chaffey believe that the Internet requires a change in traditional marketing tools, while identifying the eight most important elements [Chaffey et al. 2000]: audience, integration, marketing support, brand, strategic partnership, organizational structure and budget. These elements are explored in strategic marketing planning.

Kalyanam and McIntyre include additional elements in the "4P" model, forming the "4P+$P^2C^2S^3$" model [Kalyanam and McIntyre 2002]. In their view, such a model has a broader context that can give a more complete classification of the elements, as shown in Figure 1.

Kalyanam and McIntyre also show in their work the features that are appropriate for each email marketing tool. For example, Customer Service includes: Frequently Asked Questions (FAQs) and Help Desk, managing e-mail requests, chat; at the same time, the Community can be attributed to: chat rooms, rating and user reviews, wish lists, reputation rating. As the authors note, the tools of the structure perform different functions, and very often it happens at the same time. For example, the same e-mail may reflect a function performed by both Customer Service and the Community, so the two elements are overlapping tools. So Amazon.com may receive an email containing a review of a book that was sent by a customer (Community) in response to a request from a company (Customer Service). Thus, the classification of marketing mix tools by type of activity gives a clear idea of what should be considered when developing a marketing plan for e-business or Internet marketing.

Based on the assertion that the "4P" model is not critical to modern Internet marketing, Constantinides in 2002 proposed his "4S" web marketing mix model, which is an integrated approach to managing enterprise

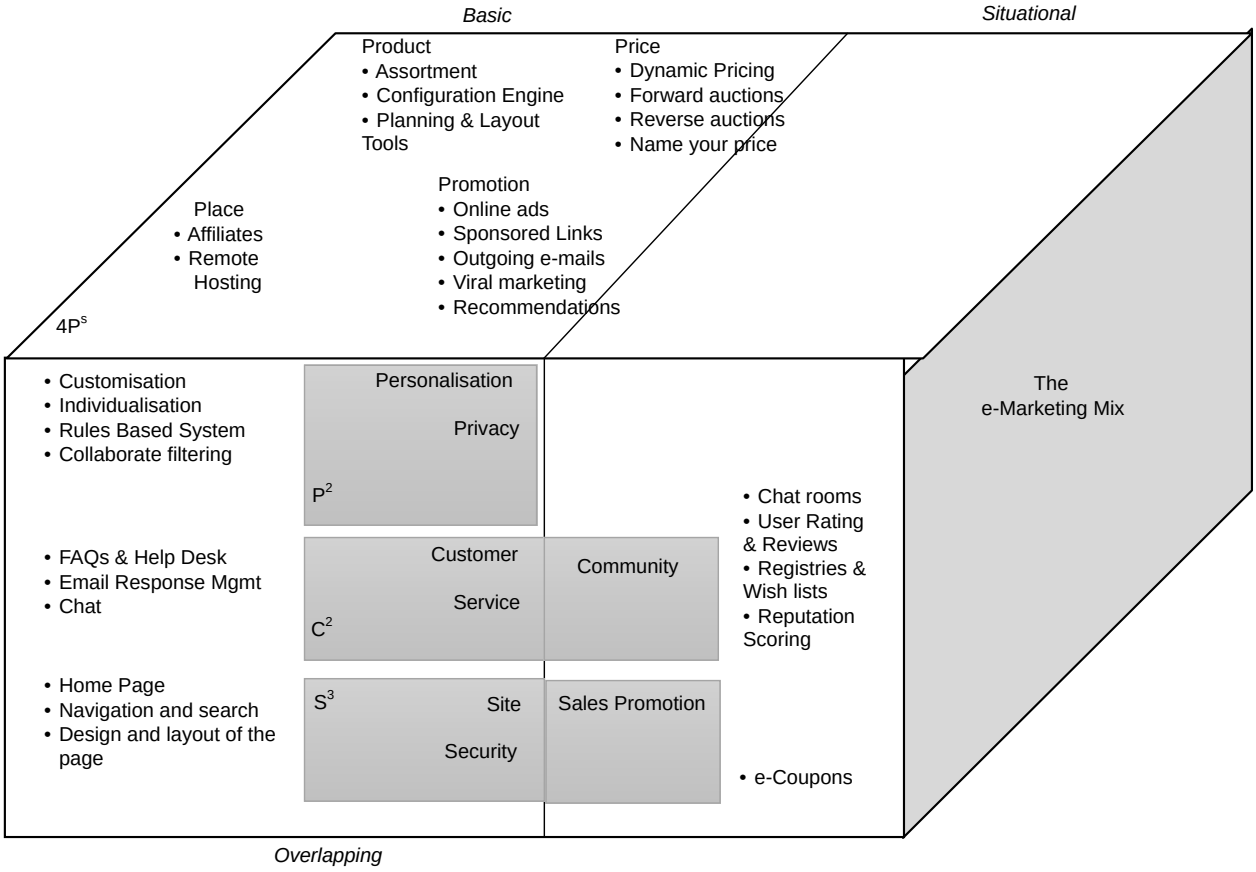


Fig. 1. Taxonomy of email marketing according to "4P+$P^2C^2S^3$" model

Source: Authors' elaboration based on Kalyanam and McIntyre [2002].

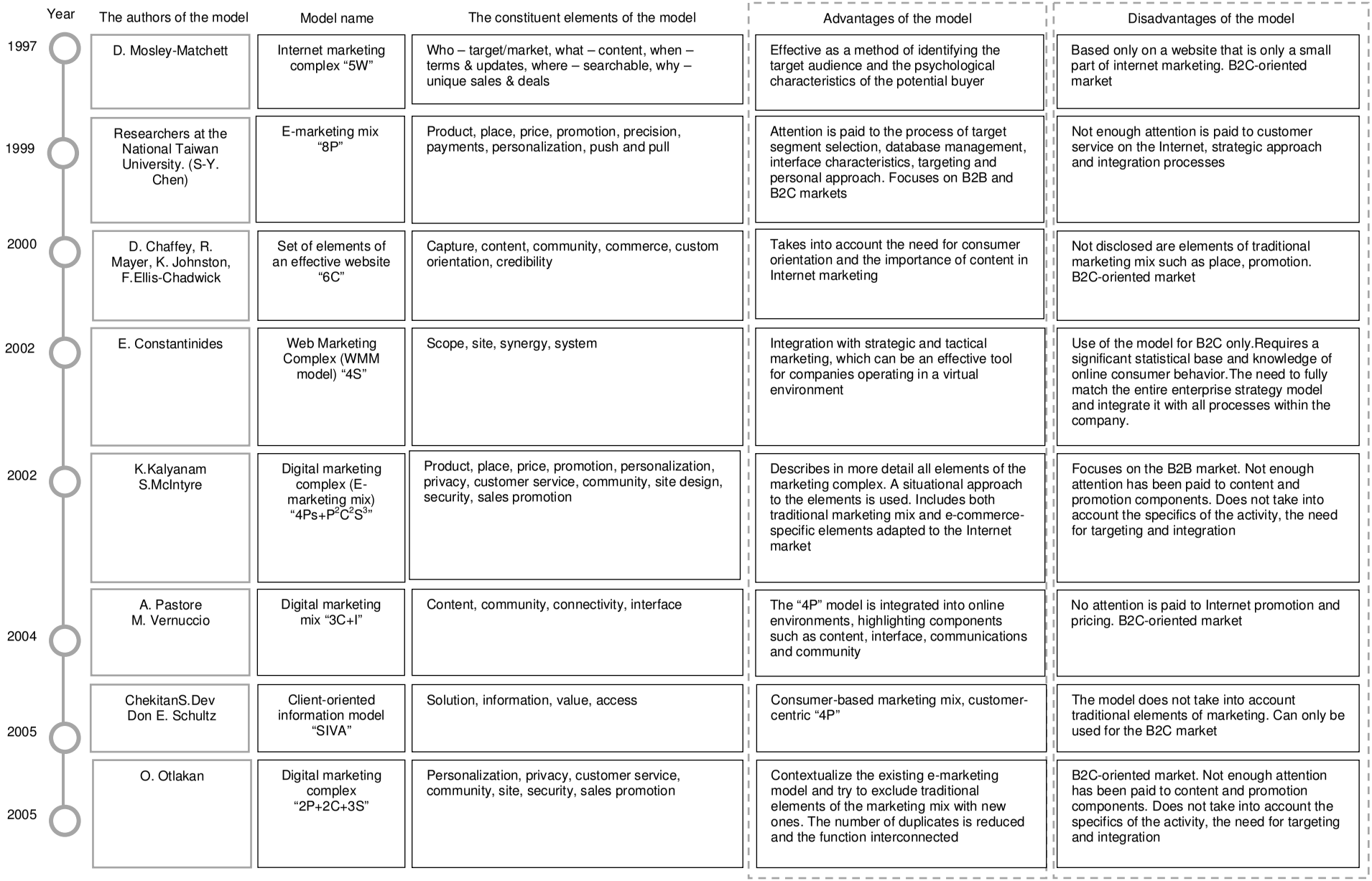
presence on the Internet that includes four critical e-marketing ingredients: scope, site, synergy, system. The content of this model extends to the strategic and business organizational level and substantiates the following elements: strategic goals; market analysis; research into the company's potential; the level of development of e-commerce; the strategic role of e-commerce for the business entity; a modern web platform, spacious data warehouse and an efficient security system [Constantinides 2002].

Comparing the "4S", "4P" and "4C" models, Chekitan Dev and his co-authors see strategic elements in the "4S" that differentiate it from other models. This model combines strategic and tactical marketing. They believe that the "4S" seems to be the most effective tool for online companies. However, it is not suitable for all businesses. For companies offering their products on their corporate websites, the "4S" model is effective. However, if the manufacturer is not a seller to the end consumer and all sales occur through partner sites (online stores), then such a company should focus on the "4C" model, which aims to differentiate its product from the products of its competitors.

In 2005, Dev and Schultz proposed a "SIVA" model, such as "4C" and "4A": each of the elements of the marketing complex corresponds to a sign of customer behavior. Product is a solution to a buyer's problem; promotion provides information for decision making; price shoes the value of purchase; distribution gives access to the product [Dev and Schultz 2005].

In the same year Otlakan offered the model "2P+2C+3S", which is a complex of electronic marketing and includes: personalization, privacy, customer service, community, site, security, and sales promotion [Otlacan 2005].

The characteristics of the marketing mix concept models for Internet marketing, and their advantages and disadvantages are collected in Figure 2.



Year	The authors of the model	Model name	The constituent elements of the model	Advantages of the model	Disadvantages of the model
1997	D. Mosley-Matchett	Internet marketing complex “5W”	Who – target/market, what – content, when – terms & updates, where – searchable, why – unique sales & deals	Effective as a method of identifying the target audience and the psychological characteristics of the potential buyer	Based only on a website that is only a small part of internet marketing. B2C-oriented market
1999	Researchers at the National Taiwan University. (S-Y. Chen)	E-marketing mix “8P”	Product, place, price, promotion, precision, payments, personalization, push and pull	Attention is paid to the process of target segment selection, database management, interface characteristics, targeting and personal approach. Focuses on B2B and B2C markets	Not enough attention is paid to customer service on the Internet, strategic approach and integration processes
2000	D. Chaffey, R. Mayer, K. Johnston, F.Ellis-Chadwick	Set of elements of an effective website “6C”	Capture, content, community, commerce, custom orientation, credibility	Takes into account the need for consumer orientation and the importance of content in Internet marketing	Not disclosed are elements of traditional marketing mix such as place, promotion. B2C-oriented market
2002	E. Constantinides	Web Marketing Complex (WMM model) “4S”	Scope, site, synergy, system	Integration with strategic and tactical marketing, which can be an effective tool for companies operating in a virtual environment	Use of the model for B2C only.Requires a significant statistical base and knowledge of online consumer behavior.The need to fully match the entire enterprise strategy model and integrate it with all processes within the company.
2002	K.Kalyanam S.McIntyre	Digital marketing complex (E-marketing mix) “4Ps+$P^2C^2S^3$”	Product, place, price, promotion, personalization, privacy, customer service, community, site design, security, sales promotion	Describes in more detail all elements of the marketing complex. A situational approach to the elements is used. Includes both traditional marketing mix and e-commerce-specific elements adapted to the Internet market	Focuses on the B2B market. Not enough attention has been paid to content and promotion components. Does not take into account the specifics of the activity, the need for targeting and integration
2004	A. Pastore M. Vernuccio	Digital marketing mix “3C+I”	Content, community, connectivity, interface	The “4P” model is integrated into online environments, highlighting components such as content, interface, communications and community	No attention is paid to Internet promotion and pricing. B2C-oriented market
2005	ChekitanS.Dev Don E. Schultz	Client-oriented information model “SIVA”	Solution, information, value, access	Consumer-based marketing mix, customer-centric “4P”	The model does not take into account traditional elements of marketing. Can only be used for the B2C market
2005	O. Otlakan	Digital marketing complex “2P+2C+3S”	Personalization, privacy, customer service, community, site, security, sales promotion	Contextualize the existing e-marketing model and try to exclude traditional elements of the marketing mix with new ones. The number of duplicates is reduced and the function interconnected	B2C-oriented market. Not enough attention has been paid to content and promotion components. Does not take into account the specifics of the activity, the need for targeting and integration

Fig. 2. Chronology of development and characterization of Internet marketing models of the concept of marketing mix

Source: Authors’ own research.

Many misunderstandings about a number of key concepts in the marketing complex arise from the fact that different authors put different content into this structure. It is important to first understand what constitutes a marketing complex or marketing structure. Most experts believe that it is based on a marketing mix which is a set of managed parameters and marketing tools that are used by a company to best meet the needs of their target markets. Since marketing is aimed at meeting the needs of consumers, these positions are externally oriented. The inclusion in the marketing complex of various factors (rather than tools) that affect the ability to carry out marketing activities, but are not in the field of management by the organization, is contrary to the definition of marketing complex. This is especially true of environmental factors, for example when people are included in the marketing mix, meaning in this case consumers, or when purchase is included, which is more likely to characterize consumer activity. Product, price, distribution and promotion can be managed directly, but consumer cannot. It follows that the tools of the marketing complex belong to the internal environment of the organization.

From this point of view, the concept of "4C" (needs of consumers, consumer costs, convenience of purchasing products, communication) does not stand up to criticism. This concept does not represent marketing tools, but rather the direction and the purpose of using these tools. All components of this concept in other formulations are reflected in the tools of the traditional marketing complex "4P".

It is also unacceptable to include in the marketing complex the tools of other fields of activity besides marketing. For example, Process, usually a service delivery process, is a production tool, not a marketing tool. Incorporating into the traditional structure of the marketing complex, for example, the Personnel component also violates this principle. Staffing is one of the components of marketing potential. Personnel is included in all four marketing tools as each is implemented by employees. In addition, it is impossible for staff to manipulate the product assortment and its price, for example. Other components of marketing activity potential are information, technical, organizational and other provisions of marketing activities. From this point of view, the components of marketing potential can also be considered as tools of the marketing complex, creating another parallel structure that is not part of "4P". In this plan, we can consider Internet marketing tools in three ways:

- as tools of modern information support, marketing potential (in models – content, interface, communication means, community);
- as online tools for the implementation of certain tools of the traditional marketing complex – promotion through the Internet, the use of online stores, etc.;
- components of a complex of marketing tools, which can be divided into targeting (basic in the marketing complex) and providing (which are aimed at the effective use of the basics in the marketing system).

Thus, based on different classification features, different approaches to determining the structure of the marketing complex are possible. The main criterion is that they meet the definition of this concept.

RESEARCH RESULTS

Analyzing the scientific works of domestic and foreign authors, it appears that the only detailed concept of a marketing complex adapted to the Internet is the concept of network marketing which uses the acronym "$4P+P^2C^2S^3$". However, this concept has many nuances that are prone to criticism. Therefore, we will look at its shortcomings and offer a variant of a marketing complex that is adapted to the Internet and modern conditions.

One controversial point of the "$4P+P^2C^2S^3$" concept can be seen when we consider companies whose core business is offline. The website is, in this case, a tool of two elements of the marketing complex – promotion and distribution – since the buyer can place an order online. This undoubtedly creates an alternative and – for some companies and products – major distribution channel. The website is thus a tool of the "Promotion" component, as the Internet enhances a company's ability to successfully promote itself and its products. The Internet as a whole, as an audience feed, has many advantages over traditional media and other information channels. Thus, an Internet website is able to provide only a partial marketing complex.

Kalyanam and McIntyre paid little attention to the trace element of Content in their marketing concept. In most cases, the information contained on a website is the value through which the customer came to the site. The customer goes to the Internet first of all for the necessary information, and only then pays attention to the site's design and usability. And most consumers make a purchase in an online store after first carefully studying the product information through various online searches – which is one reason that online descriptions are distributed along with online stores.

Thus, it is possible to distinguish the marketing components of a Product in the integrated Internet marketing complex:

1. Product online – a product or service that is sold over the Internet (a separate type of products, goods, services), a virtual product, a search product. It is by studying this element that a unique selling point or product statement can be developed – a distinctive consumer motive, an alternative to image and entertainment advertising.
2. Content – of the website is one of the most important components.
3. Design – exterior design will allow the website to acquire an individual face, stand out from the mass of competitors. Provides better memory for users. The site design can be compared with the corporate style of the company or with the design of the product offline.
4. Usability – this element includes the following trace elements: a handy link system, FAQ sections, authorization system, and more.
5. Physical evidence – includes all those physical objects and visual images that allow a potential consumer to evaluate and predict the quality of a future service. Should also be considered as part of a Product component, especially when providing services. In this case, some kind of confirmation is needed: reviews, recommendations or certificates.
6. Elements such as Assortment, Configuration Engine, and Planning & Layout Tools – can also be featured in the Integrated Internet marketing structure, especially when selling goods via the Internet, as well as in a shop.

Summing up, we can say that the content and proportion of the elements of content, design and usability in the Product component completely depends on the specialization of the site, the market situation and user preferences.

The development of digital technology and the capabilities of the Internet add complexity to the traditional understanding of Price as an element of the "4P" model, since the location of the outlet is difficult to determine. The physical place of the transaction becomes virtual and involves the intangible aspects of the transaction. Bhatt and Emdad emphasize that the major contribution of the Internet to the development of commerce is not simply the ability to sell goods online, but rather its ability to rebuild a manufacturer's relationship with customers [Bhatt and Emdad 2001].

A feature of Promotion on the Internet is the form of information messages and promotion channels. Online stores use the following promotion tools:

1. Search Advertising (ads on search engine pages that depend on a user's query at a particular point in time);
2. Display Advertising (image or video ads, the impressions of which depend on the theme of the advertising platform, which precedes the behavior of the user and his socio-demographic characteristics);
3. Search Engine Optimization (a set of measures to promote the site in search engines);
4. Product Aggregators (Rosetka, OLX and other similar sites, which show products from many different online stores);
5. Remarketing (impressions for advertisers to users who were already interested in products in the online store)
6. e-Mail Marketing (e-mailing clients about promotions, discounts, sales, competitions, new products and hits, sales of accessories to previously purchased goods);
7. Social Media Marketing (publication of interesting content, targeted advertising, work with thought leaders, posting reviews, reputation management, anti-negativity and other similar activity on social networks, forums and blogs);
8. Affiliate Marketing (online store partners are rewarded for engaging visitors who leave their contact information, sign up for a website, sign up for a newsletter, order an item, or perform other important activities);

9. Public Relations (articles and publications in the media, communication with the business press, mentions on television and radio, the organization attracts attention of events, competitions, work with celebrities);
10. Offline Advertising (outdoor advertising, advertising on television, radio and offline sales points);
11. Discounts, Promotions and Loyalty Programs.

The Internet allows to obtain information that can be used to influence consumers (customers). Properly organized interactive communication with the manufacturer allows to create the necessary customer base. The Internet differs from other media and communications in that online communication allows addressing messages directed at a specific target consumer with a degree of flexibility. Therefore, the goal of online communication is not only to promote the product, but also to build trust with customers. Thus, the content of the element Promotion should, in addition to the traditional criteria (such as promotion, advertising, PR, sales promotion), include criteria for interactive interaction, multimedia capabilities, trust between the manufacturer and the buyer.

Place should be understood as a point of sale, for Internet marketers the point of interaction when making a purchase decision (for example, a website, landing, an advertisement, a social networking group, etc.). A properly chosen point of communication with the target audience and the convenience of communication with the seller play a huge role. Often, this aspect does not allow the company to sell well, even if there is a competitive bid.

Personalisation & Privacy can be included in the element of usability, as personalization is created for the user, not to solve the needs of the site owner, and provide a component of the Internet marketing complex. The site administrator has no right to force users to leave information about themselves and, in general, it is considered bad form on the Internet to force users to register in order to access information. Registration must be voluntary. Information security is an integral part of a website's features. But as an element of Personalization and Security, it can also be brought to the macro level of the structure for detailed study by the enterprise. With the strengthening of information security rights and a personalized approach to service marketing, this element becomes more important in the marketing structure.

The security element should also include Personnel & People. The term appeared in connection with the development of relationship marketing and service marketing. The term people refers to people who are able to influence the perception of goods of the target market: employees representing the company and the product; sales staff or call center staff who are in contact with the target consumer; consumers who are "thought leaders" in the category; manufacturers that can affect the value and quality of the product. This term also includes important consumer groups – loyal customers and VIP customers who generate significant sales for the company. The importance of these people is due to the fact that they can have a significant impact on the perception of the product of the target consumer.

The Customer Service element is essentially a feedback. Clients can independently select the department or person they want to contact, they can be provided a list of questions to choose from for faster response, and many sites offer a section with answers to frequently asked questions (FAQs). All this undoubtedly enhances the usability of the site and improves the convenience of feedback. Therefore, we can include the element Customer Service in the traceability of Usability, or attributed to the macro level, since for example in the field of services, this element is also important [Burchakow 2006].

Integrated digital marketing is, as it sounds, the integration of multiple marketing strategies to form a cohesive online approach for business. It typically entails the following: web development and design, search engine optimization (SEO) and search engine marketing (SEM), content marketing, social media marketing, local listings management, paid advertising campaigns. The idea behind integrated digital marketing is that, while each individual strategy doesn't have a huge impact on its own, when used in conjunction, a more influential online presence can be created. So, the peculiarity of Integrated Internet marketing is the presence of synergistic effect, taking into account the field of activity and the role of strategic planning. Therefore, it is advisable to pay special attention to parts of the Constantinides model:

1. Scope – identifies the major strategic issues underlying the online presence; they are subject to continuous review and evaluation.
2. Scale – issues include markets and competitors, competitors' profiles, the impact of online operations on current internal processes, and the identification of the strategic role of a firm's online presence.
3. Synergy – denotes the integration between an online presence and the internal organization of a company. On-line firms maximize their influence in the market by benefiting from synergies with ongoing commercial and organizational processes in parallel with full-scale commercial networking [Constantinides 2002].

Thus, the structure of a complex of Integrated Internet marketing tools is built on the basis of: the traditional "4P" marketing mix, the "4S" web marketing mix of Constantinides (WMM model), the "7P" model of Bitner et al. [1990], the "8P" model of researchers at National Taiwan University, and the E-marketing mix "4Ps+$P^2C^2S^3$" of Kalyanam and McIntyre (Fig. 3). This model is aimed at B2C and B2C markets.

Taking into account the idea of an integrated approach that encompasses the target structure for markets and consumers, and provides components of Internet marketing, it is possible to formulate the authors' definition of Internet marketing: an innovative Internet mix (ideas, content, methods and resources)

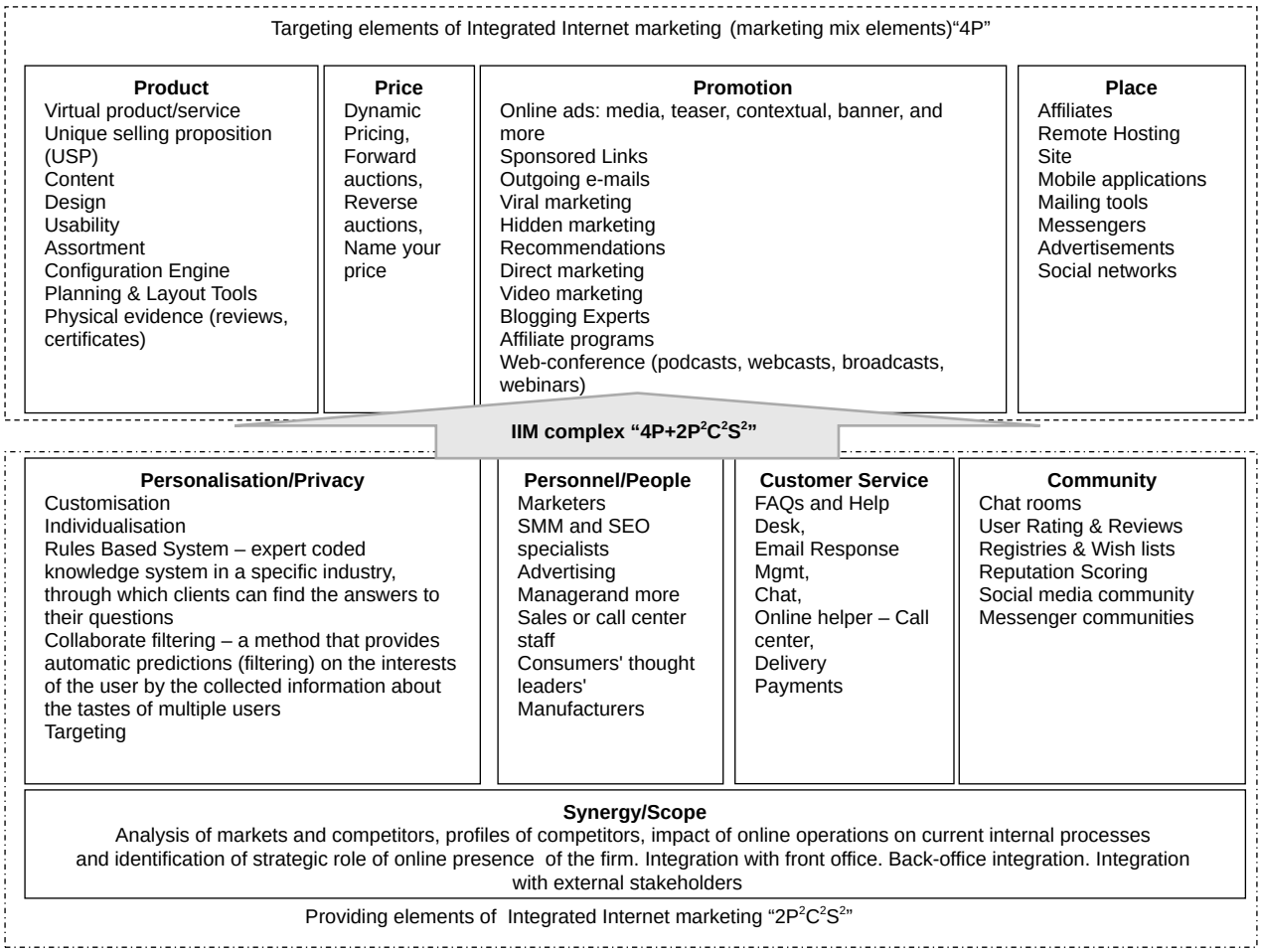


Fig. 3. Structure of integrated Internet marketing tools based on marketing mix concept

Source: Authors' own research.

on the use of information channels in cyberspace for marketing activities that aim to make a profit, and to create and maintain competitive and consumer advantages, in order to best achieve customer satisfaction and increase their awareness of companies, brands, products and services.

This definition includes the technical characteristics of the Internet, innovative marketing tools used on the Internet, namely the use of a wide range of digital communication channels aimed at achieving marketing goals, such as attracting new customers and managing relationships with existing customers, taking into account specific features of Internet marketing, as well as the importance of a strategic approach to Internet marketing management.

At the same time, it is possible to define Integrated Internet marketing as coherence (coordination of processes, connectivity of elements) of Internet marketing based on the omnichannel approach and the general structure of marketing of the enterprise for strengthening efforts to achieve the set goals. Thus, integrated Internet marketing is part of the system of integrated marketing in the enterprise and includes integrated marketing communications on the Internet to achieve goals by achieving a synergistic effect of its implementation. Management of integrated Internet marketing, in turn, is based on the use of marketing tools on the Internet and the choice of an effective functional strategy of Internet marketing.

CONCLUSIONS

Research of scientific approaches and application of the marketing mix concept to digital marketing components shows the lack of a unified approach. Some models are aimed at the consumer and the B2C market (for example: "5W" of Mosley-Matchett; "6C" of Chaffey, Mayer, Johnston, Ellis-Chadwick; "3C+I" of Pastore and Vernuccio; "SIVA" of Dev and Schultz), while others are aimed exclusively at the B2B market and do not properly take into account customer focus (such as: e-marketing mix "4Ps+$P^2C^2S^3$" by Kalyanam and McIntyre).

In addition, some components, such as people, personnel, processes, conflict with the original marketing mix concept. Based on the research, it was decided to take Kalyanam and McIntyre model as a basis, but to distinguish two blocks of constituent elements in the structure of the Integrated Internet marketing complex: targeting elements based on the traditional "4P" model adapted to the Internet environment and providing elements "$2P^2C^2S^{2"}$: Personalisation & Privacy, Personnel & People, Customer Service, Community, Synergy & Scope. This structure of Integrated Internet marketing tools based on the marketing mix concept allowed to formulate the authors' definition of Internet marketing and Integrated Internet marketing and can be used to assess the effectiveness of the entire complex of Internet marketing and its components at the enterprise.

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STRUKTURA ZINTEGROWANEGO KOMPLEKSU MARKETINGU INTERNETOWEGO WEDŁUG KONCEPCJI MARKETINGU MIX

STRESZCZENIE

Niniejsze badanie opisuje główne podejścia do cyfrowych modeli marketingowych opartych na koncepcji marketingu mix. W artykule przedstawiono główne składniki różnych modeli, takich jak: kompleks marketingu internetowego „5W" Mosley-Matchetta; „8P" e-marketing mix naukowców z National Taiwan University (Chen); zestaw elementów „6C" skutecznej witryny internetowej autorstwa Chaffeya, Mayera, Johnstona, Ellis-Chadwicka; kompleks marketingu internetowego „4S" Constantinidesa; kompleks marketingu cyfrowego „4Ps+P2C2S3" (e-marketing mix) stworzony przez Kalyanama i McIntyre'a; digital marketing mix „3C+I" Pastore'a i Vernuccio; model informacyjny firmy Dev i Schultz zorientowany na klienta „SIVA"; kompleks marketingu cyfrowego „2P+2C+3S" przedstawiony przez Otlacan. W pracy przedstawiono analizę porównawczą cech tych modeli oraz zalet i wad wykorzystania każdego z nich w ramach zintegrowanej strategii marketingu internetowego. Stworzono strukturę zintegrowanych narzędzi marketingu internetowego opartą na koncepcji marketingu mix, na którą składają się dwa bloki składowe: elementy kluczowe występujące w tradycyjnym modelu „4P", dostosowane do środowiska internetowego oraz elementy „$2P^2C^2S^2$": personalizacja i prywatność, personel i ludzie, obsługa klienta, społeczność, synergia i zakres. Autorzy formułują definicję marketingu internetowego i zintegrowanego marketingu internetowego na podstawie zbudowanej struktury zintegrowanego marketingu internetowego Kalyanama i McIntyre'a.

Słowa kluczowe: marketing internetowy, zintegrowany marketing internetowy, marketing mix, 4P, synergia

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