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Abstract
Green jobs are places of employment that contribute to preserve or restore the environment, applied in traditional sectors such as manufacturing and construction, or in new, emerging sectors such as renewable energy and energy efficiency. Green jobs are a solution for young, unemployed people, who not only can find employment but can become entrepreneurs in this sector of economy. Green jobs can also influence the European integration by programmes of international cooperation and knowledge exchange which aim to reduce youth unemployment and protect the environment. One of the examples of such programs is the Danube-Oder-Elbe (DOE) water corridor project. The article analyses the current situation of young people in the green jobs sector of labour markets in Poland, Austria, Czech Republic and Germany. The aim of article is to discuss the potential future of youth unemployment in the European integration context in these four chosen countries after having concluded the DOE water corridor project.

Keywords: *Green Places of Employment, Sustainable Development, Water Corridor Project, Youth Unemployment*

JEL Classification: *F22, J42, N34*

1. Introduction

The European integration, as other processes of integration, needs a real action which enhance the whole society's involvement in international cooperation in transport and mobility fields. An example of such actions is development of inland waterways as a part of European policy (EC [online], 2016a) and formation of green jobs related to the water infrastructure facilities used in transportation. A good transport infrastructure is vital to maintaining competitiveness of the European Union (EU). This infrastructure allows also to focus on the European integration by developing green and integrated transport (EC [online], 2016a). The European Commission formed two key programmes, Connecting Europe Facility (CEF) and Horizon 2020, to promote economic growth, jobs creation and competitiveness through targeted infrastructure investments at the European level. Although Horizon 2020 is the EU main programme for the research area, it implements the Innovation Union, the Europe 2020 flagship initiative aimed at securing Europe global competitiveness (i.e. smart green and integrated transport) (EC [online], 2016a).

The Czech Republic is the only country in all 28 states of the European Union which is neither directly nor by the good quality inland waterway connected to the sea. It is assumed that product prices comprising 40% to 60% of the transportation cost indicate an increasing fall into economic isolation within the EU (DOE [online], 2016) and building a water corridor would have a positive impact to social change and employment structure in traditional economy sectors of two most endangered by unemployment regions of Poland and the Czech Republic. Naturally, an expected impact of related to the water corridor created green jobs is large, as well as to all sectors of the economy of the Czech Republic and countries actively involved in development of the waterway communication.

One of the most important projects for the Czech Republic (and its neighbour countries, Poland and Austria) is the Danube-Oder-Elbe (DOE) water corridor project. Other countries, such as Germany, Slovakia and Ukraine, are also interested in the project participation (DOE [online], 2016). Although plans to construct a DOE canal are hundreds of years old, they have not yet been successful (Janak et al. [online], 2003). Therefore, a project conclusion seems very beneficial for economies of involved countries and the European context as a whole because the DOE water corridor is a missing link of the interconnected network of European waterways (Stasko, 1999). The corridor is a multi-functional water supply scheme of major importance for the Czech Republic and Europe. It is also an excellent example of possible green jobs creation in project leading directly to stronger European integration and fulfilling the ideas of freedom of movement, trade and brotherhood without borders – the most important values of the European integration. The project has already been included in the EU plans for the network of transport corridors for Europe, the Trans-European Network for Transport (TEN-T), which foresees the canal linking two waterways: the E20, from Germany to Austria (HamburgMagdeburg-Pardubice-PřerovDanube), and the E30, from Poland to Austria (SzczecinWrocław-Kozle-Ostrava-Přerov-Danube) (EC [online], 2016a).

The aim of this paper is to analyse the impact of green jobs creation related to the DOE project. The essence of green job has been presented in the first part of the paper. Further, the project of the water corridor and its benefits have been discussed. In the next part of the study, young people situation in the selected countries, Czech Republic, Austria and Poland (as the main participants of project) and Germany (Pys, 2013) have been discussed in the context of the DOE water corridor project.

The study is of descriptive nature. It was based on the analysis of available literature and databases from official sources of the EU countries and public statistics from the Eurostat comprising timespan of 2010-2014.

2. Definition of Green Jobs

Green activities are key actions of policy makers in countries and regions across the world that can be created in almost all economy sectors which help in sustainable development leading to *greening the economy* and are an important tool in counteraction to unemployment. From several definitions of green jobs available in literature, Table 1 presents some of them. A progress toward goals defined by green jobs can be measured by a wide range of indicators, such us better integration, poverty reduction or reduction in CO_2 emission.

Table 1: A Selection of Definitions of Green Jobs

Source	Definition
Eurostat: The Eurostat methodology for the Environmental Goods and Services Sector (EGSS) does not define – 'green jobs', but measures employment in the EGSS	The EGSS is a heterogeneous set of producers of technologies, goods and services that prevent or minimise pollution and minimise the use of natural resources. Thus, environmental activities are divided into two broad segments: environmental protection and resource management. Only those technologies, goods and services are considered that have an environmental protection or resources management purpose as their prime production objective (i.e. 'environmental purpose'), hence excluding goods and services that are not provided mainly for environmental purposes.
International Trade Union Confederation (ITUC)	A green jobs reduces environmental impacts of enterprises and economic sectors, while providing decent working and living conditions to all those involved in production and ensuring workers' and labour rights are respected
United Nations Environment Programme, UNEP	Green jobs are "work in agricultural, manufacturing, research and development R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but non-exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, material and water consumption through high-efficiency strategies; decarbonise the economy and minimize or altogether avoid the generation of all forms of waste and pollution".
International Labour Office, ILO	Green jobs include direct employment which reduces environmental impact, ultimately to levels that are sustainable. This definition includes jobs that help to reduce the consumption of energy and raw materials, decarbonizes the economy, protect and restore ecosystems and biodiversity and minimize the production of waste and pollution. It is broader concept of "green jobs", which might embrace any new job in a sector which as a smaller than average environmental footprint and contributes to improving overall performance, albeit perhaps only marginally.

Sources: (UNEP [online], 2008; ILO, 2008; ITUC [online], 2010, IDEA, 2010; Eurostat [online], 2015b)

Green jobs should be understood as decent jobs that contribute to preserve or restore the environment, both in traditional sectors such as manufacturing and construction and new, emerging sectors such as renewable energy and energy efficiency (ILO, 2008). A green job is any job or self-employment that *genuinely* contributes to a more sustainable world. At the enterprise level, green jobs can produce goods or provide services that benefit the environment, for example green buildings or clean transportation. For persons beginning the professional career, the meaning and potential of green places for employment is very high.

Green jobs idea is an evolving concept and therefore it is difficult to give a strict definition. This dynamic concept is based on the fact that each new product, service or technology might evolve in a more efficient replacement in terms of energy and material consumption, emission and other particle pollution emissions. Therefore, it is fairly complicated to define with clear boundaries what can be considered as a green sector, an eco-industry or green jobs (Hess, 2012). The green jobs approach in the economy offers enormous opportunities for job creation (Hess, 2012), many of which are already part of the European green economy. These opportunities range from sectors traditionally associated to the environmental content, such a renewable energies or recycling, to other activities that represent emerging sectors in green jobs, such as sustainable mobility, and to activities in sectors which have a potential for conversion into sustainable activities. A possible job creation allows not only for solving young people unemployment problem, but also for focusing more on the environment protection issues. These common actions, expressed in the Danube-Oder-Elbe (DOE) water corridor project, can lead to better European integration. Moreover, green economies and growth are associated to a promising shift from environmental protection into original and innovative resource-saving technologies (Jänicke, 2012).

The number of green jobs is constantly rising in the EU. According to the Eurostat estimates, employment in the EU-28 environmental economy raised from 2.9 million full-time equivalents in 2000 to 4.3 million full-time equivalents in 2012. The environmental economy in the EU-28 generated EUR 671 billion with EUR 271 billion of value added in 2012 (Eurostat [online], 2015a). With the exception of 2006, between 2000 and 2012 the environmental economy consistently outperformed the overall economy in terms of the employment growth. Therefore, green jobs create a desirable capacity to involve young people in the labour market. With its multidimensional impact to the economy and employment enhancement capacity the DOE project has an interesting potential for the green society development in the context of the European integration.

3. The Danube-Oder-Elbe (DOE) Water Corridor Project

The aim of the DOE water corridor project is to create a channel connecting three main rivers of the Danube-Oder-Elbe region with three neighbour countries. The DOE water corridor uses extraordinary advantages of the Czech Republic territory, with the lowest point of the European watershed between the Danube and the Oder rivers (the Moravian Gate) (DOE [online], 2016a). Although the project would be mainly ongoing in the Czech Republic it can influence the economy of all regions. In the European integration context this project is important because it builds missing cross-border connections, promotes modal integration and interoperability, furthermore, it offers green transport solutions (EC [online], 2016b). The DOE project is interesting by connecting through the water corridor two most populated and industrialised regions of Poland and Czech Republic, Silesia and the Moravian-Silesian region, with the Baltic Sea.

The project of the Danube-Oder-Elbe water corridor is seen as an important anti-crisis long-term investment giving considerable contribution to the employment rise both in the construction and operational phase (DOE [online], 2016a). As specified, it may relate directly to jobs such as (DOE [online], 2016a):

- providing basic documentation arising from the urgent need for processing documents;
- research and development in particular geological and hydro geological surveys, environmental and biological research and to ensure comparable data on biodiversity

(as a basis for future impact assessment on the environment and nature), hydro technical research, urban studies, etc.;
- jobs with investors and screening to ensure their implementation;
- jobs in construction to the relevant oriented construction companies, also jobs related with flood protection or water balance;
- jobs resulting from the multiplier effect. These have the greatest extent as known from the experience with the construction of highways. They include jobs in construction companies subcontractors, suppliers of machines, energy, water, building materials and other needs, providers of transport and other services, etc.;
- jobs from the operationalisation of the DOE water corridor which occur in a number of sectors (agriculture, industry and tourism) in the territory adjacent to the DOE water corridor.

The multipurpose Danube-Oder-Elbe water corridor offers several advantages and opportunities. It combines advantages such as providing water balance and stability of the territory - offsetting potential impacts of the global climate change, flood protection, water management regimes for overcome long-term drought, environmental protection - restoration of wet habitat, increase of biodiversity, use of renewable energy, increase of the energy stability system, green transport, diversification of supply of strategic materials and thus the increase of energy and transport security. It promises substantial benefits for business and industry in the nearby of the waterway. Having reached its end, the project shall help generate a wide range of benefits that meaningfully contribute to economic development and improve quality of life in the neighbourhood of the DOE corridor (DOE [online], 2016a).

The positive impact to employment related to the DOE project has not been a subject of a considerable scientific interest, focusing in this regard mainly on the collapse of inland navigation and degradation of the waterway network in Central Europe (Kulczyk et al., 2013).

Undoubtedly, construction works for the DOE canal create a number of temporary jobs in the region. However, it is disputable whether the DOE would lead to sustainable job opportunities in the long-term (Janak et al. [online], 2003) bearing in mind the current overall depression in inland navigation throughout Europe (Kulczyk et al., 2013). Therefore, a proper cost-benefit analysis, including assessment of the number of long-term jobs created in relation to public money spent is an absolute requirement. Furthermore, a still potential DOE route, due to its consideration by regional spatial development plans of the Czech Republic, hampers other investments and overall development of some of regions along the channel. This situation impacts surrounding villages and towns and does not foster job creation in the affected regions (Janak et al. [online], 2003). This is a serious issue because development of the wider neighbourhood of the potential DOE corridor is determined by these development limits.

4. Green Jobs as a Solution of the Young People Unemployment Problem

An approach to involve young people in green jobs sector and enhance economy growth based on green activities is innovative for countries facing new challenges on their labour markets, such as extremely high young people unemployment. There is an ongoing programme which uses green jobs in Tunisia (UNOPS [online], 2015). This initiative aims to give young, unemployed graduates access to jobs while simultaneously developing green growth in the country (UNOPS [online], 2015). This innovative project can be helpful also in Europe experiencing high numbers of young graduates and high rates of youth unemployment (Eurostat [online], 2016a).

Unemployment is still a serious problem for the economies in the region. In 2014, Poland faced the highest unemployment rate of 9.0% among the countries under consideration (Austria - 5.6%, Germany - 5.0%, Czech Republic - 6.1%) (Eurostat [online], 2016b) (Table 2). A situation of young people in the labour market in the EU-28 varies because of educational model and efficiency in the transition process from school to work. Some authors (Fic, 2015) argue also that the reason of young people unemployment is the competency gap. As pointed out by Eurostat ([online], 2012), all EU-28 countries can be divided into five groups from which the leading one is characterised by high levels of young people attendance both in employment and in education but almost no unemployment among young people in education. Germany and Austria are positioned in this group (Eurostat, 2012). They both have established internship systems or vocational training in the secondary education, what can partially explain the high number of young people who study and work at the same time (Eurostat, 2012; Bobakova and Chylkova, 2014; Fic, 2015). Cooperation between countries which use combined work-education model can influence countries with higher unemployment rate among youth.

Table 2: Youth (Age 15-24) Unemployment among Chosen Countries in 2010-2014 (%)

	2010	2011	2012	2013	2014
Austria	9,2	8,9	9,4	9,6	10,3
Germany	9,8	8,5	8,0	7,8	7,7
Czech Republic	18,4	18,0	19,4	18,9	15,8
Poland	23,7	25,8	26,5	27,3	23,9

Source: Authors' own calculations based on Eurostat ([online], 2016c)

In Austria, one of the participants of the DOE project, youth unemployment is growing (Table 2). Although the country is referred as an example of a model education (together with Germany) supporting the transition to the labour market, it is still endangered by youth unemployment problem. The DOE water corridor can be an interesting solution for future challenges in the regional labour market.

Table 3 compares unemployment rates of two most involved regions (Silesia and the Moravian-Silesian region) in the DOE project. The unemployment in the Silesia region is lower than the average unemployment rate for Poland in contrary to the Moravian-Silesian region of which the unemployment rate since 2010 has been remaining higher than in the whole Czech Republic (Eurostat [online], 2016c). For these two regions (and countries), the highest unemployment was recorded in 2013, and it was related to economic crisis and progressive isolation of the regions, especially the Moravian-Silesian, and a collapse of heavy industry in the regions.

Table 3: Unemployment Rate for Age (25-65) in Chosen Regions in 2010-2014 (%)

	2010	2011	2012	2013	2014
Czech Republic	6,4	5,8	6,0	6,1	5,4
Moravian-Silesian region	10,2	9,3	9,5	9,9	8,6
Poland	8,0	8,0	8,5	8,8	7,6
Silesia	9,2	9,2	9,4	9,7	8,6

Source: Authors' own calculations based on Eurostat ([online], 2016c)

Green jobs formed during the DOE project realisation can positively influence to whole society. New job places can help in integration of not only two endangered by high

unemployment regions. Integration caused by realisation of the DOE project can reach more dimensions because of know-how and experience exchange with the countries with lowest unemployment rates involved in project.

5. Conclusion

The article points out the economic importance of green jobs as a relevant category in the economic practice presenting a review of green jobs definitions. These are necessary for understanding the rationale behind the Danube-Oder-Elbe water corridor project from the sustainable development and labour market perspective.

Nowadays, the transfer of economic resources toward environment-friendly activities is an essential and skilful combination of the economic, social and environmental policies. Greening the modern economy is vital to increase decent employment opportunities for young people. This approach can enhance the use of effective resources and labour productivity, and can support poverty reduction and social inclusion.

A successful conclusion of the DOE project would be a great milestone in the European integration which lays on free trade and free movement of capital and labour, based on development of communication infrastructure that ensures mobility and sustainable development.

References

[1] Bobakova, H.L. and Chylkova, M. (2014). To some disparities between national and global education in European context. In International Conference on European Integration. Ostrava: VŠB-TU Ostrava, Faculty of Economics, pp. 36.

[2] DOE (2016a) *Current situation of D-O-E proj*ect [online]. [cit.2016-03-13]. Available: http://www.d-o-l.cz/index.php/en/about-DOE-project/current-situation.

[3] DOE (2016b) *UN/ECE map of European waterway network of AGN agreement* [online]. [cit.2016-03-13]. Available: http://www.d-o-l.cz/images/stories/osn%20-%20map.jpg.

[4] EC, European Commission (2016a). Innovation and Networks Executive Agency [online]. [cit.2016-04-02]. Available: https://ec.europa.eu/inea/mission-objectives.

[5] EC, European Commission (2016b). Projects by corridor [online]. [cit.2016-04-02]. Available: https://ec.europa.eu/inea/connecting-europe-facility/cef-transport/projects-by-corridor.

[6] Eurostat (2012). *Country groups by participation education labour market*, 2012 [online]. [cit.2016-03-11]. Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/Participation_of_young_people_in_education_and_the_labour_market.

[7] Eurostat (2015a). *Environmental accounts - establishing the links between the environment and the economy* [online]. [cit.2016-03-15]. Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_accounts_-_establishing_the_links_between_the_environment_and_the_economy.

[8] Eurostat (2015b). *Environmental goods and services sector* [online]. [cit.2016-03-11]. Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_goods_and_services_sector.

[9] Eurostat (2016a). *Youth unemployment* [online]. [cit.2016-03-15]. Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Table_1_Youth_unemployment,_2014Q4_(%25).png.

[10] Eurostat (2016b). *Unemployment statistics* [online]. [cit.2016-03-15]. Available: http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics.

[11] Eurostat (2016c). *Eurostat database* [online]. [cit.2016-03-15]. Available: http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do.

[12] Fic, M. (2015). Niedopasowanie kwalifikacji i bezrobocie ludzi młodych w Unii Europejskiej. *Problemy Profesjologii*, vol. 2, pp. 53-65.

[13] Hess, D. (2012). *Good green jobs in a global economy: making and keeping new industries in the United States*. Urban and Industrial Environments. Cambridge, Mass: The MIT Press.

[14] IDEA (2010). *Consult based on literature review: green jobs. Final report.* Federal Public Service Employment, Labour and Social Dialogue, IDEA Consult in collaboration with RDC Environment and 3R, Brussels, p. 15.

[15] ILO (2008). *Global challenges for sustainable development: strategies for green jobs.* ILO Background Note G8 Labour and Employment Ministers Conference Niigata, Japan 2008.

[16] IUTC (2012). *Summary 'Growing green and decent jobs'* [online]. [cit.2016-03-13]. Available: http://www.ituc-csi.org/summary-growing-green-and-decent.html?lang=en.

[17] Janak, M. et al. (2003). *Danube Oder Elbe Canal – an opportunity or a threat?* [online]. [cit.2016-04-01]. Available: http://bankwatch.org/documents/canal_position_paper_11_03.pdf.

[18] Jänicke, M. (2012). 'Green growth': from a growing eco-industry to economic sustainability. *Energy Policy*, vol. 48, iss. C, pp. 13-21.

[19] Kulczyk, J., Dubicki, A. and Olearczyk, D. (2013). *Odrzańska droga wodna. Stan obecny i perspektywy.* Wrocław: Dolnośląskie Wydawnictwo Edukacyjne.

[20] Pyś, J. (2013). *Kanal Odra-Dunaj-Łaba od historii do realizacji*. In Kulczyk, J., Dubicki, A., and Olearczyk, D. (eds). Odrzańska droga wodna. Stan obecny i perspektywy. Wrocław: Dolnośląskie Wydawnictwo Edukacyjne, pp. 232-249.

[21] Staśko, S. (1999). *System wodny Odry i instytucje jej dorzecza*. Wrocław: IMS.

[22] UNEP (2008). *Green jobs: towards decent work in a sustainable, low-carbon world*. Worldwatch Institute, Washington DC [online]. [cit.2016-03-13]. Available: http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1569&context=key_workplace.

[23] UNOPS (2015). *New 'Green jobs platform' set to fight youth unemployment and grow the green economy in Tunisia* [online]. [cit.2016-03-13]. Available: https://www.unops.org/english/News/Pages/New-Green-Jobs-Platform-set-to-fight-youth-unemployment-and-grow-the-green-economy-in-Tunisia.aspx.