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The Green Economy Development Factors

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Abstract

The green economy is one that affects the growth of human well-being and social equality, while reducing environmental threats and the use of natural resources. Countries which support change of their economies into greener models create new conditions to support this transformation. Therefore there are two main groups of factors which can be identified as factors of green economy development. There are dimensions of innovation transfer and corporate social responsibility (CSR), which are two areas of source such development factors. The topic of interest of this article is the process of ongoing transformation of the economic and social model towards a more environmentally sustainable and social justice called sustainability transition, which is reflected in the process of changes towards green economy. The aim of this paper is to indicate sources of factors of the green economy development and to propose a solution for a “grow first and clean up later” strategy. The adopted method was exploratory factor analysis performed for secondary data for all regions of Poland in the Statistica programming environment. The source of data used in this research was Polish Main Statistical Office database. Obtained results confirmed the main thesis of the paper.

Keywords: eco-innovation, green economy, green jobs

Introduction

The concept of green economy has recently appeared in the mainstream public debate. The reason for the large interest in the green economy were the initiatives taken by global and regional organizations seeking a way out of the multifaceted economic, ecological and social crisis (Walker and Plotnikova, 2018). The concept of green economy began with the idea of sustainable development and was supported by technological innovations (Ryszawska, 2013), which together give the countries (citizen societies) competitive advantage (Grudziński and Sulich, 2018). There is no doubt that green economy is also a challenge for the legal order in each country, which create a frame for business environment (Kulhanek and Sulich, 2018). Business is not only recipient of regulations and changes in its surrounding (customer choices and trends), but also interact actively with other organisations all the time looking for their new competitive position (Kulhanek and Sulich, 2018). This can be assured by innovation and support of society, if the highlighting strategy is chosen to create well recognized new value (Stańczyk, 2013). Such value can be represented by the green economy idea realisation process known as the green development (Egorova et al, 2015).

The governments of developing countries are increasingly committing to greening their economies, most explicitly under the Paris Agreement on climate change, where nearly all governments agreed to establish national road maps for decarbonization. Many also have enacted comprehensive national green growth strategies to build a green economy (Lutz, 2017). Declared changes and ambitious goals not always are realised also among most developed countries (Egorova et al., 2015). Although, there are concerns that poorer countries do not have the financial and institutional means to internalize environmental costs, and that their economies are mostly factor-driven, hence internalizing environmental costs may undermine their competitive advantages vis-a-vis innovation-driven economies (Grudziński and Sulich, 2018). For these reasons, many analysts and policymakers favour a “grow first and clean up later” strategy. The aim of this paper is to challenge this strategy through a better understanding of the economic co-benefits and costs of green transformations and to discuss and identify the areas of green economy development factors. The main thesis of this article is that green economy development factors can be recognized in areas of innovation and social

responsibility, if their aim is to reduce negative impact of any human activity on natural environment. Therefore, an exploratory factor analysis was performed on the data describing all regions of Poland.

The Green Economy

The last quarter of the 20th century saw the creation of new solutions aimed at solving social, economic and ecological problems (Piórkowska and Stańczyk-Hugiet, 2017). These solutions are intertwined and related to the progress of humanity, and they are expressed in the shift in two dimensions. The first dimension is a shift from isolated and centralized economies to open and cooperative societies which mainly want to live closer to nature and to maintain work-life balance (Ostrom, 2009). This idea is described as the green economy and its based on the sustainable and durable development strategy (Fig 1). It would be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services (Lutz et al., 2017). Therefore, these are indicators of green growth, which is element of green development towards the green economy (Grudziński and Sulich, 2018).

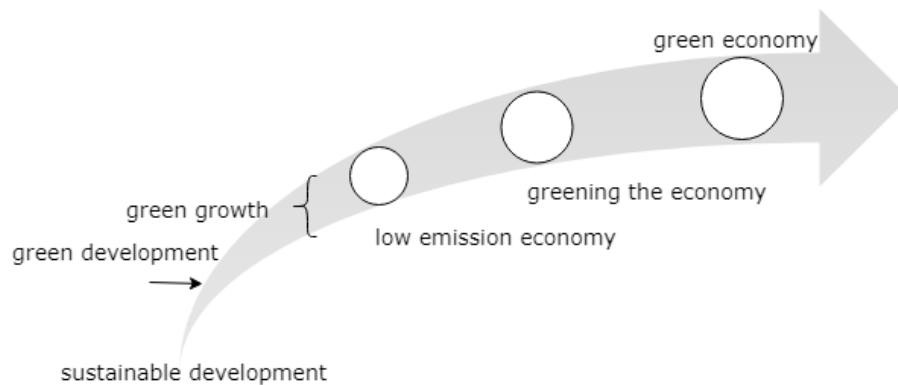


Fig. 1: Green development and its stages in realisation of green economy idea

Source: author own elaboration based on (Ryszawska, 2013).

Green economy is defined as an economy that aims at reducing environmental risks and ecological scarcities, and whose purpose is sustainable development without degrading the environment. In the literature a green economy is often described in opposition to the so called brown economy, which is based to the use of fossil fuels and non-renewable resources (Ryszawska, 2013). The comparison between brown and green economy is presented in table 1.

Table 1: Green economy versus modern brown economy

Brown economy	Green economy
"Unlimited" economic growth	Separating economic growth from the consumption of natural resources
Non-renewable energy sources	Renewable energy sources
Intensive consumption of natural resources (energy and material-intensive)	Energy efficiency
Greenhouse gas emissions	Clean production
Destruction of biodiversity	Biodiversity protection
Global social inequalities	Intergenerational and interregional justice
Unlimited consumption (over consumption)	Sustainable consumption
Lack of Corporate Social Responsibility of Businesses and Investors	Corporate Social Responsibility of Businesses and Investors
Weakening of social trust	Rising social trust

Source: author own elaboration based on (Ryszawska, 2013).

For the state the proper management of natural assets or natural capital is relevant for improving productivity and, therefore, improving competitiveness of national economy if green model is chosen. Moreover, decarbonization can be understood then as a process of charting practical pathways to deeply reducing greenhouse gas emissions and progressive abandonment of technologies typical for brown economy (Ryszawska, 2013).

For the society process of change towards green economy can influence its lifestyle to more ecological creating self-governed ecological settlements or other revolutionary changes (Walker and Plotnikova, 2018). Therefore an implementation of green economy can have a significant impact on human society because of (Sulich and Zema, 2018):

- a) eradicating poverty and hunger through targeted measures to alleviate and eliminate poverty, and enhancing agricultural production capacities and food security;
- b) implementing innovation-driven development strategies and generating momentum for sustainable, healthy and stable economic growth;
- c) advancing industrialization to inject impetus to coordinated development between urban and rural areas and among the three dimensions of sustainable development;
- d) improving social security and social services to ensure equal access to basic public services;
- e) safeguarding equity and social justice to improve people's well-being and promoting all-round human development;
- f) protecting the environment and building protective barriers for eco-security;
- g) addressing climate change actively and integrating climate change response into national development strategies;
- h) promoting efficient utilization of resources and sustainable energy;
- i) improving national governance and ensuring economic and social development in line with the rule of law.

Governments around the world increasingly recognize that the creation of long-term citizen society value depends also on the state's ability to understand and respond to increasing demands from the society (Grudziński and Sulich, 2018). The social dimension of the green development is related also to innovations, which accelerate economic development. The need for a new environmentally friendly ways and approaches to production management is becoming more evident.

Green growth towards green economy provides a means by which economic, environmental and social goals can be simultaneously achieved (Rutkowska-Podołowska and Węglarz, 2017). It presents an opportunity to make existing industries more sustainable while at the same time encouraging new industries and a diversified economy. Technological innovation is essential to this transition, without innovation it will be very difficult and costly to address major environmental issues (Piórkowska and Stańczyk-Hugiet, 2017).

Innovativeness of Green Economy

Addressing climate change while promoting economic growth requires the large-scale deployment of green technologies across key sectors such as power generation, transport and energy use (Rutkowska-Podołowska et al., 2016). Together these types of industry create green sector of economy. Although many of these technologies, such as wind and solar energy or hybrid and electric cars, are already available, they are often more costly than existing fossil fuel-based options, meaning either that further refinement is required or that new technologies must be developed (Rutkowska-Podołowska et al., 2017). Investing in research and development, supporting commercialization, strengthening markets and fostering technology diffusion are all key policy actions required for the deployment of new technologies and innovations (Organa and Sus, 2018). Therefore development of the green economy is based on knowledge (know-how and skills) transfer process (Picture 2). Innovations use the results of technological development, new combinations of existing technology or the use of other knowledge desired by the organisation (Piórkowska and Stańczyk-Hugiet, 2017).

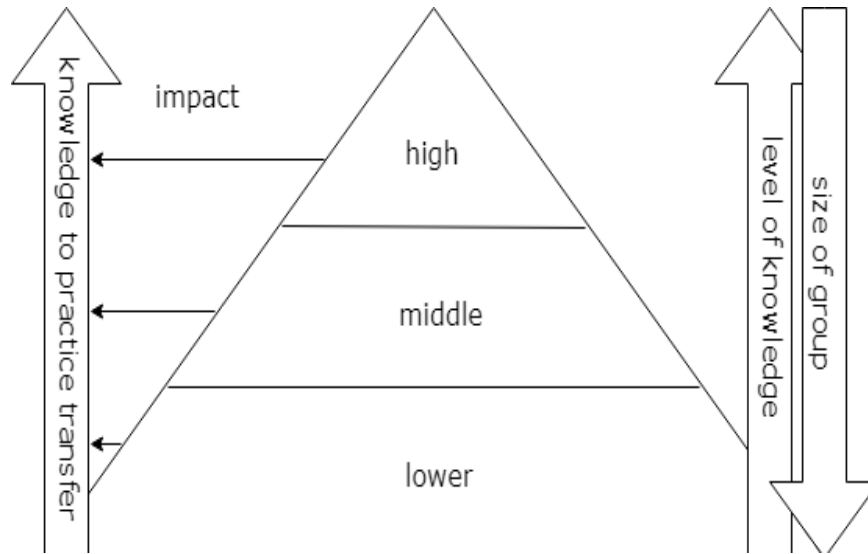


Fig. 2: The knowledge transfer pyramid

Source: author own elaboration based on (Sulich, 2017)

This phenomenon was described by pyramidal model of knowledge transfer. This model states that innovation comes from well-educated small group of society with ideas and knowledge how to “make their dreams come true”. On every higher level of pyramid the knowledge size of group is decreasing, but the degree of complexity of their innovation is also bigger. This model shows one huge limitation of approach of green economy: that limited size group (high) has to way across longer distance, than bigger group of basic education (Sulich, 2017). Explanation is that mostly in high knowledge group presents discoveries, whereas basic knowledge give only small improvements (Kozar, 2017). Therefore the impact of high level knowledge is bigger. Based on this conviction, organisations are exploring green business opportunities, increasingly based on systemic thinking and radical innovations, aiming to capture and create value from new business models (Abarar, 2014).

Among the organisations of the green sector, the implementation of innovations means that their creation is not an accidental, occasional activity, but a programmed activity consisting of seeking development opportunities, developing new technologies, new products and forms of marketing as well as constant staff training so that they are able to create innovations and their implementation according to the challenges and needs of the market (Rutkowska-Podołowska and Węglarz, 2017).

Corporate Social Responsibility

The changes taking place in the modern world force also the adoption of an innovative attitude among organisations operating in accordance with corporate social responsibility (CSR). As it was presented in Table 1, rapid evolution and popularity of good CSR practices in provided services prove to be standard of green economy (Ryszawska, 2013). Not only is a symptom of change, but is a second possible area of green economy development. That is why business, building and implementing new CSR strategies, is looking for new fields of activity, while trying to recognize the current socio-environmental problems that can be solved with its help (Demków and Sulich, 2017). The contemporary dynamic business environment forces an interdisciplinary discussion about the next fields of the organization's activities (Kulhanek and Sulich, 2018). This discussion is undertaken by both theoreticians and practitioners, pointing to the importance of the company's relationship with the environment. In addition, the ongoing debate is trying to identify the roles that globalization companies have to play and the tasks they must take on each other (Organa and Sus, 2018). There is a new direction of CSR development proposed and it is defined by green jobs, which combine in-depth dialogue and cooperation with various groups of stakeholders with the protection of the natural environment.

The term “green jobs” is used in practice and according to the Bureau of Labor Statistics is defined as “jobs in business that produce goods or services that benefit the environment or conserve natural resources” or “jobs in which workers’ duties involve making their establishment’s production processes more environmentally friendly or use fewer natural resources” (Bureau of Labor Statistics, 2013). The broader analysis of definition of green jobs is explained in Kozar (2017) and Rutkowska-Podolowska et. al. (2016) articles. Green jobs are also an area of emergence of innovative solutions that also help to eliminate problems of local communities (Kozar, 2017). Because corporate social responsibility is also a set of organization’s commitments to renew and strengthen the society in which it operates (Demków and Sulich, 2017). Moreover, it is believed that thanks to the greening of the economy, green jobs will be created, thanks to which it will be possible to fight unemployment and prevent environmental degradation (Rutkowska-Podolowska et. al., 2016). Thanks to them green economy in CSR dimension steps also in socio-economic practice. Moreover, many of green jobs are the effect of the implementation of innovations and sometimes are described as one of eco-innovations, because employed in green jobs people contribute to new products and processes which provide customer and business value but significantly decrease environmental impacts (Kozar, 2017).

Method

The adopted method in this article was exploratory factor analysis performed on the secondary data obtained from Polish Main Statistical Office (GUS, 2018). The goal of this method is to uncover the underlying structure of a relatively large set of variables. In this article it is assumed that measurable variables (indicators of sustainable development) can be intertwined by the unmeasurable factors. Therefore, this technique within factor analysis whose overarching goal is to identify the underlying relationships between measured variables.

In result of procedure of exploratory factor analysis obtained the plot of own values, which indicates that there are two main factors which are related to all measurable indicators.

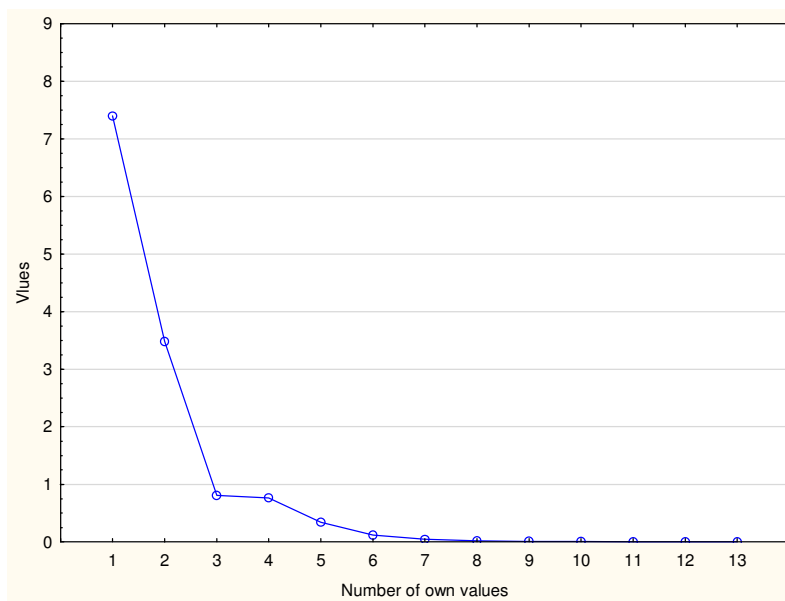


Fig. 2: Chart of factors values

Source: author own calculations

In Poland there are indicators which describe sustainable development and it is possible to choose a three groups of these indicators which are related also to the green economy development. In table 2 a statistical analysis of 13 sustainable indicators for 16 regions of Poland. There are three groups of indicators: group with symbol E, which is related to the environment, G symbol is for the economic

sphere of the development and S symbol if for the indicators related to the society. All 13 indicators were calculated to change their basis value into basis unit per region citizen.

Table 2: Statistical analysis of the sustainable development indicators for Regions of Poland for 2016

Indicator symbol and meaning [basis unit/citizen]	Median	Variation coefficient	Minimum value	Maximum value
			Region	Region
E1 = underground water exploitation resources	0,02	43,43	-1,26	2,08
			Opole region	Masovia
E2 = expenditure on protection of atmospheric air and climate	-0,46	99,73	-0,85	2,14
			Podlaskie	Masovia
E3 = fees and receipts for the environmental protection and water management fund	0,02	41,35	-1,29	1,66
			Podlaskie	Lower Silesia
E4 = legally protected areas	-0,15	42,35	-1,40	1,85
			Opole region	Warmia-Masuria
E5 = expenditures on fixed assets for water management	-0,51	66,74	-0,87	2,53
			Lubusz	Lesser Poland
S1 = registered unemployment rate	-0,05	22,17	-1,33	2,13
			Masovia	Warmia-Masuria
S2 = students of post-graduate studies and participants of doctoral studies	-0,16	60,46	-1,01	3,25
			Lublin region	Masovia
S3 = average monthly expenses on health	0,10	10,02	-1,57	2,41
			Holy Cross	Masovia
G1 = gross domestic product per capita	-0,10	22,89	-1,08	3,01
			Lodzkie	Masovia
G2 = gross value of fixed assets per capita	-0,13	20,61	-0,83	3,30
			Kuyavia-Pomerania	Masovia
G3 = investment outlays in enterprises per capita	-0,32	161,21	-0,58	3,53
			Lublin	Masovia
G4 = capital expenditures on total fixed assets	-0,22	126,96	-0,74	3,30
			Holy Cross	Masovia
G5 = gross operating surplus	-0,37	77,70	-0,82	3,00
			Opole region	Masovia

Source: author own elaboration based on GUS (2018).

In the next step factor loads were calculated in table 3 their values $> 0,55$ are presented. There are two indicators E3 (fees and receipts for the environmental protection and water management fund) and S1 (registered unemployment rate) which are not correlated to main two factors. Although there are two main factors negatively correlated with indicators. First factor combine environmental indicators (E1, E2, E4, E5) together with economic indicators (G3, G4, G5). Second factor shows also relation between society (S2, S3) and economy (G1, G2).

Eco-innovations can be described as the first factor, because they usually use environment as a resource for economic development. Eco-innovation are based on the environment local conditions and influence local economy. Corporate social responsibility can be recognized by the number of educated people in each region and the development of local society combined with their well-being and welfare.

Table 3: Factor loads and their correlations with measured indicators

Indicator symbol	Factor 1	Factor 2
E1	-0,924820	0,363176
E2	-0,960427	0,234249
E3	-0,273692	-0,491889
E4	-0,902525	0,423883
E5	-0,936689	0,328045
G1	-0,507802	-0,821178
G2	-0,477323	-0,819180
G3	-0,988278	0,087282
G4	-0,982763	0,162747
G5	-0,966353	0,253287
S1	0,326299	0,441980
S2	-0,471350	-0,727146
S3	-0,403208	-0,773954
Explained variance	7,397829	3,482756
Share	0,569064	0,267904

Source: own calculations results

Obtained results for 16 regions of Poland proved that although there are three categories of sustainable development measurable indicators, there are two main (non-measurable) factors which can explain interdependencies between measurable variables. Their negative correlations indicate that there a space for action in case of Poland to green its economy and introduce more eco-innovations and corporate social responsibility. There are also big regional differences between regions of Poland which can be listed descending from the most 'green region'.

Conclusions

Innovation in technologies and how they are applied are key to enabling industry to create new business values while also benefiting people and the planet. Innovation plays an important role in building and maintaining a competitive position and competitiveness of individual enterprises, regions or entire countries. The specific form which combines both dimension of the green economy development are green jobs. In recent years, manufacturing companies have been upgrading their efforts towards sustainable manufacturing from pollution prevention to integrated approaches that take into account product lifecycles and wider impacts. Eco-innovation helps to enable this evolution through a combination of technological and non-technological changes that can yield substantial environmental improvements. The recent economic crisis and climate change negotiations should be taken as a great opportunity to move towards a green economy by accelerating innovation and to build citizen responsible society. In green economy model realisation strategy "grow first and clean up later" is not possible due to the environmental cost and violation of sustainability principles. Therefore the social dimension represented by CSR concept and idea of green jobs are intertwined with innovativeness. These two areas are source of green economy development which need to be better examined in further researches.

Results obtained for Poland in exploratory factor analysis prove that this country need to change its strategies and policy to become more green. There are ecological problems which can influence whole country economy and society in future. Indeed the are two main factor which influence the green development of Poland. These two universal factors are: eco-innovation and corporate social responsibility. In both cases there are scarcities of them to assess Poland as a green country. It is proposed to compare countries green competitiveness in these two dimension using multicriteria analysis method in future. Results of such analysis can give better view on undertaken strategies in developing and developed countries.

References

- Abarar, I. and Razgani, H. (2014) 'The luxury trends in emerging countries an exploratory study' Proceedings of the 2014 Annual Conference of the Emerging Markets Conference Board, 9–11 January 2014, Lucknow, India, 45-48.
- Bureau of Labor Statistics. (2013) 'Green Jobs Overview' Bureau of Labor Statistics. [Online], [Retrieved November 11, 2018], <https://www.bls.gov/green/overview.htm>
- Egorova, M., Pluzhnic, M. and Glik, P. (2015) 'Global trends of «green» economy development as a factor for improvement of economical and social prosperity' *Procedia - Social and Behavioral Sciences*, 166, 194-198.
- Demków, K. and Sulich A. (2017) 'Wybrane wyzwania związane ze społeczną odpowiedzialnością dużych i średnich podmiotów gospodarczych' *Marketing i Rynek*, 24 (11), 42-52.
- Grudziński, A. and Sulich, A. (2018) '*Green European integration*' Proceedings of the 4th International Conference on European Integration 2018 (ICEI 2018), ISBN: 978-80-248-4169-4, 17-18 May 2018, Ostrava, Czech Republic, 364-371.
- GUS (2018) 'Bank danych lokalnych ' Główny Urząd Statystyczny. [Online], [Retrieved November 24, 2018], <https://bdl.stat.gov.pl/BDL/dane/podgrup/temat>
- Kozar, Ł. (2017) 'Shaping the green competence of employees in an economy aimed at sustainable development' *Human Resource Management / Zarządzanie Zasobami Ludzkimi*, 119(6), 55-69.
- Kulhanek, L., Sulich A. (2018) 'Financial risk in the contemporary environment of enterprises'. *Zeszyty Naukowe Wyższej Szkoły Humanitas. Zarządzanie*, 19(2), 49-63.
- Lutz, C., Zieschank, R. and Drosdowski, T. (2017) 'Measuring Germany's transition to a green economy' *Low Carbon Economy*, 8, 1-19.
- Organa, M. and Sus, A. (2018) '*Exploiting opportunities in strategic business nets – the case study*' Proceedings of the 31st International Business Information Management Association Conference (IBIMA), ISBN 978-0-9998551-0-2, 25-26 April 2018, Milan, Italy. 5380-5390.
- Ostrom, E. (2009) 'A general framework for analyzing sustainability of social-ecological systems' *Science*, 325, 419-422.
- Piórkowska, K. and Stańczyk-Hugiet, E. (2017) 'Evolutionary economics, organisational evolution, and behavioural approach: in search of commonalities' *International Journal of Economics and Business Research*, 14 (3/4), 237-253.
- Rutkowska-Podołowska, M. and Węglarz, M. (2017) 'Analysis and evaluation of capital expenditures on environmental protection in Poland'. *Vesnik Grodzenskaga džâržanaŭga uniwersiteta imâ Ānki Kupaly. Ėkanomika, Sacyâlogiâ, Biâlogiâ*, 7(1), 78-86.
- Rutkowska-Podołowska, M., Sulich, A. and Szczygieł N. (2016) '*Green jobs*' Proceedings of the 3rd International Conference on European Integration 2016 (ICEI 2016), ISBN: ISBN 978-80-248-3911-0, 19-20 May 2016, Ostrava, Czech Republic, 822-829.
- Rutkowska-Podołowska, M., Sulich, A., Pakulska, J. (2017) 'Environmental insurance in Poland and selected EU countries' *Zeszyty Naukowe Wyższej Szkoły Humanitas. Zarządzanie*. 18 (3), 79-89.
- Ryszawska, B. (2013) 'Koncepcja zielonej gospodarki jako odpowiedź na kryzys gospodarczy i środowiskowy' *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 318, 48.

Stańczyk, S. (2013) Behaviourism in Management, Management Trends in Theory and Practice/ Hittmar, S. (ed.) University Publishing House, University of Zilina, 45-49.

Sulich, A. (2017) 'Future entrepreneurs' expectations based on the example of Wrocław University of Science and Technology students' *Zarządzanie Publiczne. Zeszyty Naukowe Instytutu Spraw Publicznych Uniwersytetu Jagiellońskiego*. 4, 477-49

Sulich, A. and Zema, T. (2018) 'Green jobs, a new measure of public management and sustainable development' *European Journal of Environmental Sciences*, 8 (1), 69-75.

Walker, K. and Plotnikova, M. (2018) 'Ecological settlement as a self-government model in rural areas' *Management Theory and Studies for Rural Business and Infrastructure Development*, 3 (40), 416-423.