

p-ISSN 2300-4088

e-ISSN 2391-5951

NR 4 (2017)

PROGRESS IN ECONOMIC SCIENCES

**CZASOPISMO NAUKOWE INSTYTUTU EKONOMICZNEGO
PAŃSTWOWEJ WYŻSZEJ SZKOŁY ZAWODOWEJ
IM. STANISŁAWA STASZICA W PILE**

p-ISSN 2300-4088
e-ISSN 2391-5951

Progress in Economic Sciences

**Czasopismo Naukowe Instytutu Ekonomicznego
Państwowej Wyższej Szkoły Zawodowej im. Stanisława Staszica
w Pile**

Nr 4 (2017)

RADA NAUKOWA

Ismail Aktar, Yalova University, Turcja

Lidia Antoshkina, Berdiansk University of Management and Business, Ukraina

Peter Čajka, Matej Bel University, Słowacja

Marek Chrzanowski, Szkoła Główna Handlowa w Warszawie Polska

Andrzej Czyżewski, Uniwersytet Ekonomiczny w Poznaniu, Polska

Dan Danuletiu, "1 Decembrie 1918" University in Alba Iulia, Rumunia

Jolanta Drożdż, Lietuvos agrarinės ekonomikos institutas, Litwa

Wojciech Drożdż, Uniwersytet Szczeciński, Polska

Mariola Dźwigoł-Barosz, Politechnika Śląska, Polska

Camelia M. Gheorghe, Romanian-American University Bucharest, Rumunia

Alexandru Ionescu, Romanian-American University Bucharest, Rumunia

Sergij Ivanov, Prydniprowska Państwowa Akademia Budownictwa i Architektury, Ukraina

Ana Jurcic, John Naisbitt University Belgrade, Serbia

Branislav Kováčik, Matej Bel University, Słowacja

Grażyna Krzyminiewska, Uniwersytet Ekonomiczny w Poznaniu Polska

Oleksandr Melnychenko, Uniwersytet Bankowy w Kijowie, Ukraina

Donat Jerzy Mierzejewski, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska

Dragan Mihajlovic, John Naisbitt University Belgrade, Serbia

Algirdas Miškinis, Vilnius University, Litwa

Radosław Miśkiewicz, Luma Investment S.A., Łaziska Górne, Polska

Ranka Mitrovic, John Naisbitt University Belgrade, Serbia

Elvira Nica, The Academy of Economic Studies Bucharest, Rumunia

Peter Ondria, Danubius University, Słowacja

Kazimierz Pająk, Uniwersytet Ekonomiczny w Poznaniu, Polska

Ionela Gavriła Paven, "1 Decembrie 1918" University in Alba Iulia, Rumunia

Marian Podstawka, Szkoła Główna Gospodarstwa Wiejskiego w Warszawie, Polska

Maria Popa, "1 Decembrie 1918" University in Alba Iulia, Rumunia

Gheoghe H. Popescu, Dimitrie Cantemir University Bucharest, Rumunia

Tadeusz Stryjakiewicz, Uniwersytet Adama Mickiewicza w Poznaniu, Polska

Andrzej Wiatrak, Uniwersytet Warszawski, Polska

KOMITET REDAKCYJNY

Redaktor naczelny

Jan Polcyn, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska

Sekretarz redakcji

Michał Bania, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska

Redaktorzy

Paweł Błaszczyk, Uniwersytet Ekonomiczny w Poznaniu, Polska

Agnieszka Brelik, Zachodniopomorski Uniwersytet Technologiczny w Szczecinie, Polska

Bazyli Czyżewski, Uniwersytet Ekonomiczny w Poznaniu, Polska

Krzysztof Firlej, Uniwersytet Ekonomiczny w Krakowie, Polska

Anna Hnatyzyn-Dzikowska, Uniwersytet Mikołaja Kopernika w Toruniu, Polska

Grzegorz Kinelski, Stowarzyszenie na rzecz Gospodarki Energetycznej Polski, IAEE, Polska

Joanna Kryza, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska

Emilia Lewicka-Kalka, Dolnośląska Szkoła Wyższa, Polska
Sebastian Stępień, Uniwersytet Ekonomiczny w Poznaniu, Polska
Anna Turczak, Zachodniopomorska Szkoła Biznesu w Szczecinie, Polska
Zofia Wyszowska, Uniwersytet Technologiczno-Przyrodniczy im. J.J. Śniadeckich w Bydgoszczy, Polska

Redaktorzy tematyczni

Wawrzyniec Czubak, Uniwersytet Przyrodniczy w Poznaniu, Polska
Iulian Dobra, "1 Decembrie 1918" University in Alba Iulia, Rumunia
Silvia Maican, "1 Decembrie 1918" University in Alba Iulia, Rumunia
Andreea Muntean, "1 Decembrie 1918" University in Alba Iulia, Rumunia
Eugeniusz Wszołkowski, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile

Redaktor statystyczny

Grzegorz Przekota, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile

Redaktorzy językowi

Lyn James Atterbury, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska
Ludmiła Jeżewska, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska
Marek Kulec, Państwowa Wyższa Szkoła Zawodowa im. Stanisława Staszica w Pile, Polska

ZESPÓŁ RECENZENTÓW

Madalina Balau, Universitatea Danubius Galati, Rumunia
Piotr Bórawski, Uniwersytet Warmińsko-Mazurski w Olsztynie
Elena Druica, University of Bucharest, Rumunia
Anna Dziadkiewicz, Uniwersytet Gdański
Barbara Fura, Uniwersytet Rzeszowski
Agnieszka Głodowska, Uniwersytet Ekonomiczny w Krakowie
Justyna Góral, Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – PIB w Warszawie
Brygida Klemens, Politechnika Opolska
Andrzej Klimczuk, Szkoła Główna Handlowa w Warszawie
Patrycja Kowalczyk-Rólczyńska, Uniwersytet Ekonomiczny we Wrocławiu
Olive McCarthy, University College Cork, Irlandia
Anna Maria Moisello, University of Pavia, Włochy
Michał Moszyński, Uniwersytet Mikołaja Kopernika w Toruniu
Aklilu Nigussie, Ethiopian Institutes of Agricultural Research, Etiopia
Jarosław Olejniczak, Uniwersytet Ekonomiczny we Wrocławiu
Grzegorz Paluszak, Uniwersytet Warszawski
Arkadiusz Piwowar, Uniwersytet Ekonomiczny we Wrocławiu
Beata Przyborowska, Uniwersytet Mikołaja Kopernika w Toruniu
Diana Rokita-Poskart, Politechnika Opolska
Oksana Ruzha, Daugavpils University, Litwa
Joanna Smoluk-Sikorska, Uniwersytet Przyrodniczy w Poznaniu
Marzena Szewczuk-Stępień, Politechnika Opolska
Mirosława Szewczyk, Politechnika Opolska
Piotr Szukalski, Uniwersytet Łódzki
Joanna Wiśniewska-Paluszak, Uniwersytet Przyrodniczy w Poznaniu

Wersja elektroniczna czasopisma jest wersją pierwotną.



© Copyright by Państwowa Wyższa Szkoła Zawodowa
im. Stanisława Staszica w Piła

Piła 2017

p-ISSN 2300-4088

e-ISSN 2391-5951

Projekt realizowany
z Narodowym Bankiem Polskim
w ramach programu edukacji ekonomicznej



Poglądy autorów publikacji nie mogą być utożsamiane ze stanowiskiem
Narodowego Banku Polskiego.

Publikacja współfinansowana przez



Adres Redakcji: Instytut Ekonomiczny
Państwowa Wyższa Szkoła Zawodowa
im. Stanisława Staszica w Piła
ul. Podchorążych 10
64-920 Piła
tel. (067) 352 26 11
<http://pes.pwsz.pila.pl>
pne@pwsz.pila.pl

Czasopismo jest indeksowane w następujących bazach:
BazEcon, BazHum, CEJSH, DOAJ, Index Copernicus, ERIH Plus

Przygotowanie i druk:
KUNKE POLIGRAFIA, Inowrocław

Spis treści

ARTYKUŁY

Andrzej CZYŻEWSKI, Joanna STROŃSKA-ZIEMANN , Determinanty zmian w rolnictwie i na obszarach wiejskich w podregionie piłskim w świetle analizy czynnikowej.....	11
Marcin BORUTA , Gerontechnologia jako narzędzie w procesie zaspokajania potrzeb mieszkaniowych seniorów.....	25
Ryszard DZIEKAN, Magdalena KONIECZNY , Wykształcenie konsumentów żywności ekologicznej z województwa podkarpackiego a czynniki wpływające na jej zakup	37
Łukasz KRYSZAK, Jakub STANISZEWSKI , Czy mieszkając na wsi warto się kształcić? Kapitał ludzki jako determinanta dochodów na wsi i w mieście	51
Piotr KUŁYK, Łukasz AUGUSTOWSKI , Rozwój regionalny w kierunku trwale równoważonej gospodarki niskoemisyjnej	69
Milda Maria BURZAŁA , Synchronizacja aktywności gospodarczej Polski i Niemiec. Kilka uwag na temat przyczynowości.....	85
Joanna NUCIŃSKA , Uwarunkowania pomiaru efektywności finansowania edukacji – zarys problemu	103
Silvia Ștefania MAICAN, Ionela GAVRILĂ-PAVEN, Carmen Adina PAȘTIU , Skuteczna komunikacja i lepsze wyniki edukacyjne dla studentów specjalizacji ekonomicznych.....	119
Agnieszka POCZTA-WAJDA, Agnieszka SAPA , Paradygmat rozwoju zrównoważonego – ujęcie krytyczne	131
Grzegorz PRZEKOTA , Cenowe konsekwencje zróżnicowania rozwoju regionalnego w Polsce	143
Rafał KLÓSKA , Rozwój zrównoważony regionów w Polsce w ujęciu statystycznym	159
Zuzanna RATAJ, Katarzyna SUSZYŃSKA , Znaczenie społecznego budownictwa mieszkaniowego w zrównoważonym rozwoju	177
Dragan Ž. DJURDJEVIC, Miroslav D. STEVANOVIC , Problem wartości w postrzeganiu zrównoważonego rozwoju w międzynarodowym prawie publicznym	193

Dragica STOJANOVIC, Bojan DJORDJEVIC , Rozwój rynku węglowego i wydajności energetycznej w Republice Serbskiej	213
Biljana ILIĆ, Aleksandar MANIĆ, Dragan MIHAJLOVIĆ , Zarządzanie odnawialnymi źródłami energii i wybieranie projektów zrównoważonego rozwoju we wschodniej Serbii – metody MCDM	223
Marijana JOKSIMOVIC, Biljana GRUJIC, Dusan JOKSIMOVIC , Bezpośrednie inwestycje zagraniczne i ich wpływ na kraje rozwijające się ekonomicznie w trakcie przemian	239
Gabrijela POPOVIĆ, Dragiša STANUJKIĆ, Vesna PAŠIĆ TOMIĆ , Wybór projektu ośrodka przy użyciu programowania kompromisowego.....	247
Dragan KOSTIC, Aleksandar SIMONOVIC, Vladan STOJANOVIC , Zrównoważony rozwój regionu: przypadek Centrum Logistycznego w Pirot ...	257
Marija KERKEZ, Vladimir GAJOVIĆ, Goran PUZIĆ , Model oceny ryzyka powodzi przy użyciu rozmytego analitycznego procesu hierarchicznego	271
Katarzyna SMĘDZIK-AMBROŻY , Polityka rolna UE a zrównoważony rozwój rolnictwa w regionie wielkopolskim	283
Monika ŚPIEWAK-SZYJKA , Senior na rynku pracy	295
Sebastian STĘPIEŃ, Dawid DOBROWOLSKI , Straty i marnotrawstwo w łańcuchu dostaw żywności – propedeutyka problemu	305
Anna SZCZEPAŃSKA-PRZEKOTA , Identyfikacja wahań koniunkturalnych na rynku kontraktów terminowych na produkty rolne	317
Anna TURCZAK , Zatrudnienie w działalności badawczo-rozwojowej w wybranych krajach Unii Europejskiej i świata	333
Grzegorz KINELSKI, Kazimierz PAJĄK , Rynek konkurencyjny i źródła jego przewagi w subsektorze elektroenergetycznym	347
Agnieszka WLAZŁY , Wpływ zasobów środowiskowych na rozwój gospodarczy obszarów wiejskich na przykładzie Gminy Stare Miasto.....	361
Marta GUTH, Michał BORYCHOWSKI , Zrównoważony rozwój obszarów wiejskich w Polsce w polityce Unii Europejskiej w perspektywach finansowych na lata 2007–2013 i 2014–2020	387
Ranka MITROVIC, Ana JURCIC, Marijana JOKSIMOVIC , Wpływ bezpośrednich inwestycji zagranicznych na rozwój ekonomiczny Serbii i Polski	405
Radosław MIŚKIEWICZ , Wiedza w procesie pozyskiwania przedsiębiorstw	415
Andreea CIPRIANA MUNTEAN, Iulian BOGDAN DOBRA , Związek między satysfakcją turystów i lojalnością wobec kierunku podróży.....	433
Kodeks etyczny czasopisma „Progress in Economic Sciences”	455

Table of contents

ARTICLES

Andrzej CZYŻEWSKI, Joanna STROŃSKA-ZIEMANN , Determinants of changes in agriculture and rural areas in the Piła sub-region in the light of factor analysis	11
Marcin BORUTA , Gerontechnology in providing for the housing needs of the elderly	25
Ryszard DZIEKAN, Magdalena KONIECZNY , The education level of organic food consumers from the Podkarpackie province versus factors impacting its purchase	37
Łukasz KRYSZAK, Jakub STANISZEWSKI , Does education pay off for those living in the countryside? Human capital as a determinant of rural and urban workers' incomes	51
Piotr KUŁYK, Łukasz AUGUSTOWSKI , Regional development towards sustainable low-carbon economy	69
Milda Maria BURZAŁA , Synchronization of business activities between Poland and Germany. A few comments on causality	85
Joanna NUCIŃSKA , Conditions for measuring the efficiency of education funding: an outline of the problem	103
Silvia Ștefania MAICAN, Ionela GAVRILĂ-PAVEN, Carmen Adina PAȘTIU , Effective Communication and Improved Educational Results for Students in Economic Specializations	119
Agnieszka POCZTA-WAJDA, Agnieszka SAPA , The paradigm of sustainable development: a critical approach	131
Grzegorz PRZEKOTA , The consequences of price differentiation for regional development in Poland	143
Rafał KLÓSKA , Sustainable development of individual regions in Poland in terms of statistics	159
Zuzanna RATAJ, Katarzyna SUSZYŃSKA , The importance of social housing in sustainable development	177
Dragan Ž. DJURDJEVIC, Miroslav D. STEVANOVIC , Value problem in perception of sustainable development in international public law	193

Dragica STOJANOVIC, Bojan DJORDJEVIC, Carbon Market Development and Energy Efficiency in the Republic of Serbia	213
Biljana ILIĆ, Aleksandar MANIĆ, Dragan MIHAJLOVIĆ, Managing renewable energy resources choosing the sustainable development projects in Eastern Serbia – MCDM methods	223
Marijana JOKSIMOVIC, Biljana GRUJIC, Dusan JOKSIMOVIC, Foreign direct investment and their impact on economic development countries in transition	239
Gabrijela POPOVIĆ, Dragiša STANUJKIĆ, Vesna PAŠIĆ TOMIĆ, Resort Project Selection by Using Compromise Programming	247
Dragan KOSTIC, Aleksandar SIMONOVIC, Vladan STOJANOVIC, Sustainable development of the region: the case of Logistic Centre Pirot	257
Marija KERKEZ, Vladimir GAJOVIĆ, Goran PUZIĆ, Flood risk assessment model using the fuzzy analytic hierarchy process	271
Katarzyna SMĘDZIK-AMBROŻY, The European Union’s (EU) agricultural policy and the sustainable development of agriculture in the Wielkopolska region	283
Monika ŚPIEWAK-SZYJKA, The elderly on the labour market	295
Sebastian STĘPIEŃ, Dawid DOBROWOLSKI, Loss and waste in the food supply chain: an introduction to the problem	305
Anna SZCZEPAŃSKA-PRZEKOTA, Fluctuations in the futures market for agricultural products	317
Anna TURCZAK, Employment in the research and development sector in selected countries of the European Union and the world	333
Grzegorz KINELSKI, Kazimierz PAJAŁ, Competitive market and sources of its advantages in the electric energy subsector	347
Agnieszka WLAZŁY, The impact of environmental resources on the economic development of rural areas using the example of the Stare Miasto municipality	361
Marta GUTH, Michał BORYCHOWSKI, Sustainable development of rural areas in Poland in the European Union policy and the financial perspectives for 2007–2013 and 2014–2020	387
Ranka MITROVIC, Ana JURCIC, Marijana JOKSIMOVIC, Impact of FDI on the Economic Development of Serbia and Poland	405
Radosław MIŚKIEWICZ, Knowledge in the process of enterprise acquisition	415
Andreea CIPRIANA MUNTEAN, Iulian BOGDAN DOBRA, Considerations regarding relationship between tourists satisfaction and destination loyalty ..	433
‘Progress in Economic Sciences’ – Code of Ethics	461

Dragan KOSTIC*
Aleksandar SIMONOVIC**
Vladan STOJANOVIC***

Sustainable development of the region: the case of Logistic Centre Pirot

Introduction

The Balkans area has a non-homogeneous level of development of transport infrastructures and a preponderance of road freight traffic flows, with current traffic having a great impact on the environment of the area. It also has a need for better connecting ports with landlocked countries.

Improving the accessibility of the Balkans involves better freight mobility, upgrading transport standards, developing unified models of sustainable mobility management and integrated logistics chains and attracting innovative investments. Integration requires better cooperation among the different countries and regions, combining physical and professional training investments through interregional transport networking and pre-feasibility studies.

The main activities envisaged are the assessment of existing transport standards and terminal supply, gap analysis, the development of "Corridor quality networks" and „Multimodal Development Centres", harmonisation of existing ICT tools for tracing rail transport and interface with customs, the establishment of „Green Transport Agreements" and common training modules.

Efforts should focus on contributing to prove the feasibility of better usage of the existing transport infrastructure, wider usage of multimodal transport and upgrading the transport infrastructure to support and facilitate certain interregional connections. Development of an intermodal node in the middle of the Balkans will facilitate further development of intermodality in the region.

* Free Zone Pirot

** Free Zone Pirot

*** Free Zone Pirot

Logistic Centre Pirot – Setup of the analyses

The analyses carried out in the document intend to provide a preliminary answer to the following key question: which target market(s) may be potentially defined as attractive for the development of an intermodal centre in Pirot. In that respect, three main lines of potential development have been identified:

- ❑ Intercepting import/export and transit flows to/from ports;
- ❑ Offering regional distribution transport and logistics facilities within the Balkans;
- ❑ Supporting transit trade from Turkey along TEN-T corridor X branches.

In general, from the supply side, important infrastructure projects and plans are in progress and/or have been already financed both by the Serbian Government and the European Union, which will lead to a significant increase in national and international connections for the Pirot Free Zone. Notably, an accessibility analysis has been explicitly carried out, showing that the City of Pirot will benefit from a remarkable increase of rail and road connections with ports both in the Adriatic and in the Black Sea, with a reduction of the transit time by road and railway. Furthermore, its central location within the Balkans region will be significantly enhanced thanks to the general upgrade of the local and regional road networks. This context will provide an overall increase of the accessibility of Pirot Free Zone, meaning more effective and efficient possibilities of both international/inter-continental supply and of regional distribution in the Balkans area. In addition, the national and international transport and logistics operators active in the area exhibited a remarkable interest in consolidating their position and, if effectively supported, to support the growth of future traffic¹.

Accessibility analysis²

The first step refers to a comprehensive analysis of the accessibility of Pirot FZ for national and international destinations, as well as its competitiveness with respect to the transit trade in the area. In more detail, two main points have been taken into account:

- ❑ Euro-Mediterranean/worldwide accessibility. This analysis helps support the possibility of supplying industrial activities located into industrial zone Pirot from any feasible external location (for

¹ Intermodal Logistic Center Pirot, Prefeasibility study, 2011, p. 12.

² [ITALBALK Report, 2011, p. 125].

instance, this currently happens for rubber provided to companies from Malaysia) as well as for distribution from LCP to international destinations;

- Balkans accessibility. This analysis also helps evaluate the possibility of LCP being chosen as an effective location for regional warehouses serving the Balkans area.

Both analyses have been carried out on the current situation, i.e. considering the actual physical and functional characteristics of the freight supply networks (road, rail, sea, inland waterways), and also on a future scenario, i.e. assuming a substantial implementation of EU transport policies in the Balkans area, with specific reference to the development of the Pan-European Corridors IV (from Dresden and Nuremberg to Istanbul, Constanța and Thessaloniki), VIII (Napoli-Varna) and X (from Salzburg, Graz and Budapest to Thessaloniki and Igoumenitsa) and their synergic or competitive integration with the national freight network of the Republic of Serbia.

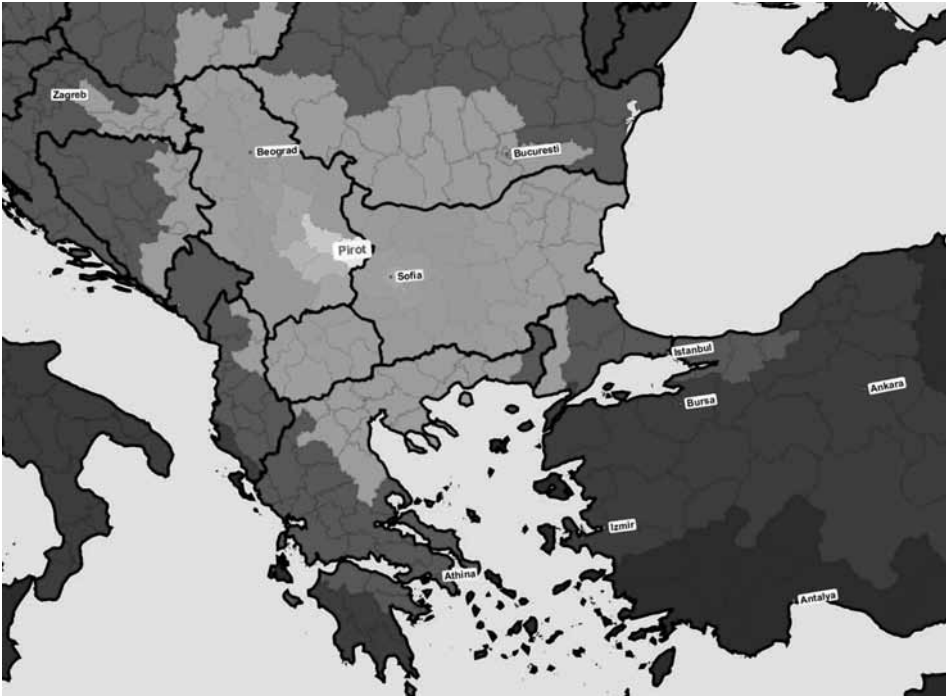
For this purpose, a quantitative methodology has been adopted, based on the application of a system of mathematical models reproducing the performances (e.g. times and costs) of the whole multimodal freight supply network. The system of models, developed by a research team at the Università di Napoli “Federico II” – Dipartimento di Ingegneria dei Trasporti on behalf of LOGICA, covers, in detail, the 1508 NUTS3 zones (approximately corresponding to the administrative county level) related to 57 countries in the Euro-Mediterranean basin. Notably, the model has been fine-tuned to provide a reliable simulation of the current situation, thanks to field data provided by Free Zone Pirot.

Furthermore, the impact analysis of the completion of the Pan-European corridors relevant for Free Zone Pirot can be easily performed through appropriate modifications of the supply network underlying the model, which can be then run again to predict the future performances of the freight supply system. In all scenarios, for the sake of simplicity, the model has been applied by considering an average 20 tons consignment not requiring specific assistance (e.g. refrigerated products, dangerous goods).

Then, on the basis of the travel times and costs calculated through the supply model, proper accessibility measures have been defined to synthesise the results of the analysis and provide an immediate and helpful picture of the situation in Figure 1.

This stage involves the analysis of the active accessibility of Pirot FZ with respect to NUTS3 zones in the Euro-Mediterranean area. For this purpose, it depicts the isochrones, measured in multiples of hours, representing freight travel time with the best available mode between Pirot and each NUTS3 zone in the Balkans Region.

Figure 1. Active accessibility from Pirot: travel time [h] with the fastest mode from Pirot to NUTS3 destinations (general view)



Source: [ITALBALK Report, 2011, p. 129].

Brief review of the infrastructure of freight transport networks in the Balkans

The current structure of the road network in the Balkans area, defined by considering the actual configuration of infrastructures, is a main motorway axis running along the path of the future Pan-European Corridor X between Beograd and Nis, with two southbound branches going respectively towards the Former Yugoslavian Republic of Macedonia and to Bulgaria, with a good connection up to the Turkish border. The remaining road axes, also along the paths of future Corridors IV and VIII, do not exhibit exceptional performances, with a single carriageway and ineffective functional characteristics. Intra-national road connections are also substantially poor, with significant bottlenecks and capacity drawbacks in a remarkable amount of the network.

Similarly, the rail and inland waterways network structures are taken into account for the definition of the current scenario. Notably, Serbian and Bul-

garian networks are substantially electrified, with some remarkable 2-track branches, while the remaining of the network is mostly characterised by single non-electrified links, leading to inadequate performances for effective freight traffic.

Figure 2. Main rail (green lines) and inland waterways (blue lines) networks in the Balkans region (situation at 31/12/2009)



Source [ITALBALK Report, 2011, p. 18].

As a consequence, in general the area needs substantial improvement of the road and rail networks, in terms of both upgrading the existing links and construction of new possibly intermodal axes, devoted to intra-regional and international passenger and freight traffic.

This is actually the main aim underlying the Pan-European corridors network in the Balkans, reported in Figure 2, whose structure is intended to provide for reliable north-south (namely Corridors X and IV) and east-west (namely Corridors V, VIII and the Egnatia route) connections.

Starting from this premise, a number of both EU and nationally funded projects have been carried out and/or are under implementation, with expected significant impacts on freight accessibility in the Balkans. A thorough review of such implementations is covered by the SEETO (South East Europe Transport Observatory).

Figure 3. Network of Pan-European corridors

Source: Wikipedia, [https://commons.wikimedia.org/wiki File:Paneuropetransport.png](https://commons.wikimedia.org/wiki/File:Paneuropetransport.png).

Desk review of trade flows across Europe and Balkans³

In order to draw preliminary indications about the scenarios, a demand analysis has firstly been carried out which investigates the main characteristics of trade flows across Europe and the Balkans, in terms of both o-d matrices and network flows and depicts the import/export performances of the Republic of Serbia in the 2000–2009 reference period, with a specific focus on trade to/from Italy and the rest of Europe. Finally, in order to understand the context in which the intermodal platform will operate, model forecasts of demand trends in future scenarios were carried out, characterised by improvements of the infrastructural networks (e.g. completion of the Pan-European Corridors). Notably, the crude petroleum, electricity and natural gas trades were not taken into account because their transport modes usually involve the use of pipelines and other specific transport chains of no interest to the current feasibility study. The Republic of Serbia plays a major role in the area, with a remarkable amount of import/exports towards the Euro-Mediterranean basin.

³ Intermodal Logistic Center Pirot, Prefeasibility study, 2011, p. 12.

The results of the assignment can be then compared with existing counts on some links, and specific correction procedures adopted for enhancing the goodness of fit of the analysis. Results of the assignment of the current demand matrix to the current supply network are reported in Figure 3, which has been derived under the assumption of competitiveness of the Corridor X, i.e. hypothesising the removal of all barriers to transit trade through Serbia. Clearly, the route of Corridor X is one of the main axes for northbound-southbound Balkan crossing, with a strategic relevance in capturing and supporting trade to/from Eastern Greece and Turkey.

In more detail, the total Turkish trade with the 57 Euro-Mediterranean countries comes to about 42 million tons/year in export and 75 million tons/year in import⁴. With respect to this total amount, the transit trade potentially attractable from Serbia is represented by the flows approximately related to/from Central European countries (e.g. France, Germany), which adds up to 14.66 million tons/year, subdivided into 8.37 million tons/year northbound and 6.29 southbound. These overall flows should be firstly be disaggregated into the sea and road mode alternatives respectively; in turn, road flows should be further divided into flows crossing Serbia and flows crossing other countries (e.g. Bulgaria): a summary of the situation is reported in Table 1.

Table 1. Potential transit Turkish trade for Pirot area in the current scenario (model estimates)

trade to/from Turkey of interest for Serbia (tons/year)	direction	
	northbound	southbound
overall	8,374,246	6,289,727
sea mode	4,938,204	2,986,133
Ro-Ro Adriatic sea (Trieste Port)	2,706,430	1,656,998
Ro-Ro France (Marseille Fos Tolone)	2,231,774	1,329,135
road mode	3,436,042	3,303,594
through Serbia (Dimitrovgrad)	1,659,928	1,396,312
Through other countries (mainly Bulgaria)	1,776,114	1,907,282
Actual Serbian market share	48%	42%

Source: Intermodal Logistic Centre Pirot, Prefeasibility study, November 2010.

Interestingly, approximately half of Turkish road transit trade crosses Serbian boundaries northbound. Model estimates suggest the total trade along the M1 branch between Pirot and Nis to be approximately 6.85 million tons/year (4.11 northbound and 2.74 southbound), therefore the weight of Turkish transit trade on the Pirot road axis is approximately the 40% northbound and 50% southbound.

⁴ [ITALBALK Report, 2011, p. 79].

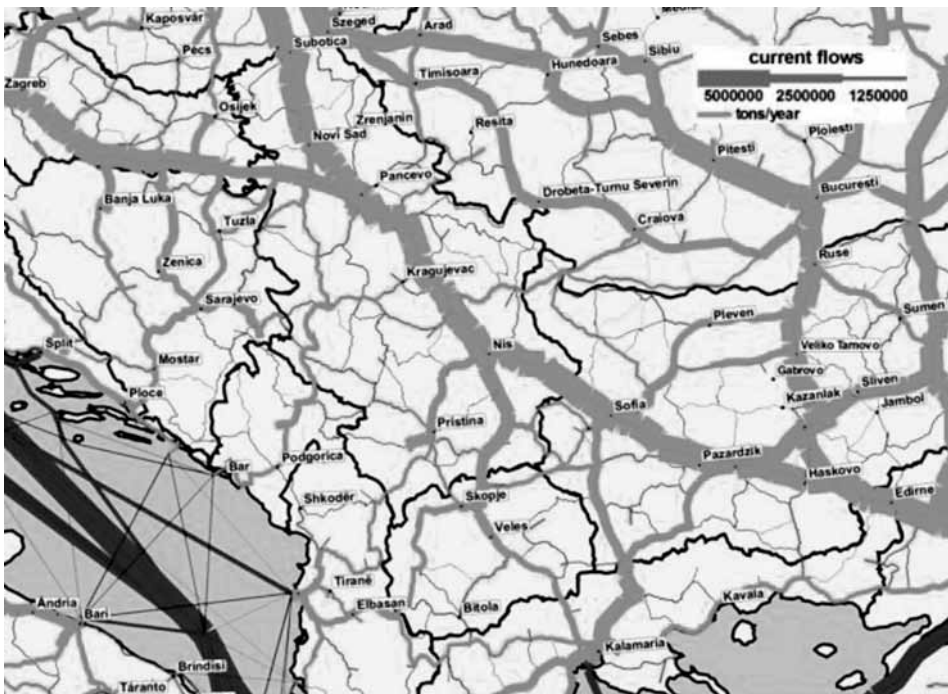
Notably, a prospective increase in the effectiveness of Corridor IV should be taken into account and supported by the Government of Serbia in order to make the route more attractive (e.g. reduction of transit fees). Indeed, the completion of Corridor X is a real priority for the Government of the Republic of Serbia and the Government of the Republic of Bulgaria, witnessed by the agreement signed on 27/04/2010 between the Prime Minister of the Republic of Bulgaria and Prime Minister of the Republic of Serbia. In this way, Corridor X will be crucial in the northbound-southbound directions, allowing for the achievement of higher rates of traffic flows.

This aspect can also be easily stressed when looking simply at distances. For instance, a consignment between Istanbul and Munich would require:

- ❑ 2154 km on Corridor IV;
- ❑ 2016 km on Corridor X in the Serbia-Hungary direction;
- ❑ 1928 km on Corridor X in the Serbia-Croatia direction.

Notably, the last option means reaching, in practice, a 10.5% saving in the distance for each trip and, taking into account that the daily traffic at the Gradina (Serbian-Bulgarian) border crossing is about 900 trucks, this leads to a saving of 41 million tons/km per day.

Figure 4. Yearly flows marked green (tons/year) in the current demand scenario under the hypothesis of effective of Corridor X



Source: Intermodal Logistic Centre Pirot, Prefeasibility study, 2011.

Logistic Centre Pirot project

National and local, legal and policy frameworks allow for the development of logistic centres within defined industrial areas.

The logistic centre development project inside Free Zone Pirot is justified for the community as the City of Pirot had a strong industrial background before the crisis of 90s since when it has been facing serious socio-economic stagnation.

The industrial zone has been recognised as a potential opportunity to mitigate negative economic and social trends in not only the municipality of Pirot but also in the surrounding municipalities. Fresh investment injections are needed to mitigate strong economic decline and impoverishment, resulting in a high unemployment rate and consequent depopulation trends affecting the entire region.

Free zone development and its modernisation through the establishment of the logistic centre may have different benefits for the communities in Pirot region, and to a certain extent, may boost their socio-economic development. This might happen through an increased chance of attracting future investors.

The arrival of new companies, in addition to various incentives provided at central government and municipal levels, may also be attracted by improved services provided by the logistic centre, and will have a positive impact on employment in the region (both direct and indirect).

For this purpose, a public private partnership was established between Municipality Pirot and Free Zone Pirot to cooperate on the development of the Logistic Centre Pirot (hereinafter LCP). The role of the City of Pirot is to provide land for the construction of the LCP and the role of Free Zone Pirot is to provide the knowledge and effort to realise this project. Relevant national government ministries were involved with the project to provide support for access and the provision of national and international funds necessary for the project which aims to attract investment and reduce unemployment in the wider Pirot district and South-eastern Serbia.

An employment boost is the ultimate goal of the establishment of the industrial zone and its development through the logistic centre. It is expected that employment will happen at three levels.

1. Temporary employment of workers during project implementation (persons who will prepare project documentation, as well as experts, qualified and mid qualified workforce who will participate in the construction work of the logistic centre.) Estimated number of people employed in this phase is 400.
2. Employment within companies already in the zone and also in these companies which are expected to enter into the free zone regime in the next period, is around 4,000 new workers.

3. Permanent employment of workers who will provide services on behalf of the Logistic Centre. Some of these workers will be in charge of the proper functioning of public parking, basic infrastructure services, and mechanisation and maintenance inside entire industrial zone. The estimated number of employees for operating the terminal is 40.
4. Indirect employment through SMEs which will serve the companies in the zone. The scope of the employment process will depend on the size and type of industries which will be installed inside the zone. Pirot is well-known for textile, food and rubber industries, therefore it is expected that these sectors will continue to grow in the future.

Logistics Centre Pirot (LCP) will give current users and future investors access to infrastructure-equipped land and more efficient transport and transshipment of goods from truck to rail and vice versa, by reducing transport costs and environmental pollution. Technical specification of the construction of LCP⁵:

- ❑ Railway terminal with three railway tracks: 304 m, 304 m and 548 m in the first phase, projected track length of 650–680m in the second stage.
- ❑ Development and infrastructure equipment of around 36 hectares of land (3.2 km of roads, 500 m long dike for flood length, 10 new transformer stations 10/0.4 kV 630 KVA and 8.5 km long 10 kV underground cable network, setting the street lightning in the designated land, setting of a 3.2 km channel for a telecommunication system, the construction of 3.5 km of water supply network, 3.7 km drainage system, a 2.7 km sewer system).

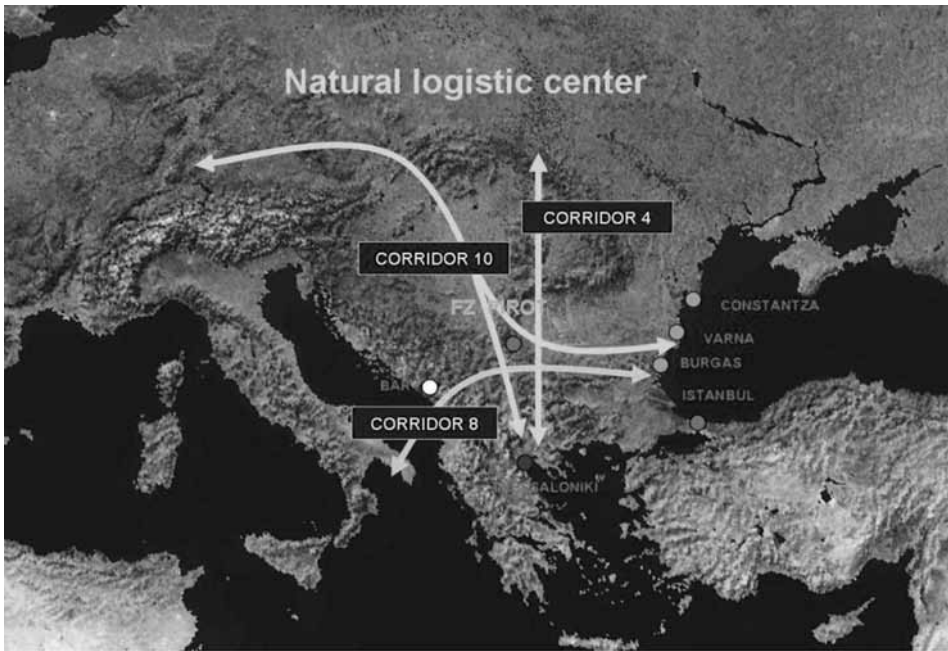
Completed project documentation includes the conceptual design of LCP with a maximum capacity of 25,000 TEU/year, the pre-feasibility study, the feasibility study for the construction of LCP, and the detailed regulation plan. After construction of the terminal, investors will be offered 36 ha of land equipped with infrastructure for operation.

The distance from LCP to the future highway (Corridor 10X) is about 1 km and the direct connection of the intermodal terminal is with the Nis-Bulgarian border railway route. It is located close to the airport in Sofia and Nis.

Regarding the time frame, the completion of construction works will be by the end of 2020, and the location of the project is Free Zone Pirot. The total value of the project is EUR 12.8 Million.

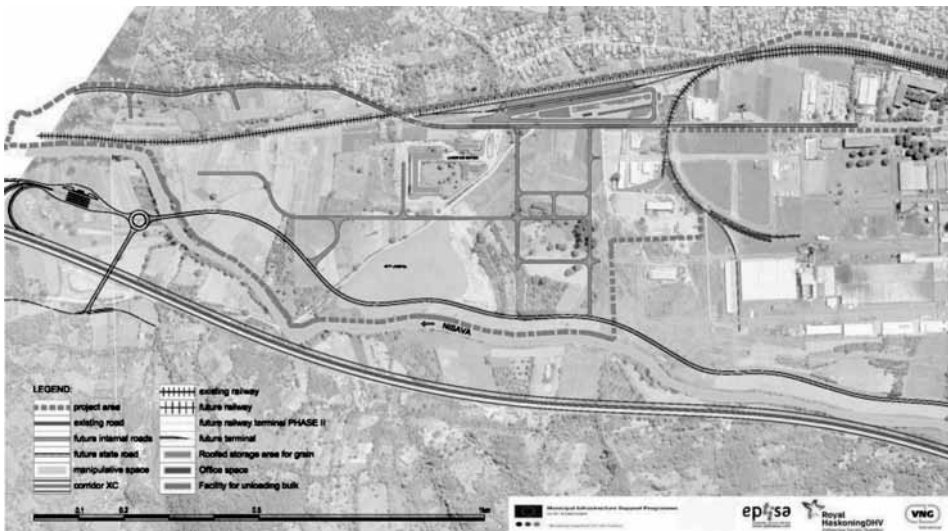
⁵ [MISP, 2014, p. 11].

Figure 5. Illustration of the location of the Logistic Centre Piro on Balkan Peninsula on Corridor X, between Corridors IV and VIII



Source: Intermodal Logistic Centre Piro, Prefeasibility study, November 2010.

Figure 6. Layout of the location of Logistic Centre Piro, showing proposed infrastructure (project area, intermodal terminal, existing and future roads, existing and future railway legs)



Source: [MISP, 2014, p. 44].

SWOT analyses of Logistic Centre Pirot⁶

The SWOT analysis within this document discusses the potential future location intended for the construction of Logistic Centre Pirot. The aim of the analysis is to detect all potential advantages and disadvantages of the existing site as well as to determine the opportunities and threats to the work of the terminal.

This analysis summarises the results of previous chapters and previous analyses, highlighting the most important characteristics below.

Strengths: Located on Corridor 10, between Corridors 4 and 8; accessible place (time, costs) with respect to the amount of influence of its road and rail transports in the Balkans, Greece, and northern Turkey; the Istanbul-Munich route is shorter via Corridor X than via Corridor IV; the synergy of Free Zone and Industrial Park allows very flexible operation modes suitable for the users of Free Zone Pirot; the existence of the container stacking lanes in the FZP; firmly established connections of the future intermodal centre with maritime transport in Cyprus, Burgas, Bar, and Durres.

Weaknesses: The lack of development financing programmes; incomplete infrastructure and logistics equipment; the lack of project documentation that would demonstrate cost-effectiveness of the intermodal terminal; under-developed marketing services; insufficiently equipped container stack lane.

Opportunities: Clear and strong support from the local authorities and state institutions; available manpower of different profiles which can be included in the revival of the existing facilities and development of new activities; presence of big companies, e.g. 'Tigar Tyres' (part of the Michelin group); provision of subsidies for business development by the state; the completion of the road section of Corridor X should take place by 2018.

Threats: Inefficient railway system (low transport speed and unreliability of delivery); possible postponement of the EU aid to transport infrastructure; investors' distrust of the institutions; either accelerated migration or aging of the work-capable population; the gap between the education system and the demands of industry; uncertainty about the duration of the benefits provided by the state.

Conclusion

From a general standpoint, as a logistics base, due to its position, Serbian Logistic Centre Pirot is a good place for a company to locate its operations if wanting to closely and efficiently serve its EU, South-East Europe (SEE) or Middle Eastern customers. It borders the EU, at the Hungarian state line, offer-

⁶ [KOSTIĆ Č., 2016, p. 247].

ing the possibility of production outside the European Union. Businesses can enjoy all the benefits of working outside the EU, while being able to provide services and transport goods in projected and flexible time frames. Externally, it can serve as a manufacturing hub for duty-free exports to a market of 1 billion people which includes the EU, the United States of America, Russia, SEE, and Belarus.

Therefore, the following key aspects have been identified with reference to the preceding target markets:

- ❑ connection with ports: Pirot FZ can be effectively served by rail from the Black Sea ports, especially Burgas, which is exhibiting significant trade increases in recent years. Furthermore, Thessaloniki can be also reached by rail, with a slightly less effective connection, and the resolution of the current issues in the Nis and Beograd railway stations will lead to effective rail connections with the Adriatic ports (e.g. Rijeka, Koper). This might have importance in increasing the supply of future regional distribution centres (see next point);
- ❑ regional distribution centre: the previous point clarifies that the possibilities of intercontinental and international supplying of the Pirot intermodal centre will increase in the future, together with a substantial increase in its accessibility in the Balkans. Therefore, Pirot can be an ideal candidate for regional distribution in the area. This possibility will be explored subsequently in a detailed feasibility study which will identify potential customers, starting from the supply chains of the customers already established in the free zone;
- ❑ transit trade: the possibility of scale economies in the transit trade will benefit from the substantial increase of the overall traffic along Corridor X.

Bibliography

- ADRIATIC-DANUBE-BLACK SEA MULTIMODAL PLATFORM project (2014), Funding programme: South East Europe Transnational Cooperation Programme. Programme call and priority: 3rd Strategic Call, Aol 3.3 Improve framework conditions for multi modal platforms, 24/04/2012 – 31/12/2014, Ref. Number SEE/C/0004/3.3/X.
- ITALBALK Report, Prefeasibility study, Intermodal Logistic Centre Pirot (2011), Sub-project 2 – Analysis of technical and economic feasibility of new Maritime Intermodal lines between Italy and the Balkan countries, Project: ITALBALK – „Integration of Logistics and Transportation on Relations ITALY-BALKANS „Activities: 2.4 economic sustainability, Updated: 31/05/2011.
- KOSTIĆ D., SIMONOVIĆ A., STOJANOVIĆ V. (2016), *Logistic Center Pirot – Euro Asian intermodal transport node*, [in:] The priority directions of national economy development 2016, edited by J. Đ. Todorović, M. Radosavljević, University of Niš, Faculty of Economics, Niš, ISBN: 978-86-6139-129-3.

- MISP – Municipal Infrastructure Support Program (2014), Feasibility Study, Pirot Logistics Center, December 2013, CRIS 223–292 (08/SER01/13/21), Municipality Pirot, P2011 – 3, Pan European Corridors (2016), Wikipedia, <https://commons.wikimedia.org/w/index.php?curid=486764> (accessed on 21 February 2016).

Zrównoważony rozwój regionu: przypadek Centrum Logistycznego w Pirot

Streszczenie

Szukając zrównoważonego rozwiązania dla rozwoju lokalnego obszaru, miasto Pirot, Republika Serbii oraz firma Wolna Strefa Pirot stworzyły publiczno-prywatne partnerstwo w celu rozwoju Centrum Logistycznego w Pirot. Obejmuje to bimodalny terminal transportowy z parkiem przemysłowym, który umożliwi przyciąganie nowych inwestorów, zmniejszy poziom zanieczyszczenia środowiska, zwiększa zastępowanie paliw kopalnianych, redukuje koszty transportu i łączy się z multimodalną siecią transportową.

Słowa kluczowe: terminal towarowy, sieć multimodalna

Sustainable development of the region: the case of Logistic Centre Pirot

Abstract

Looking for a sustainable solution for the development of the regional area, the City of Pirot, Republic of Serbia and Free Zone Pirot company established a public private partnership for the purpose of developing the Logistic Centre Pirot. This consists of a bimodal transport terminal together with an industrial park which will enable the attraction of new investors, decrease the level of environmental pollution, increase substitution of fossil fuels, decrease transportation prices and connect to the multimodal transport network.

Key words: Freight Transport Terminal, Multimodal Network

JEL: F00, L50

Wpłynęło do redakcji: 28.02.2017 r.

Skierowano do recenzji: 06.03.2017 r.

Zaakceptowano do druku: 19.05.2017 r.