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MAGDALENA ANNA ZWOLIŃSKA-LIGAJ

Pope John II State School of Higher Education in Biała Podlaska, Poland

POSSIBILITIES OF IMPLEMENTING THE SMART DEVELOPMENT CONCEPT IN RURAL AREAS FROM A BUSINESS PERSPECTIVE. THE EXAMPLE OF EASTERN POLAND

Key words: Eastern Poland, smart development, innovativeness, entrepreneurship, peripheral regions

ABSTRACT. The aim of this paper was the evaluation of the impact of selected background conditions for implementing the smart village concept in the opinion of entrepreneurs. The assessment was based on an opinion poll on a sample of 240 entrepreneurs from three regions of Eastern Poland, using a questionnaire. The results were presented using descriptive analysis, including a comparative analysis of areas with low and high levels of smart growth potential. The presented results show that rural areas in the abovementioned regions, in general, create disadvantageous conditions for enhancing innovativeness through business activity, and the surveyed agents are characterised by a low level of innovativeness. In the opinion of the surveyed entrepreneurs, on the impact of selected factors on enterprise innovativeness, the potential impact of the local environment is above average. The findings point to a need to develop the endogenous potential of rural areas from peripheral regions by increasing access to modern ITC infrastructure and the role of the institutional environment in the process of knowledge transfer to the local sector of companies, the development of local connections in the business sector and within the scope of cooperation of local authorities with entrepreneurs.

INTRODUCTION

The concept of smart growth of rural areas (smart village) is a new idea for rural development, originating in the sustainable growth approach. Its formation is influenced by factors such as: strengthening net economy and the need for a territorial approach within the framework of development policy, care for life quality and conditions of the natural environment, ongoing processes of globalisation, as well as technical and technological change. The concept also pays attention to opportunities for development for rural areas

with peripheral characteristics [Naldi et al. 2015, Guzal-Dec 2018, Zwolińska-Ligaj 2018, Adamowicz, Zwolińska-Ligaj 2020, Paniagua 2020].

The smart village assumes that technological progress, if successfully integrated with other initiatives of rural area development, can create new possibilities to increase income, offer services and strengthen the community, resulting in a significant improvement of life quality in the countryside [Van Gevelt, Holmes 2015, Wolski, Wójcik 2019]. ICT (Information and Communication Technologies) tools and digital skills are seen as a factor facilitating access to services and business development [Stratigea 2011, Nagy et al. 2018]. The most important areas of the smart village concept are: public services, management and the co-management of commune area, social creativity, technological innovations concerning the improvement of social cooperation and business growth, communication development (modern means of communication in particular), including internet networks, environmental protection and the development of various forms of using the nature's potential [Nagy et al. 2018, Wójcik 2018, p. 10].

The progress of innovativeness constitutes the foundation of smart growth. In the case of rural areas, it requires the multidimensional, pro-innovative activity of local development agents that include local authorities, countryside communities and support bodies. It is aimed at the improvement of rural areas, both in economic and social dimensions [Wójcik 2018, p. 7, Zwolińska-Ligaj 2018]. The concept requires searching for and finding development possibilities originating from using own, local potential, through the efficient use of information and communication technologies, as well as implementing best practices. This quest is pursued by the development of relations of horizontal and vertical character, with regard to local identity [Wolski, Wójcik 2019, p. 44, compare Zavratnik et al. 2018]. The abovementioned view on smart development is a manifestation of the territorial approach that incorporates territorial determiners of innovative processes, and points out the strategy of rural area development that is based on the concept of neo-endogenous growth. Local knowledge and other resources, as well as the co-operation of local agents with local authorities, external partners and wider networks, constitute a basis for the strategy in question [Shucksmith 2019, Wolski, Wójcik 2019]. The existence of social networks and relations in a given rural area may be the key to its innovativeness development [Dargan, Shucksmith 2008, p. 278]. In the case of entrepreneurs, it determines their involvement in the learning process [Isaksen, Karlsen 2016, Zwolińska-Ligaj 2018, 2019].

Nowadays, pro-innovative activity is widely understood as supporting new social solutions, based on collective activity in a local context, and promoting modern concepts of production and services implemented on small, local markets [Da Rosa Pires et al. 2014]. EU policy concerning the innovativeness of rural areas is based on the pursuit of new possibilities for rural development, and strengthening human and social capital by e.g., the flourishment of sustainable, innovative chains of values, implementing digital technologies

and the growth of an ecosystem of innovations [EC 2016]. Referring to peripheral areas, new forms of business are indicated. They result from designing services based on local amenity services, creative economic growth, developing networks and co-operation, as well as building partnerships with cities. Such chances mainly concern growing demand for high-quality, healthy food, the development of services in areas such as tourism, health, leisure, culture, the arts and crafts, housing, multifunctional agriculture, bioeconomy as well as eco-economy [Da Rosa Pires et al. 2014, Naldi et al. 2015, Zwolińska-Ligaj 2016, Eder 2019].

The aim of this paper is the evaluation of the impact of selected background conditions for implementing the smart village concept in the opinion of entrepreneurs.

INPUT AND RESEARCH METHODS

Empirical research was conducted in Poland, in the following voivodships: Lubelskie, Podkarpackie, and Warmińsko-Mazurskie. They complied with the criterion of peripherality, as defined by their border location, and socio-economic conditions. Their rural areas were characterised by the potential for smart development, showing relatively poorer conditions in terms of economic status, life quality and mobility, in comparison with remaining regions of the country [Zwolińska-Ligaj 2018, p. 133].

Ten communes were selected within each of the regions, taking their potential for smart growth into account. The joint authorship concept of a tool was used [Zwolińska-Ligaj et al. 2018] to define the potential for smart development of rural and urban-rural communes in the regions in question[1]. Eight companies were selected in each of the thirty researched communes. The choice was made on the basis of data from the National Business Registry Number, with reference to the highest level of employment, which assumes virtually larger possibilities to participate in local innovative processes. Research was conducted by means of an opinion poll with the use of a questionnaire. The survey was carried out

[1] Presenting the smart development concept was made by performing a diagnosis of six dimensions such as: management, life quality, the economy, society, the natural environment and mobility. 24 metrics were suggested. Next, the zero unitarization method was applied to define the value of the synthetic *Qs* metrics for smart growth potential in communes, independently within each of the three regions. Normalization, with the use of the quotient transformation formula, was performed. Stimulant variables were normalized according to the formula: $Zij = \frac{\mathrm{X}ij - \min Xij}{\max Xij - \min Xij}$ and destimulant variables were normalized according to the following formula: $Zij = \frac{\max Xij - Xij}{\max Xij - \min Xij}$. Normalization satisfied the condition: $Zij \in [0, 1]$ [Kukuła 1999]. The value of the synthetic variable was determined, characterizing each object according to the smart growth potential level $Qi = \frac{1}{m}\sum_{j-1}^{m} Zij, \quad (i = 1, \ldots, r)$. Communes within each voivodeship...

by an external agent from July to November 2018. The study input consisted of 240 questionnaires. It covered data from between 2016 and 2018. The statistical sample mainly included companies from the following sectors: manufacturing (43.3%), the wholesale and retail trade (15.0%), and construction (10.8%). Micro-enterprises constituted over half of the sample (63.8%). The majority of surveyed entrepreneurs defined the type of their business as labour-intensive (87.5%), while the rest of them as knowledge-intensive (9.6%) or capital-intensive (2.9%)[2].

The outcomes were presented by means of descriptive analysis with the use of quantitative and qualitative methods, including comparative analysis, within the set of communes representing the class of relatively very high and very low values of the synthetic *Qs* metrics for smart development potential. The data were processed using Statistica 13.3 software and presented in both a descriptive and graphic form of tables and figures. The Mann-Whitney U test was used for statistical analysis of the empirical input to compare the results presented in the system of compared groups of municipalities using the criterion of the level of smart development potential. The value and significance level of the Mann-Whitney U test were specified for the size of both groups over 20 cases. The α level was assumed to be 0.05 in the calculations.

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[1] c.d. ... on which the study was performed, were classified into five groups showing: very high, high, average, low and very low smart development potential. For this reason, the range of the synthetic variable was obtained through the formula: $R(Qi) = maxQi - minQi$ and designated the *k* parameter of division according to the formula: $k = \frac{1}{5} R\,(Qi)$ [Kukuła 2014]. Five groups of territorial units were extracted on the basis of the following formulas [comp. Kukuła 2014]: The group with a very high level of smart development potential: $Qi \in [maxQi - k, maxQi]$; the group with a high level of smart development potential: $Qi \in [maxQi - 2k, maxQi - k]$; the group with an average level of smart development potential: $Qi \in [maxQi - 3k, maxQi - 2k]$; the group with a low level of smart development potential: $Qi \in [maxQi - 4k, maxQi - 3k]$; the group with a very low level of smart development potential: $Qi \in [maxQi - 5k, maxQi - 4k]$ [Kukuła 2014]. 10 communes were selected for empirical research in each of the regions, randomly drawing five communes from two extreme classes of the indicator values. The surveyed communes included: in the Lubelskie Voivodeship: Janów Lubelski, Parczew, Milejów, Poniatowa, Jastków, Nielisz, Stary Brus, Abramów, Dzwola, Leśniowice, in the Podkarpackie Voivodeship: Trzebownisko, Mielec, Świlcza, Nisko, Ustrzyki Dolne, Krzywcza, Wielkie Oczy, Domaradz, Dynów, Nozdrzec and in the Warmińsko-Mazurskie Voivodeship: Stawiguda, Tolkmicko, Mikołajki, Węgorzewo, Orneta, Szczytno, Sępopol, Sorkwity, Kozłowo, Świętajno (description of methods based on [Zwolińska-Ligaj 2018]).

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The following aspects were taken into account in the polls: 1) an evaluation of the innovative activity of companies in comparison with competitors from the sector (an evaluation made on a 1-5 scale, where 1 stands for very low activity, and 5 – very high); 2) an evaluation of the possibility of enhancing the competitive position of a company (an evaluation made on a scale from 1 to 5, where 1 means that the possibilities definitely do not exist, and 5 – that they definitely do exist); 3) an evaluation of a commune's general conditions in terms of enhancing business functioning and development (an evaluation on a scale 1-5 where 1 means that the conditions are definitely not beneficial, and 5 – they are definitely beneficial for business functioning and development); 4) an evaluation of selected endo- and exogenous factors with reference to the strength of their impact on implementing innovations in companies (an evaluation on 1-5 scale where 1 means that a factor definitely does not have an impact on company innovativeness, and 5 – definitely does have an impact on company innovativeness).

THE FINDINGS

The evaluation of innovative activity performed by entrepreneurs showed that it was low in comparison with competitors. The data presented the crucial statistical differences, dependent on the represented classes of communes (Table 1).

Innovative activity was rated higher in the case of entrepreneurs performing their activity in communes considered to be at a high level of smart development. That is why company self-evaluation proves the view established in specialist literature concerning a low innovativeness level of companies operating in peripheral regions, and the influence of objective environmental conditions on possibilities for pro-innovative activity.

The smart development of rural areas is connected with a need to enhance competitiveness by undertaking actions aimed at improving innovativeness. The group of researched agents showed the existing, extraordinary possibilities in this field, based on the innovative character of products and services and implementing innovations concerning

Table 1. The evaluation of the innovative activity of companies in comparison with competitors from the sector, according to the smart development potential of researched communes (N = 240)

Smart development potential	$\overline{X}$	σ	Mann-Whitney U test p-value
Low	2.63	0.709	0.022
High	2.87	0.660	
Total	2.75	0.694	-

Source: own elaboration based on empirical research

Table 2. The evaluation of the possibility to enhance the competitive position of a company, according to selected areas, and the smart development potential of researched communes (N = 240)

Areas of competitiveness	Total		Smart development potential				Mann-Whitney U test p-value
			high		low		
	$\overline{X}$	σ	$\overline{X}$	σ	$\overline{X}$	σ	
Quality of products/services	3.64	0.89	3.68	0.87	3.60	0.91	0.669
Modern, innovative character of products/ services	3.57	1.03	3.68	0.95	3.46	1.09	0.102
Price of products/services	3.56	0.89	3.52	0.86	3.60	0.92	0.366
Customer service quality	3.55	0.95	3.60	0.96	3.51	0.95	0.355
Implementing innovations concerning processes, organisation, marketing	3.47	1.07	3.54	1.05	3.39	1.09	0.252
Employees' regular pursuit of competence improvement and knowledge update	3.41	1.12	3.46	1.19	3.37	1.05	0.278
Timeliness of deliveries/speed of deliveries	3.38	1.04	3.34	1.10	3.41	0.98	0.953
Cost of production/service	3.38	0.93	3.38	0.95	3.38	0.91	0.910
Good market research	3.38	0.99	3.36	1.04	3.39	0.95	0.720
Managers' skills and competence	3.35	0.92	3.38	0.95	3.32	0.89	0.325
Co-operation with institutions to acquire knowledge	3.33	1.01	3.41	0.95	3.25	1.07	0.150
Constant look out for employees able to generate and implement innovations	3.29	0.97	3.34	0.94	3.24	1.00	0.398
Narrow field of expertise, specialist knowledge and skills	3.23	1.00	3.18	1.02	3.27	0.98	0.637
Ability to adapt production/services to customer requirements	3.20	0.97	3.22	1.02	3.17	0.92	0.538
Eco-friendly activities/eco-friendly company image	3.19	1.05	3.19	1.04	3.19	1.06	0.799
Expanding outlets	3.07	1.35	3.30	1.27	2.84	1.39	0.016
Relations with local authorities	3.03	1.15	3.13	1.14	2.94	1.15	0.211
Good relations, sharing knowledge with competitors	3.00	1.07	3.01	1.10	3.00	1.05	0.884
Use of modern technologies for communication with partners and customers	2.99	1.22	3.13	1.13	2.85	1.28	0.142

Source: own elaboration based on empirical research

processes, organisations and marketing. Entrepreneurs enumerated the quality of products/services and customer care, as well as product/service price (Table 2) as other important potential sources of a company's competitiveness, apart from innovative activity.

The results revealed that respondents are able to recognize the potential for enhancing innovativeness, despite the fact that they declare its low level. These findings are in line with other studies on companies located in peripheral regions [e.g. North, Smallbone 2000]. They show that pro-innovative actions are used to adapt to local conditions, e.g., by taking labour-intensive development paths, or a low level of subcontracting, while implemented innovations are necessary for keeping their market position [NIC 2005]. However, the majority of companies in question applied a labour-intensive activity profile, not recognizing more chances for expanding their outlets.

The factor concerning the widely understood knowledge on how to shape the competitive position of a company, created rather average opportunities. In particular, they were connected with the employees' readiness to upgrade skills and broaden knowledge, managers' skills and competence and market research, as well as actions within the scope of a narrow area of expertise, demanding specialist knowledge and skills. The results seem to confirm other research, pointing out the deficiencies of peripheral regions in the fields of human capital, access to qualified manpower, as well as finances and the knowledge network [Rodríguez-Pose, Crescenzi 2008, Planes-Satorra, Paunov 2017].

Taking the factors concerning company competitiveness into consideration, which is one of the focuses of the smart development concept, and include, e.g.: shaping local relations, expanding outlets, and using modern technologies in economic activity, it should be observed that they were not perceived by respondents as factors with more power to enhance business competitiveness, and estimated their role in the process as average. In reference to the factor concerning shaping local relations and knowledge networks, and taking into account yet other findings, it should be noted that knowledge transfers do not always lead to competitiveness improvement. They can be forced by threats e.g., from the competitors' side [Araújo et al. 2013]. Moreover, it is recommended to build "global" links that are supplemented by an appropriate local resource base [Lagendijk, Lorentzen 2007].

The opportunities for strengthening the competitive position in the researched areas, as perceived by entrepreneurs, did not exhibit statistically crucial differences, dependent on commune classes, except for the ones connected with expanding outlets. They were evaluated much higher, in the case of entrepreneurs from communes with a high level of smart development potential. At this point, it should be noted that this group of communes was characterised by relatively favourable location conditions, defined by the close vicinity of larger urban centres, or the occurrence of resources conditioning tourism attractiveness.

Local conditions as evaluated by respondents can be defined as unfavourable to business functioning and development. The assessment did not show statistically crucial differences as referred to the classes of communes represented by entrepreneurs (Table 3).

Table 3. The evaluation of a commune's general conditions in terms of enhancing business functioning and development according to the smart development potential of researched communes (N = 240)

Smart development potential	$\overline{X}$	σ	Mann-Whitney U test p-value
Low	2.44	0.889	0.169900
High	2.61	0.833	
Total	2.52	0.864	-

Source: own elaboration based on empirical research

Entrepreneurs noticed the powerful influence of the whole set of endo- and exogeneous factors that could potentially stimulate a company's state of innovativeness. The most important factors were the ones crucial from the perspective of the smart village concept. They included: the quality of the institutional environment, access to modern ITC infrastructure, and the relations of trust and openness to cooperation that characterise the local economic environment and the representatives of local authorities (Table 4).

When it comes to the institutional environment, respondents underlined the meaningful role of local authorities concerning cooperation and establishing relations with entrepreneurs. The researched enumerated the following factors as those having a lesser impact on the state of company innovativeness: possibilities resulting from the use of local resources and a commune's natural environmental heritage, the existence of local networks of company connections that facilitate the implementation of innovations in given agents, the inflow of investors, new residents and tourists.

Two factors revealed diversification that depended on commune classes: the existence of people who are educated, qualified and interested in updating knowledge and skills - rated higher in the case of entrepreneurs representing the group of communes with a low level of smart development potential; and the use of resources and natural environmental heritage of the commune - rated as more meaningful in the case of units with a high level of smart development potential. Such an evaluation seems to result from (in the case of communes with a high potential for smart development) more favourable local conditions referring to human and social capital, and access to natural environmental supplies that stimulate local entrepreneurship.

Table 4. The evaluation of selected endo- and exogenous factors with reference to the strength of their impact on implementing innovations in companies, made by entrepreneurs, according to the smart development potential of researched communes (N = 240)

Development factors		Total		Smart development potential				Mann-Whitney U test p-value
				high		low		
		$\overline{X}$	σ	$\overline{X}$	σ	$\overline{X}$	σ	
Internal	Cooperation of local authorities with entrepreneurs, close relations	3.83	0.84	3.83	0.90	3.83	0.77	0.887
	Trust, cooperation between entrepreneurs and sharing knowledge	3.72	0.85	3.66	0.90	3.78	0.80	0.251
	Educated, qualified people, caring for broadening their knowledge and improving skills	3.71	0.77	3.59	0.77	3.83	0.76	0.043
	Development, promotion of local cooperation by the local authorities of a commune	3.70	0.72	3.65	0.73	3.74	0.72	0.340
	Enhancing setting up new businesses by the local authorities of a commune	3.69	0.81	3.58	0.89	3.80	0.71	0.058
	Local authorities' participation in the development of existing businesses	3.63	0.76	3.59	0.76	3.66	0.75	0.484
	Encouraging business support institutions by the local authorities	3.55	0.76	3.57	0.76	3.53	0.77	0.765
	Use of commune's supplies and its natural environmental heritage	3.42	0.80	3.54	0.82	3.30	0.76	0.025
	The existence of local networks of innovations, clusters	3.34	0.86	3.35	0.89	3.33	0.83	0.736
External	Technical infrastructure, ICT technologies	3.82	0.77	3.83	0.80	3.81	0.75	0.855
	The assistance of institutions enabling access to knowledge and information essential for innovative activity	3.79	0.81	3.79	0.80	3.78	0.83	0.816
	Use of EU and other funds by the economic agents in a commune	3.56	0.81	3.48	0.82	3.65	0.78	0.127
	Development of economic links ith urban centres	3.50	0.86	3.60	0.85	3.39	0.86	0.091
	Inflow of investors, new residents, tourists	3.37	0.92	3.39	0.99	3.35	0.85	0.801

Source: own elaboration based on empirical research

CONCLUSIONS

The presented findings of the study point out that, in general, in rural areas of the researched peripheral regions, conditions for pro-innovative business activity are unfavourable. The companies in question, having potentially higher chances for innovative activity, and constituting vital elements of local economies, are characterised by a low level of innovativeness. Hence, the research revealed an innovation gap, in terms of the entrepreneurs' perception of an insufficient level of businesses innovativeness.

Company innovativeness can be shaped by complimenting factors originating in local structure and its environment. As for the first group, the meaning of the following factors should be stressed: human and social capital occurring together with a proactive attitude of local authorities in the local environment, as well as the existence of relations based on trust and openness to co-operation that characterises the local economic environment and the representatives of local authorities. On the other hand, one should appreciate the role of the infrastructure enabling the development of interlinks between the local structure and its environment, and the proactive approach of institutions in the environment, which can facilitate an inflow of knowledge and information, necessary for the innovative activity of various agents creating local structures.

With regard to these findings, it should be stated that this is an unfavourable situation, if, in the entrepreneurs' opinion, the abovementioned factors create limited possibilities for the improvement of business innovativeness. However, the deficiencies within the scope of local resources, such as human and social capital or local relations, have also been revealed. Possibilities for strengthening the competitive position, as based on outlets, relations with local authorities, competitors, as well as the use of modern technologies for communication with partners and customers, are also limited. In light of this study on company innovativeness, the resources and natural environmental heritage of a commune as well as existing networks of innovations or clusters do not stimulate either. The potential for developing exogenous factors, such as the use of EU and other funds by the economic agents in a commune, the development of economic links with urban centres, the inflow of investors, new residents and tourists are restricted. It should be noted however that the potential of rural areas concerning factors of company innovativeness within the field of interest of the smart village concept is insufficient. Conditions more conducive to company innovativeness took place in areas with a high level of smart development potential and were related to relatively favourable location conditions determined by the proximity of larger urban centres or the presence of resources determining tourist attractiveness.

Taking the local environment and its potential influence on innovativeness into account, it should be noted that it is above average in light of the research results. The outcomes also reveal a need for developing the endogenous potential of peripheral rural areas in terms of: improving access to modern ICT structure, increasing the role of the institutional

environment in the process of knowledge transfer to the local business sector as well as developing local links in the business sector, which can boost a company's role in the innovative management of resources from rural areas.

Extending the territorial scope of research beyond the region of Eastern Poland and covering other regions of the country would constitute an interesting research perspective. The further development of research on the possibilities of implementing the concept of intelligent development in local systems requires considering the role of local governments and other institutions in supporting the development of various forms of cooperation of enterprises representing selected industries and the effects of this cooperation in the form of innovation.

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MOŻLIWOŚCI WDRAŻANIA KONCEPCJI INTELIGENTNEGO ROZWOJU OBSZARÓW WIEJSKICH Z PERSPEKTYWY PRZEDSIĘBIORSTW. PRZYKŁAD REGIONÓW POLSKI WSCHODNIEJ

Słowa kluczowe: Polska wschodnia, smart village, innowacyjność, przedsiębiorczość, region peryferyjny

ABSTRAKT

Celem badań była ocena wpływu wybranych uwarunkowań realizacji koncepcji inteligentnego rozwoju obszarów wiejskich w opinii przedsiębiorców. Oceny tej dokonano na podstawie badań sondażowych z wykorzystaniem kwestionariusza wywiadu na próbie 240 przedsiębiorców z trzech regionów Polski Wschodniej. Wyniki zaprezentowano z wykorzystaniem analizy opisowej, w tym analizy porównawczej obszarów o niskim i wysokim poziomie potencjału inteligentnego rozwoju. Wskazują one, że na obszarach wiejskich badanych regionów peryferyjnych występują ogólnie niesprzyjające warunki aktywności proinnowacyjnej przedsiębiorstw, a badane podmioty charakteryzuje niska innowacyjność. W opinii badanych przedsiębiorców na temat wpływu wybranych czynników na innowacyjność przedsiębiorstw potencjalny wpływ środowiska lokalnego jest ponadprzeciętny. Wykazano potrzebę rozwijania potencjału endogenicznego obszarów wiejskich regionów peryferyjnych w zakresie zwiększenia dostępności nowoczesnej infrastruktury informatycznej i komunikacyjnej, zwiększenia roli otoczenia instytucjonalnego w procesie transferu wiedzy do lokalnego sektora przedsiębiorstw, rozwoju lokalnych powiązań w sektorze przedsiębiorstw i w ramach współpracy samorządu lokalnego z przedsiębiorcami.

AUTHOR

MAGDALENA ANNA ZWOLIŃSKA-LIGAJ, PHD

ORCID: 0000-0001-6770-7092
Pope John II State School of Higher Education in Biała Podlaska, Poland
Faculty of Economics
95/97 Sidorska St., 21-500 Biała Podlaska, Poland
e-mail: m.zwolinska-ligaj@dydaktyka.pswbp.pl