International Conference

CHALLENGES OF EUROPE:

GROWTH, COMPETITIVENESS AND INEQUALITY

11th
CONFERENCE
2 0 1 5

Publisher:
Faculty of Economics, University of Split
Cvite Fiskovića 5
21000 SPLIT, CROATIA
Phone: + 385 21 430 600
Fax: + 385 21 430 701

For the Publisher:
Željko Garača Dean

Managing Editors:
Ivan Pavić, Vinko Muštra

Typesetting:
Josip Grgić, Velimir Skroza

Cover Design:
Maja Ćukušić

CHALLENGES OF EUROPE: GROWTH, COMPETITIVENESS AND INEQUALITY

Eleventh International Conference

Challenges of Europe

Proceedings:

PDF available online
PDF on CD ROM with full papers

Edited by:

Faculty of Economics in Split

University of Split
Faculty of Economics
Split, Croatia

SPLIT - Hvar, May 27-29, 2015

UDC 338.24(4)(063)

ISSN 1849-2541 (Online)
ISSN 1847-4497 (CD-ROM)

MEASURING INDUSTRIAL ENVIRONMENTAL SUSTAINABILITY WITH A COMPOSITE INDICATOR: EVIDENCE FROM ITALIAN REGIONS

Roberta Arbolino
Department of Human and Social Science
University of Naples "L'Orientale"
Largo S. Giovanni Maggiore 30,
80134 Naples (Italy)
Phone: ++39 081 6909448; Fax: ++39 081 6909442
E-mail: rarbolino@unior.it

Luisa De Simone
Department of Human and Social Science
University of Naples "L'Orientale"
Largo S. Giovanni Maggiore 30,
80134 Naples (Italy)
Phone: ++39 081 6909445; Fax: ++39 081 6909442
E-mail: ldesimone@unior.it

Key words: *Industry Ecology, Sustainability, Multivariate Analysis, Composite indicator*

ABSTRACT

The paper proposes a composite indicator called "industrial environmental sustainability index" (IESI), in order to measure ecological industrial policies through a ranking of the considered observations (i.e. Italian regions).
The index, overcoming the traditional concept of industrial virtuosity - that refers to sustainable performance of an industry - is built considering simultaneously the efforts made by enterprises (as well as industrial districts) and public local bodies in applying an ecosystem approach to the industrial sector.
We propose a methodology following the OECD (2008) one, based on a multivariate analysis using the Principal Component Analysis, which is a useful technique used to determine a composite indicator of ecological industrial virtuosity at a regional level.
The results of our analysis are twofold: obtaining a ranking of Italian regions related to the environmental aspects of the industrial activities and investigating the role played by public and private actors in order to identify weaknesses such as policy recommendations.

1. Introduction

The industrial development is the main cause of the ecosystem alteration and the resources availability (ENEA, 2012).
According to the European Directives (2009/28/EC; 2009/29/EC; 2009/30/EC: 2009/31/EC; 2009/406/EC; 2009/443/EC) the creation of an eco-sustainable system requires a process driven by public and private investments (UNEP, 2011) and a management closely connected to the industrial and environmental policy guidelines:
in line with "European Strategy 2020", the public investments must be influenced by a flexible and dynamic economic policy aimed at the efficient management of the resources (OECD2011).
the private investments must respond to the principles defined by industrial ecology (Frosch, 1992; Garner & Keoleian, 1995; Ayers, 1989; Tibbins, 1992; Allenby 1992), especially by "industrial symbiosis strategy" (Renner, 1947; Ayers, 1989; Chertow 2000), maximizing the collecting of resources from the inside and minimizing waste materials to the outside.

Thus, governance can be seen as a collection of rules, stakeholders' involvement and processes to realize a common goal (Kemp and Martens, 2007). According to Kemp et al. (2005), better governance is a prerequisite for taking steps towards sustainability.
Nevertheless, at the moment the role played by the governance in the process for sustainable industrial development lacks recognition.In particular this is the case regarding the indicators choice to evaluate the impacts of the environmental policies.
In fact, a huge number of environmental indicators, which are used to evaluate the achieved industrial ecology level - as a process with which policies of sustainable developmet are persued (Frosh and Gallopoulos, 1989) - are linked to the efficiency concept (Saisana M., Tirantola S. 2002). These indices allow focus on sustainability performance of industry at the facility level, at the inter-firm level, and at the regional or global level, following the systemic approach and the territorial one (Chertow, 2000).
Currently there is no application that considers—as requested by the EU directives— public investments, private ones and a management connected with industrial and environmental policy guidelines.
Then, overcoming the concept of industrial virtuosity, the aim of this paper is to define a composite indicator called "industrial environmental sustainability index" (IESI) - which includes both government institutions and business sector synergies in order to monitor the ecological industrial activities of a Region, by adopting an integrated territorial approach (Wallner, 1998).
The construction of the index will be structured following two integrated steps. The outputs of each step measures: i) the efforts made by enterprises (as well as industrial districts) both in terms of realized investments and management activities; ii) the financial commitment of public local bodies in applying an ecosystem approach to the industrial sector.
Finally, by aggregating the two components we will obtain a composite index, which will be used to obtain a ranking of the considered observations (i.e. Italian regions).
We propose a methodology following the OECD (2008) one, based on multivariate analysis: i) analysis of variables by PCA, so to obtain a "simpler structure of factors"; ii) weighting and aggregation procedure by a factor method, based on the factors score coefficients.
The paper is structured as follows: after presenting a background on the industrial sustainability indicators literature (section 2), information on data and methodology will be provided (section 3), and an empirical test on Italian regions will be performed (section 4). In section 5 the conclusions are drawn.

2. BACKGROUNDS ON INDUSTRIAL SUSTAINABILITY INDICATORS

Industrial ecology operates on three levels (Chertow M.R., 2000):

- within a firm, using tools such as "green" or "full-cost" accounting (Bennett & James, 1998), pollution prevention, and eco-efficiency (Huppes & Ishikawa, 2005);
- across firms/organizations, it implies a cooperation among firms and organizations through resource and information sharing within a single industry sector or across different sectors.
- the enterprises to national or global level through the study of the cycles and the flows. (Ayres, 1989).

On the basis of the continuous process of integration between environment and productive system that are engaged, for each of these levels the concept of industrial ecology involves two types of sustainability: environmental and industrial.
The definition of the environmental sustainability as "maintenance of the natural capital" indicates all the constraints about the four main activities that regulate the human economic subsystem: on the side of the inputs, the use of renewable resources and not; the pollution and the wastes on the side of the outputs (Goodland R., 1995). This approach strengthens international engagements and the ability of the countries to check the environmental aspects in line with national objectives. The OECD (1993) has been the first organization to conceive in the 1989 environmental indicators, usable on an international level.
The industrial sustainability can be defined instead as the adoption of strategies of business and activities that answer to the actual demands of enterprises and shareholders, protecting, sustaining and improving the human and natural resources that will be necessary in the future improvements. . (Labuschagne C. et al., 2007, Feng S.F et al.) In this context the concept of sustainability referred to the firm is accompanied by one refers to the product. Beginning from the 1990s different measures of sustainability and metrics of performance have been defined for each of these dimensions, of which the main ones follow:

Table 1: Industrial Ecology Indices

INDUSTRIAL ECOLOGY		
ENVIRONMENTAL SUSTAINABILITY	**INDUSTRIAL SUSTAINABILITY**	
	PROCESS	**PRODUCT**
OECD CORE SET	Global Reporting Initiative	OECD TOOLKIT
ESI	Dow Jones Sustainability Index	WALMART'S INDEX
EPI	EMAS, ISO, ECOLABEL	
ECOLOGICAL FOOTPRINT	World Business Council for Sustainable Development (WBCSD)	

Source: our elaboration

All the provided indicators refer to the national territorial level or to a single enterprise except the environmental certifications and the EF that also considers the regional and local level.
In the first cluster, OECD Core Set of environmental indicators is linked to the monitoring of environmental conditions and trends. It includes about 50 indicators, which cover a broad range of environmental issues and economic data to track pressures on the environment and responses by governments, industry and households. (OECD, 2000)

The Environmental Sustainability Index (ESI) is a composite index regarding socio-economic, environmental and institutional indicators that characterize and influence the environmental sustainability on a national level. The indicators allow to compare a series of matters reentering in the following five categories: 1) environmental systems; 2) reduction of

the environmental tensions; 3) reduction of the human vulnerability to the environmental tensions; 4) social and institutional ability; 5) global administration.
The Environmental Performance Index (EPI) is a composite international index, according to which e the countries are classified on the basis of the followings environmental matters: 1. the reduction of the environmental tensions on human health 2. the promotion of the vitality of the ecosystem united to the healthy management.
EPI methodology is based on the development performance indicators calculated as a country's distance from a defined target (Yale Center-Columbia University 2014).
With respect to the industrial sustainability, a number of sustainability assessment methodologies exists in practice for evaluating the performance of companies (Ramachandran, 2000).
Probably the most well-known international sustainability performance indicator set is developed by the Global Reporting Initiative. Indicators in GRI belong to two major categories: core and addition. They are categorized according to three dimensions: economy, environment and society. GRI is a voluntary initiative intended to provide a tool for decision making in multi-level processes such as, management, operation, and internal or external stakeholders. GRI initiative gives a standard format of sustainability performance report so that manufacturers can benchmark the performance of their processes (GRI, 2002a; 2002b).
Another worldwide methodology was developed by the World Business Council for Sustainable Development (WBCSD) in 1997, by introducing the eco-efficiency concept (WBCSD, 1999). The framework considers two sustainable dimensions: environmental and social. The considered process indicators are divided into specific activity and general activity for all other activities (World Business Council for Sustainable Development, 1997).
Through the WBCSD, member companies exchange their experiences in implementing eco-efficiency and share their ideas with the business community worldwide.
Dow Jones Sustainability Indexes are used to assess the financial and sustainability performance of the top 10% of the companies in the Dow Jones Global Total Stock Market Index. The assessment is divided into three distinct sections with 12 criteria, covering the economic, environmental and social dimensions and including answers from the questionnaire as well as the results from a media and stakeholder analysis. (Dow Jones Sustainable index, 2006)
The intent of the OECD toolkit is to provide a moderate level of technical expertise for small and medium companies. The focus of the toolkit is on the calculation and interpretation of 18 core indicators of sustainability performance in terms of materials and processes. (Bordt, 2009)
Considering these examples of industrial environmental indices, some difficulties related to our goal arose:
1) The territorial level, that is almost exclusively expressed either with regards to national aggregate or single enterprise;
2) They don't consider the eco-sustainable activity in term of synergy among different actors.
These critical elements don't allow a transparent comparison of the performance of various policy alternatives, and facilitate the identification of areas that may require improvement (Bohringer & Jochem, 2007) also by a careful reallocation of resources. (UN, 2003; UNESCO-SCOPE, 2006).

3. MEASURING INDUSTRIAL ENVIRONMENTAL SUSTAINABILITY: A COMPOSITE INDICATOR

Synthesizing the complex phenomenon of industrial sustainable ecology in a single indicator may appear ineffective for the loss of disaggregated information to which the synthesis leads.

Nevertheless, a composite indicator - that is a mathematical aggregation of a set of individual indicators - can measure multidimensional concepts that usually have no common unit of measurement (OECD, 2008).
Considering the limitations and the criticisms emerged from the literature review, we have built our indicator considering the territory as key of connection to realize sustainable policies and strategies of the Industrial Ecology, as hypothesized by Wallner (1998), according to whom, to overcome the inside difficulties in the practical pursuit of the Sustainable Development, the local level must be valorized.
The positive implications that this can produce are also contained in UN (1992; 2001a; 2002) and in EU (Committee of the Regions, 2005; 2007; EU, 2007; 2008a) recommendations, according to which the regional level choice fulfils the need to define an optimal size for successfully implementing sustainable development in terms of geographic staircases (Allenby, 1992; Zilahy and Huisingh 2009). Graymore et al. (2008), besides, contend that the regional level provides the greatest opportunity for local governments to work together with their constituent communities toward sustainable development.
Following these suggestions, the IESI has been calculated using the methodology proposed by OECD (2008) and applied on a lot of cases (Nicoletti et al.2000; Coco and Russo2006; Ercolano and Gaeta, 2012; Ercolano and Romano, 2012) based on the following steps:

- Data selection
- Multivariate analysis, that is used to study the overall structure of the dataset, assesses its suitability and guides subsequent methodological choices;
- Weighting and aggregation procedure.

3.1 Data and Multivariate analysis

The analysis involves 21 Italian regions, according to the availability of recent data (2012) provided by ISTAT and Italian Observatory on industrial district.
For the choice of the variables we try to identify those directly related to policy and company choices in the industrial ecology domain (table 2); more specifically, the selected variables concern all the available responses defined both by local public body to stimulate an enterprise to adopt a virtuous behaviour, and by private subjects to achieve a high or good ecological performance level. Thus, the variables are classified in two further groups: one named "resources", that is referred to investment choices, and the other named "management", that is referred to management activities for environmental sustainability.

Multivariate analysis is carried out using Principal Component Analysis (PCA), that is a useful multivariate technique for transforming a large number of variables in a data set into a smaller and more coherent set of uncorrelated (orthogonal) factors – the principal components (Pearson, 1910; Hotelling, 1933). The principal components account for much of the variance among the set of original variables. Each component is a linear weighed combination of the initial variables.

The PCA is based on two phases. In the first one, the user defines the number of factors – that represent the data and their variance. One of the most commonly used methods of extraction is Kaiser's criterion, or the eigenvalue rule. Under this rule, only those factors to which was associated eigenvalues larger than one and that contribute cumulatively to the explanation of the overall variance by more than 60 %, will be chosen.

Table 2– The Variables

Label	Description	Unit
	Enterprises variables	
	Resources	
Environm_cert_	Environmetal certification achieved by enterprises	n.
R&D_Expend	R&D Expenditure by enterprises	€
BAT_Techn_	BAT technologies adopted by enterprises in industrial districts	n.
Ecolabel_	Ecolabel achieved by enterprises	n.
Environ_cert_projec_	Projects on evironmtal certification realized by enterprises in industrial districts	n.
Prod_pol_projec_	Projects on product policy realized by enterprises in industrial districts	n.
Renew_energy_	Renewable energy production	n.
Unsp_Financ_Fund_	Unspent Financial Funds by enterprises	%
	Management	
Patents_	Patents	n.
Water_infrast_	Water infrastructures maneges by enterprises in industrial districts	n.
Waste_infrast_	Waste infrastructures maneges by enterprises in industrial districts	n.
Energy_infrast_	Energy infrastructures maneges by enterprises in industrial districts	n.
Environm_Services	Environmental services maneges by enterprises in industrial districts	n.
Green_techn_	Energy saving and renewabe energy technologies adopted by enterprises in industrial districts	n.
Cogener_techn_	Energy saving and cogeneration technologies adopted by enterprises in industrial districts	n.
	Public subject variables	
	Resources	
R&D_Pub_Expend	R&D Expenditure by Public Administration	€
Pub_incentive_	Public incentives	€
Exp_paid	Expense paid	€
	Management	
Law_Ecol_Ind_Area	Regional Law on Ecological Industrial Area	dummy

The second phase consists in the rotation of factors, that is usually used because this procedure allows a better view of the data. The rotation procedure adopted in this work is *Varimax* rotation (Linting *et al*., 2007; Svedin, 2009), which minimizes the number of variables with high loadings on each factor, and thus simplifying the interpretation of factors In other words it maximizes loading of individual indicators on individual factors, so to obtain a ‘‘simpler structure’’ of the factors (OECD; 2008).

3.2 Weighting and aggregation (WA) procedure

Indicators should be aggregated and weighted according to the underlying theoretical framework: correlation and compensability issues among indicators need to be considered and either be corrected for or treated as features of the phenomenon that need to be retained in the analysis [OECD, 2008]. Generally, weights can be equally distributed for all indicators, or assigned on the basis of public/expert opinion. This could be not always desirable in circumstances in which a high degree of objectivity and accuracy is required [Ercolano, Romano, 2012].

A number of weighting techniques exist, but in this work we use PCA to group individual indicators according to their degree of correlation. According to the OECD methodology (2008), weights are built up from the matrix of factor loadings after rotation, as the square of factor loadings represents the proportion of the total unit variance of the indicator, which is explained by the factor. The approach consists in: ‘‘weighting each detailed indicator according to the proportion of its variance that is explained by the factor it is associated to, while each factor [subdomain] was weighted according to its contribution to the portion of the explained variance in the dataset’’ [Nicoletti et al.2000].

In this study we adopt a different WA procedure (Antony and Rao, 2007; Hightower, 1978) that is based on the factor score coefficients, also called component scores, which are

estimated using regression method. Factor score are the scores of each case or statistic unit - Italian regions (Reg_) in our example – on each factor. For the *j*th regions the index value is calculated as follows:

$$Ij = \sum_{K=1}^{f}(\frac{\lambda k}{\Lambda}) * \alpha_k^{xj} \qquad (1)$$

Where:

- I_j represents IESI indicators for each *j*th region,
- $\alpha_k^{xj} = \{\alpha_1^{xj},\ldots., \alpha_f^{xj}\}$ represent factor scores of each case – x_j – on each *f*th factor,
- $\lambda_k = \{\lambda_{k1},\ldots., \lambda_{kf}\}$ represent the variance (%) each *f*th factor explains,
- Λ represents the cumulative explained variance and
- x_j represents the cases.

The indicator measures the sustainability of industrial policy of one case (Reg_) related to the other on a linear scale. Since its value can be positive or negative, a standardization procedure was developed using the Max – min normalization technique:

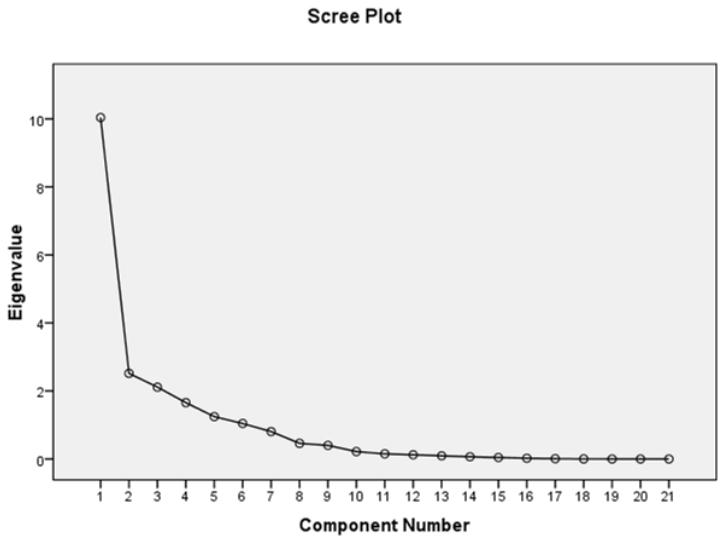
$$SIj = \frac{(Ij - Min\ I)}{(Max\ I - Min\ I)} * 100 \qquad (2)$$

Where SIj represents standardized IESI indicator for each *j*th region, Min I and Max I are the minimum and maximum value among Ij indicator, respectively.
In this way, the composite indicator value can range from 0 to 100 by making the interpretation easier.

4. EMPIRICAL RESULTS

For the building up of composite indicator – IESI – we consider all of factors that show an eigenvalue larger than one. After examining the scree plot (fig.1), only six factorial axes (subdomains) were extracted for analysis, showing a cumulative variance of more than 88%.

Figure 1 – Screeplot of eigenvalue of factors



Correlation coefficients (loadings) of each variable on each factor - presented in table 2 – are the results of a *Varimax* (orthogonal) rotation, so they naturally range from -1 to +1. Hence, the first factor – it accounts for 47,8% of the total variation – is a reasonable representation of the environmental efforts made by enterprises; the second one – it accounts for 11,9% of the total variation - may be interpreted as a measure of enterprises activity in environmental technology. The third factor, with a 10% of the total variance, represents the activities made by enterprises generated by public subject economic action; the fourth one accounts for 7,8% of the variance, representing fiscal incentives to support sustainability performance in the industrial sector. The last two factors – respectively, account for 5,9% and 4,9% of the variance – they represent the action made by each regional governance, in terms of legislative recognition of ecological industrial areas– factor 5 – and of R&D expenditure – factor 6.
In table 3, IESI values for each region are presented. The first value – S-IESI – is calculated using formula (1) and then (2), in order to give normalized values in a range from 0 to 100. For an easier interpretation of the phenomenon, we consider IESI values compared to the average value, set equal to 100 – A-IESI.
According to IESI values, the rank of Italian regions shows a remarkable difference between North and South. The graph in figure 2 makes the interpretation easier.
The Italian regions that are above average -and show a better environmental sustainability performance in the industrial sector - belong to the Northern area (only Marche is a central region) where there is a long and strong industrial tradition.
However, contrary to what we would have expected, this positive reality represents only 25% of regional distribution (6 regions on 20).
Hence, in the last position, we find a very heterogeneous territorial distribution, with some regions from North and Central areas, and all Southern ones.

Table 3 – Varimax rotation factor matrix

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Cert_amb_IMP	,358	,880	,174	,155	-,016	,023
Spesa_RD_IMP	,249	,940	,090	-,073	-,021	,009
Brev_reg_IMP	,379	,843	,230	-,102	-,111	,039
Infr_acq_IMP	,370	,295	-,051	,377	,138	,666
Infr_rif_IMP	,766	,163	,422	,166	,176	,315
Infr_ener_IMP	,753	,424	-,185	,255	,029	,261
Serv_IMP	,553	,220	,272	,574	,266	,283
Tecnol_ee_fer_IMP	,799	,275	,261	-,011	,385	,074
Tecnol_ee_cog_IMP	,672	,387	,255	,225	,174	,298
Tecn_BAT_IMP	,793	,355	,302	,009	,262	,130
Marchi_IMP	,304	,621	-,251	-,200	,409	,281
Prog_Cert_amb_IMP	,929	,062	-,005	,167	,200	-,182
Pol_prod_IMP	,717	,389	,298	,114	,154	-,090
Pol_Clima_IMP	,907	,194	,096	-,026	-,251	-,005
APEA_IMP	,235	-,039	,811	-,017	,470	-,009
Prod_en_fer_IMP	,063	,835	,035	,219	,138	-,183
Spesa_RD_PA	,077	,276	-,069	,291	-,030	-,699
Norm_APEA_PA	,209	,011	,216	-,052	,915	,081
Inc_fondi_no_spe_PA	,066	-,151	-,267	,848	-,062	-,175
Spesa_prev_PA	,141	,163	,376	,788	-,090	,029
Spesa_erog_PA	,248	,251	,892	,054	-,002	,037

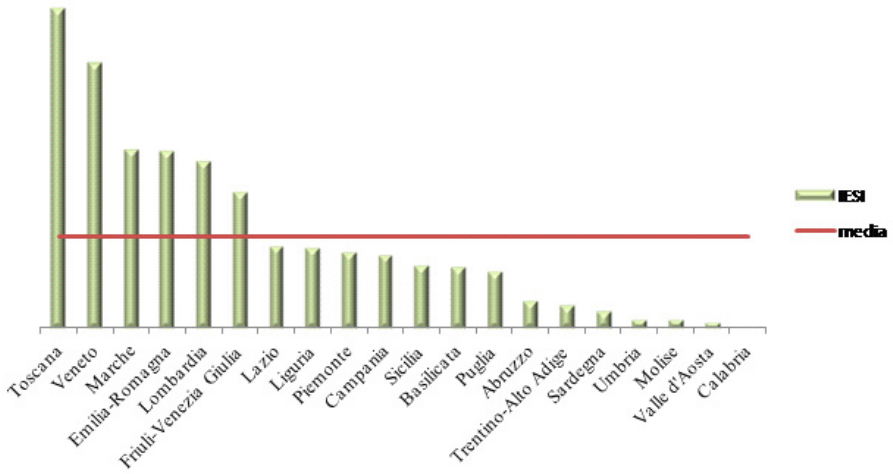
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Table 4 – IESI Ranking

Rank	Region	S - IESI	A - IESI
1	Toscana	100	348,712
2	Veneto	83,107	289,806
3	Marche	56,053	195,463
4	Emilia-Romagna	55,616	193,941
5	Lombardia	52,333	182,492
6	Friuli-Venezia Giulia	42,731	149,008
7	Lazio	25,610	89,305
8	Liguria	25,211	87,915
9	Piemonte	23,961	83,555
10	Campania	22,827	79,599
11	Sicilia	19,723	68,776
12	Basilicata	19,387	67,605
13	Puglia	17,834	62,191
14	Abruzzo	8,637	30,118
15	Trentino-Alto Adige	7,507	26,176
16	Sardegna	5,669	19,768
17	Umbria	2,814	9,814
18	Molise	2,752	9,595
19	Valle d'Aosta	1,767	6,162
20	Calabria	0,00	0,00

Figure 2 – IESI - region rank and average value



In order to obtain more information about the efforts by public and private subjects in the Ecological Industrial domain, we have calculated regional IESI for enterprises and for public bodies, using our WA procedure with standardization (1) and (2).

In particular, from the PCA results, we can assume the first three factors axes focus on enterprises activities in industrial ecology domain, while the other three focus on public body activities. Then, we calculated IESI_IMP – for the private subjects – by considering only the factor scores of each cases (Reg_) on the first three factors; the IESI_PA – for public subjects – is based on the factor scores on the last factors axes.

This disaggregated analysis shows that in the regions with better IESI values there is a strong synergy between public and private action. Toscana, Marche and Emilia – Romagna present

an almost equal percentage of enterprises and local body efforts – almost 50% each. Only in Veneto and Lombardia the sustainable performance in industrial sector is mainly the result of the strategy of the enterprises.
The worst regions show high percentage of public component. It means that in Southern regions public support is very important in order to achieve environmental sustainability target, even if the position in the ranking shows the inefficiency of these policies.

Table 5 – IESI value for enterprises and public body, and their percentage

Rank	Regions	% SI_IMP	% SI_PA
1	Toscana	0,47	0,53
2	Veneto	1,00	0,00
3	Marche	0,49	0,51
4	Emilia-Romagna	0,49	0,51
5	Lombardia	0,61	0,39
6	Friuli-Venezia Giulia	0,52	0,48
7	Lazio	0,48	0,52
8	Liguria	0,34	0,66
9	Piemonte	0,27	0,73
10	Campania	0,24	0,76
11	Sicilia	0,14	0,86
12	Basilicata	0,30	0,70
13	Puglia	0,23	0,77
14	Abruzzo	0,31	0,69
15	Trentino-Alto Adige	0,34	0,66
16	Sardegna	0,20	0,80
17	Umbria	0,11	0,89
18	Molise	0,11	0,89
19	Valle d'Aosta	0,19	0,81
20	Calabria	0	100

5. **CONCLUSION**

The conversion of industrial areas implemented through green investments in renewable energy is taking more emphasis in the context of industrial ecology. We have tried to analyze and assess this complex phenomenon using a single indicator; this may appear ineffective for the loss of disaggregated information to which the synthesis leads, but we have demonstrated that it can offer important insights on the development of environmental policies in order to define guidelines for the policy makers.
In the methodology procedure we have tested, the choice of data and the right territorial level is crucial for a correct definition of a certain phenomenon: obviously the same phenomenon could be represented by several indicators, taking into account taking into account the availability of data of statistical units considered (Ercolano and Romano, 2012). Indicators may be seen as pointers which, used effectively, may reveal conditions and trends that help in development planning and decision-making (Tschirley, 1996). Also, indicators can assess the performance of economic and ecological systems (and their change over time) and help set policy goals with regard to sustainable development (Lancker and Nijkamp, 2000). According to Nijkamp and Ouwersloot (1998) an indicator may be conceived as a partial but

representative mapping of a compound attribute of a phenomenon under study into a one-dimensional measure, which has a relevance for policy-making.
This paper has developed a theoretical framework to underpin the construction of a composite indicator, and through this presented a clear picture of environmental sustainability in the industrial sector in each Italian region. Its relevance consists not only in its purpose, but also in the methodology that has been used: the multivariate analysis and PCA in particular, which overcome common problems related to the choice of weights.
After having obtained the ranking of the regions that basically divided Italy in two groups – sustainable industrial regions and not-sustainable ones, we investigated the determinants of this situation that can be used to measure that can be used to measure the efficiency of public and private action.
The results of this analysis can allow to understand that the industrial sector in Italy needs to be "structurally and environmentally" improved in terms of a better allocation of public and private economic resources

BIBLIOGRAPHY

Allenby, B.R. (1992). **Design for environment: implementing industrial ecology**, PhD Dissertation , Rutgers University, New Brunswick, NJ.

Antony, G. M. & Rao, K. V. (2007). **A composite index to explain variations in poverty, health, nutritional status and standard of living**: Use of multivariate statistical methods. *Public Health*, 121, 578-587.

Arbolino R., Romano O., (2014). **Multivariate analysis for the ex post evaluation of fiscal environmental fiscal reform and methodological proposal**, VII International Meeting in Dynamics of Socio-Economic System, Dyses 2014. University of Seville in September 16-18,

Ayres R. U., (1989). **Industrial metabolism: Theory and policy**, in Ayres, R. U., Simonis, U. K. (Eds.), Industrial Metabolism: Restructuring for Sustainable Development, United Nations University Press, Tokyo, pp. 3–20

Bennet James (1998)

Bohringer, C. and Jochem, E.P. (2007). **Measuring the immeasurable – A survey of sustainability indices**. Ecological Economics, 63: pp 1-8.

Bordt, M., (2009). **OECD Sustainable Manufacturing Toolkit, Sustainability and U.S. Competitiveness Summit**, U.S. Department of Commerce, October 8, 2009.

Chertow M. R., (2000). **Industrial Symbiosis: Literature and Taxonomy**, in Annual Review of Energy and Environment, 25: 313-337

Coco, G., & Russo, M. (2006). **Using CATPCA to evaluate market regulation**. In S. Zani, et al. (Eds.), Data analysis classification and the forward search (pp. 369–376). Berlin: Springer.

Dow Jones Sustainability Index (2014). **Guide**, available at: www.sustainabilityindexes.com/D.J.S.I_pdf/publications/Guidebooks/D.J.S.I_Guidebook_World_80.pdf, version 8.0, August.

ENEA (2012). **Eco – innovazione dei processi industriali**, EAI

Ercolano S., & Romano O., (2012). **Who Makes the Most? Measuring the ''Urban Environmental Virtuosity''**, Social Indicators Researcher, Springer

Ercolano, S., & Gaeta, G. L. (2012). **(Re)assessing the power of purse. A new methodology for the analysis of the institutional capacity for legislative control over the budget,** Journal of Dyses

Feng S.F, Joung C.B., Gang Li, (2014) *Development Overview of Sustainable Manifacturing Metrics*, NIST, USA p.1.

Frosch, R. (1992). **Industrial ecology: A philosophical introduction**, AA.VV. (a cura di) in Proc. National Academy of Sciences of the United States of America, Vol. 89, pp.800-803

Frosch, R.A., Gallopoulos, N.E. (1989). **Strategies for Manufacturing**, Scientific American 261:3, pp 144-152

Garner & Keoleian, (1995). "Industrial ecology: an introduction", in Pollution Prevention and Industrial Ecology, National Pollution Prevention Center for Higher Education, University of Michigan, Ann Arbor.

Goodland R. (1995), *The Concept of Environmental Sustainability, Annual Review of Ecology and Systematics*, Vol. 26 pp. 10-12.

Graymore, M.L.M., Sipe, N.G., Rickson, R.E., (2008). **Regional sustainability: How useful are current tools of sustainability assessment at the regional scale?** Ecological Economics 67: 362-372.

GRI – Global Reporting Initiative, (2002a). **The Global Reporting Initiative – An Overview**. Global Reporting Initiative, Boston, USA, Available at www.globalreporting.org (2004).

GRI – Global Reporting Initiative, (2002b). **Sustainability Reporting Guidelines 2002 on Economic and Social Performanc**e. Global Reporting Initiative, Boston, USA, Available at www.globalreporting.org (2004).

Hightower, W. L. (1978). **Development of an index of health utilizing factor analysis**. *Medical Care*, 16, 245-55.

Hotelling H., (1933), Analysis of a Complex of Statistical Variables into Principal Components. Journal of Educational Psychology, 24:417–441,498–520, 1933.

Huppes G., Ishikawa M., (2005), Eco-Efficiency and its Xsterminology, Journal of Industrial Ecology, Vol. 9, Issue 4, pp. 43-46, 2005

Kemp, R., Martens, P., (2007). **Sustainable development: how to manage something that is subjective and can never be achieved?** Sustainability: Science, Practice and Policy 3: 1-10.

Kemp, R., Parto, S., Gibson, R.B., (2005). **Governance for sustainable development: moving from theory to practice**. International Journal of Sustainable Development 18: 12-30

Labuschagne C., Brent A.C., R..Van Erck P.G (2007), *Assessing sustainability performances of industries*, p.2.

Lancker, E., Nijkamp, P., (2000). **A policy scenario analysis of sustainable agricultural development options: a case study for Nepal**. Impact Assessment and Project Appraisal. 18 (2), 111–124.

Linting, M., Neurman, J. J., Groenen, P. J., & Van Der Koojj, A. J. (2007). **Nonlinear principal components analysis: Introduction and application**. Physical Methods 12 (3), 336–358.

Nicoletti, G., Scarpetta, S., & Boylaud, O. (2000). **Summary indicators of product market regulation with an extension to employment protection legislation**. OECD Economics Department working papers no. 226

Nijkamp P., Ouwersloot H. (1998), **Multidimensional sustainability analysis**, in J C J M van den Bergh and M Hofkes (editors), Theory and Implementation of Economic Models for Sustainable Development (Kluwer, Dordrecht) pages 255–273

OECD (1993), OECD 1993 core set of indicators for environmental performance reviews, a synthesis report by the Group on the State of the Environment, Environmental monographs n.83.

OECD (2008) **Handbook on Constructing Composite Indicators: Methodology and User Guide**, OECD Publishing

OECD (2011), **Towards Green Growth: A Summary for Policy Makers**. Paris: OECD.

OECD, (2000), **Part B - Environmental Performance Indicators**, OECD Rome Conference Proceedings-Volume II: Framework s and indicators, pp.99 - 127.

Pearson K., (1910), On lines and planes of closest fit to systems of points in space, Philosophical Magazine, Series 6, vol. 2, no. 11, pp. 559-572

Ramachandran, N., (2000). **Monitoring Sustainability: Indices and Techniques of Analysis. Concept** Publishing Company, New Delhi

Renner G. T., (1947). **Geography of Industrial Localization**, in Economic Geography, 23, no. 3: 167–189, .

Saisana M., Tarantola S., (2002), **State-of-the-art Report on Current Methodologies and Practices for Composite Indicator Development**, EUR Report 20408 EN, European Commission, JRC-IPSC, Italy.

Staniškis J., Arbačiauskas V. (2004), **The Sustainable Industrial Development: Reality and Vision**. In "Technological Choices for Sustainability", Springer- Verlag.

Svedin, L. M. (2009). Organizational cooperation in crises Farnham: Ashgate.

Tibbs H.B.C. (1992), **Industrial Ecology: An environmental agenda for industry**, Global Business Network, USA

Tschirley J.B., (1996), **Considerations and constraints on the use of indicators in sustainable agriculture and rural development: workshop on land quality indicators for sustainable resource management"**, 25–26 January, FAO, Rome

UN, (1992). **Agenda 21 - Earth Summit;** The United Nations Programme of Action from Rio.

UN, (2001a). **Guidance in preparing a national sustainable development strategy: managing sustainable development in the new millennium**. DESA DESA/DSD/PC2/BP13.

UN, (2002). **Plan of Implementation of the World Summit on Sustainable Development**.

UN, (2003): **Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts and Sources 2003**

UNEP, (2011), **Towards a Green Economy**. New York: United Nations

UNESCO-SCOPE, Policy Briefs, May 2006. No.1 UNESCO-SCOPE Paris.

United Nations Educational, Scientific and Cultural Organization - Scientific Committee on Problems of the Environment (2006): "**Indicators of sustainability: Reliable tools for decision making**".

Wallner HP. (1998), Towards sustainable development of industry: networking, complexity and eco-clusters. Journal of Cleaner Production 7 (1): 49 – 58.

WBCSD – World Business Council for Sustainable Development, (1997). **Signals of Change: Business Progress Toward sustainable Developmen**t. Geneva, Switzerland.

World Business Council for Sustainable Development (WBCSD), (1999). **Eco-efficiency Indicators and Reporting: Report on the Status of the Project's Work in Progress and Guidelines for Pilot Application**. Geneva, Switzerland.

Zilahy, G., Huisingh, D., (2009). **The roles of academia in Regional Sustainability Initiatives.** Journal of Cleaner Production 17: 1057-1066.

Yale Center-Columbia University, (*2014) EPI Full Report and Analysis, pp.13-17*

EQUIPMENT AND EFFECTIVENESS OF THE USE OF FIXED ASSETS IN ECONOMICALLY WEAK AND STRONG FARMS IN SELECTED COUNTRIES OF CENTRAL AND EASTERN EUROPE

Aldona Skarżyńska
Institute of Agricultural and Food Economics – National Research Institute (IAFE-NRI)
Świętokrzyska 20, 00-950 Warsaw 1, Poland
Phone: +48 50 54 603
E-mail: Aldona.Skarzynska@ierigz.waw.pl

Irena Augustyńska-Grzymek
Institute of Agricultural and Food Economics – National Research Institute (IAFE-NRI)
Świętokrzyska 20, 00-950 Warsaw 1, Poland
Phone: +48 50 54 727
E-mail: Irena.Augustynska@ierigz.waw.pl

Konrad Jabłoński
Institute of Agricultural and Food Economics – National Research Institute (IAFE-NRI)
Świętokrzyska 20, 00-950 Warsaw 1, Poland
Phone: +48 50 54 736
E-mail: Konrad.Jablonski@ierigz.waw.pl

Key words: *asset utilisation efficiency, efficiency of production, fixed assets in economically weak and strong farm*

JEL codes: D24, Q12

ABSTRACT

The article presents the effectiveness of the use of fixed assets in economically weak and strong farms in eight countries of Central and Eastern Europe on average in 2010-2012. The data have been obtained from the EU farm survey conducted under FADN. The aim of the study was to evaluate the differences in the technical equipment of economically strong and weak farms in comparison to the achieved performance. A common feature of economically weak and strong farms was the predominance of fixed assets in the property of agricultural holdings. However, this indicator was more unfavourable in the first group of farms (apart from Bulgaria). The efficiency of use of total assets in economically weak farms in most countries was lower – as compared to the economically strong ones – the difference ranged from 33.3% in Latvia to 57.1% in Slovenia. The efficiency of use of buildings and machinery was also lower – from 8.5 in Bulgaria to 57.1% in Romania. In consequence, the efficiency of the conducted production was worse.

1. INTRODUCTION

When managing a farm, a farmer must make decisions about what to produce, how much to produce and how to produce. The level and structure of production are determined – apart from the climate and soil conditions – also by the farmer's experience and farm's technical work equipment. An appropriate choice of agricultural machinery and equipment and their rational utilisation has an impact on the economic performance of agricultural holdings. It also makes it possible to increase productivity and reduce the burden for the people working on a farm. Unfortunately, it also has a negative characteristic: technical equipment is expensive to buy and to use as well. Therefore, it is a significant capital expenditure, and subsequently a cost carrier, both for fixed and variable costs. Therefore, the utilisation level for technical work equipment in the production process can determine the competitiveness of a farm.

According to numerous authors (Kowalski and Szeląg, 2006; Mróz, 2006; Zając et al., 2006), who conducted research on the equipment consisting of machinery and tools in Polish farms, the current equipment leaves much to be desired, mainly because of the poor technical condition resulting from many years of utilisation, which is often inappropriate. It is only the quantitative equipment that can be satisfactory. However, in many cases, the machines owned by farmers could be called "aged". The life of such equipment has been prolonged for over 20 or even 30 years, it often includes machinery and tractors purchased in the 1980s. According to Morgan (1993), the machines that are about 15 years old, and sometimes even the 10-year-old ones, are already obsolete in terms of numerous design solutions. Therefore, they are not able to meet the current agri-technical and economic requirements.

Currently, in the conditions of market economy, some farmers can not afford to buy new machinery and equipment, and hence acquire the used equipment, most often imported one. As a result, they replace the more obsolete machinery with a slightly less obsolete one. It is disadvantageous because they often purchase high-power tractors and combine harvesters (mainly for cereals) that are used only for their own needs (Szuk, 2006).

The factor that determines the unit cost of operation of each machine is the time of its use during the year. The research shows that the annual use of machines in many agricultural holdings in Poland represents about 2/3 of the normative use (Kowalik and Grześ, 2006).

The research conducted by the Institute for Building, Mechanisation and Electrification of Agriculture showed that in the conditions of considerable fragmentation of the Polish agriculture, it is not possible to fully exploit the available potential of most types of mechanisation. The operating efficiency of most machines amounts to 50-70% of the productive efficiency and depends, *inter alia*, on the machine operating parameters (speed, working width), proper organisation of work, the size of the fields and their distance from the farm (Komarnicki et al., 2012).

According to Pawlak [2005] in Poland in the eight-year period (1996-2004), the average use of tractors decreased by 20.8%, for combine harvesters by 20.2%, but the use of self-propelled forage harvesters increased (15.4%).

These results prove that the intensity of use of means of mechanisation in Polish agriculture is far from the level considered reasonable. This results in increased costs, reduced profitability of production and financial problems of some agricultural holdings. When planning modernisation, one should bear in mind that the purchase of machinery and tractors involves

capital invested for many years. Besides, a high indicator of capital saturation of land is not always beneficial, it can be a sign of over-investment, which leads to reduced efficiency of production (Skarżyńska et al., 2013).

In order to obtain beneficial economic effects and competitive advantage, management decisions of farm managers should lead managers to optimisation of the use of working capital and fixed assets. Increasing machine use level and the related increase in the value of capital per employee and the implementation of new technologies make the right decisions require increasing knowledge (Kay et al., 2012). Unfortunately, as indicated by the researchers, one of the weaknesses of agriculture in the countries of Central and Eastern Europe is associated with the lack of appropriate qualifications and management skills of farm managers (Baum and Weingarten, 2004).

The research by Veveris et al. (2007) shows that unfavourable capital structure, combined with the expected increase in cost-intensity of production, might lead to a significant decline in competitiveness of economically very small and small farms in the coming years. The efforts of farmers should be primarily aimed at more efficient use of resources in their possession.

Modernisation of agricultural holdings has always been an important objective of the Common Agricultural Policy. Today, the challenge is to ensure that the modernisation will support farmers in achieving economic competitiveness and in the use of environmentally friendly technologies (European Commission, 2012).

Due to the fact that knowledge on the technical equipment of farms is important, this article presents selected issues associated with this subject. The research problem was considered from two perspectives: from the point of view of the research conducted on the basis of a random sample of Polish farms and from the point of view of the research on the farms operating within the territory of the EU.

The results of Polish agricultural holdings in terms of technical equipment constituted a reason to start research on a larger scale, i.e. in selected countries of Central and Eastern Europe. The aim of the study was to evaluate the differences in the technical equipment of economically weak and strong farms in comparison to the performance of such farms.

The article is organised as follows. After the introduction to the research subject, the chapter entitled Materials and Methods presents the data sources and methods that were used in the analysis of results. The chapter entitled Results and Discussion contains the results of the tests and their synthetic analysis. The last chapter of the article – Conclusions – presents the main conclusions arising from the conducted research.

2. MATERIALS AND METHODS

The sample of Polish farms, which were evaluated in terms of technical equipment, was made up of farms that were randomly selected from the sample of farms that managed their agricultural accounting in 2006-2012 in FADN (Farm Accountancy Data Network). A total of 2,650 farms were chosen in the period selected for the research[1]. In order to achieve the

[1] The sample covered was almost 1/5 of the population of farms surveyed under the FADN system in Poland. 300-400 farms participated in the survey in each year in the 2006-2012 period. The surveys covered a period of seven years because of the fact that farms change their technical equipment.

objective of the research, i.e. to assess the differences in technical equipment (machinery, technical devices and buildings with their permanent equipment) groups were identified from the sample on the basis of two criteria.

The first criterion was the economic size of farms (expressed in thousands euro Standard Output (SO))[2]. Two groups were identified from the sample of 2,650 farms, and they were defined as economically weak and economically strong farms. The agricultural holdings that belonged to the class of very small and small farms in the ES6 classification were recognised as economically weak ones. On the other hand, the farms belonging to the class of medium-large and large farms were considered economically strong ones. The second criterion for the selection of farms was the share of crop production and animal production in the structure of the total production value of farms. It should be pointed out that the results of agricultural holdings repeated in the survey years were averaged.

As a result, the sample consisted of 647 farms, which were predominantly economically weak farms (they accounted for nearly 60%). In the group with predominantly plant production (as evidenced by its share of over 50%), there were 310 economically weak farms and 206 economically strong farms. On the other hand, in the group with predominantly animal production, there were 77 economically weak farms and 54 economically strong farms.

For all farms in the sample we calculated the indicators to reflect: (1) the machine use level of farms – it is expressed by the value of machinery and technical equipment per 1 ha of Utilised Agricultural Area (UAA); (2) the farm equipment consisting of buildings and their permanent equipment – it is expressed by their value converted to 1 ha of UAA. Subsequently, the assessment covered the significance of differences in terms of the values of such indicators in economically weak and strong farms. The non-parametric Mann-Whitney U Test was used in the research (Aczel, 2006).

In the literature, the hypotheses of this test assume the following form:

H0: the samples come from populations with the same distribution,
H1: the samples come from populations with different distributions.

In practice, the null hypothesis assumes the equality of medians or averages of two populations. On the other hand, the alternative hypothesis informs that there are significant differences in the size of these parameters. In the case of the research on the differences between the two groups, the test procedure requires the two groups to be structured jointly by the size of the examined characteristic. Afterwards, ranks from 1 to n (the size of the entire sample) are allocated to consecutive observations. On this basis, the U statistic is calculated:

$$U = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_1$$

The sum of ranks for the observations from the first group is assumed as R_1, whereas n_1 and n_2 is the size of the first and second groups respectively. The group sizes in the conducted research were relatively large. In such a case, the U statistic coincides with a normal distribution. In such

[2] In 2006-2009, ESU (European Size Unit) was the measure of the size of agricultural holdings in the EU. Since 2010, the measure has been SO (Standard Output, expressed in thousands euro). Therefore, in case of farms participating in FADN surveys before 2010, their economic size unit in ESUs has been converted and expressed in thousands euro SOs.

a situation, another test statistics could be used, which, after the appropriate mathematical transformations, assumes the following form:

$$Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}}}$$

Bearing in mind that the Z statistic has a normal distribution, the p-value has been calculated for the test used (Mann-Whitney U Test). If the p-value is lower than the assumed level of significance ($\alpha = 0.05$), there are grounds to reject the null hypothesis in favour of the alternative hypothesis. This means that the examined groups differ in a statistically significant way in terms of the size of the examined characteristics. Therefore, it is possible to determine in which group the sizes of the examined characteristic are significantly higher. This is indicated by the average value of ranks for each group.

The conducted research evaluated the technical equipment of economically strong and weak farms in selected countries of Central and Eastern Europe. For this purpose EU FADN data were used (Farm Accountancy…, 2015). The most up-to-date and available data, i.e. the ones for 2010-2012, were used for the analysis.

The research covered economically weak and strong farms in eight countries of Central and Eastern Europe, namely Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovenia. The rationale to choose them was the fact that in the total number of agricultural holdings covered by the FADN survey there were mostly economically very small and small farms (i.e. economically weak). An additional criterion involved similar conditions for the conduct of agricultural production and a similar date of joining the EU (Skarżyńska et al., 2014).

The results of economically weak and strong farms are presented in tabular form. Individual items should be interpreted as average results jointly for two economic size classes. In the case of economically weak farms, they are the average results jointly for very small and small farms, and in the case of economically strong farms – for medium-large and large ones. This means that the calculations included the number of farms comprising each size class. The study used a horizontal analysis, by comparing the parameters characterising the economically weak and strong farms in individual countries.

The evaluation covered farm resources, i.e. the Utilised Agricultural Area (UAA), labour resources expressed as the number of Annual Work Units (AWU) and the total assets.

When evaluating farm equipment consisting of technical means, land utilities and labour infrastructure were evaluated, which are expressed by the ratio of the value of machinery and technical equipment to the utilised agricultural area and the number of annual work units (AWU). Besides, the land and labour burden value has been defined by means of the value of owned buildings with their permanent equipment. The depreciation cost is the measure of consumption of fixed assets in the production process, and it is presented in relation to the total costs of farms.

The efficiency of use of technical means in economically weak and strong farms is expressed by the ratio of production value to total assets and to the value of machinery and buildings considered jointly. On the other hand, the cost of producing production worth EUR 1 was the measure of the efficiency of production.

3. RESULTS AND DISCUSSION

3.1. Equipment consisting of fixed assets in the surveyed farms in Poland

In order to show the diversity of Polish farm equipment consisting of technical machinery, devices and buildings with their permanent equipment, economically weak and economically strong farms were isolated from the research sample. Their equipment consisting of fixed assets was analysed in two groups, i.e. in agricultural holdings with predominantly crop production and animal production in the value structure of farm production. In the case of the surveyed farms, one can see the following relationship: with the increase in economic size, the utilised agricultural area increased as well. The UAA in strong farms in comparison with the economically weak farms with predominantly crop production was 7.7-fold higher, and in the ones with mainly animal production it was 4.7-fold higher (Table 1).

Table 1. Selected data describing Polish farms on average in 2006-2012

Specification	Utilised agricultural area (UAA) in farms economically		Structure of production value in total, of which:				Per 1 ha of UAA			
			crop production in farms economically		animal production in farms economically		Machinery and technical equipment in farms economically		Buildings and fixed equipment in farms economically	
	weak	strong	weak	strong	weak	strong	weak	strong	weak	strong
	(ha)		(%)		(%)		(PLN)		(PLN)	
Farms with a predominance of crop production	20.27	155.19	56.84	65.07	41.55	34.08	4692	4091	7178	3045
Farms with a predominance of animal production	18.24	86.57	40.30	14.32	58.14	85.28	5319	7852	8838	8533

Source: Own compilation based on Polish FADN.

The results indicate the differences in the burden on land of farms by the value of owned machinery and buildings. In the case of farms with predominantly crop production, there were more land utilities in economically weak farms (14.7%), whereas in the farms with mainly animal production, there were more land utilities in economically strong farms (47.6%). As far as the burden on land by the value of buildings is concerned, it was higher in economically weak farms predominantly with crop production by 135.7%, whereas in the ones with mainly animal production by 3.6% (Table 1).

Mann-Whitney U test results for farms with predominantly crop production showed that in the case of their increasing machine use level (the value of machinery and technical equipment per 1 ha of UAA), it can not be concluded that the difference between economically weak and strong farms is statistically significant, which is evidenced by the p-value > 0.05. On the other hand, the difference in terms of burden on 1 ha of UAA by the building value between economically weak and strong farms was statistically significant. On the basis of the average of ranks, the direction of the relationship has been read. The test results showed that the value of buildings and structures per 1 ha of UAA is significantly higher in economically weak farms (Table 2).

Table 2. Results of the Mann-Whitney U test for selected indicators of farms with mainly crop production

Specification	The average of the ranks in farms economically		Statistic U	Statistic Z	p-value
	weak	strong			
Machinery and technical equipment per 1 ha of UAA	264.12	250.05	30189	-1.050	0.293896
Buildings and fixed equipment per 1 ha of UAA	317.75	169.33	13561	-11.074	0.000000

Source: see table 1.

Mann-Whitney U test results for farms with predominantly animal production indicate that there are other relationships. For the value of machinery and technical equipment per 1 ha of UAA, the p-value calculated in the test is lower than the assumed level of significance (0.05). Therefore, it was concluded on the basis of the average rank that the machine use level of economically strong farms was significantly higher than for the economically weak ones. On the other hand, the differences in terms of burden on 1 ha of UAA by the building value between economically weak and strong farms were statistically significant (Table 3).

Table 3. Results of the Mann-Whitney U test for selected indicators of farms with mainly animal production

Specification	The average of the ranks in farms economically		Statistic U	Statistic Z	p-value
	weak	strong			
Machinery and technical equipment per 1 ha of UAA	53.53	83.78	3039	4.489	0.000007
Buildings and fixed equipment per 1 ha of UAA	64.90	67.57	2164	0.397	0.691037

Source: see table 1.

3.2. General characteristics and resources of farms in the countries of Central and Eastern Europe

In selected countries of Central and Eastern Europe, the economic size of farms classified in the group of economically weak and strong farms was characterised by considerable variation. The smallest economic power in the first group was featured by Romanian farms (EUR 5,900), and the highest by Hungarian ones (EUR 11,500), and in the second group by Slovenian (EUR 89,900) and Bulgarian farms (EUR 166,400) respectively.

When comparing the economic size relative to each other between the two groups of farms in individual countries, the smallest span of this measure has been found in the case of farms in Slovenia (8.4-fold), and the largest in Bulgaria (25.6-fold).

In most countries, as regards the structure of the value of economically weak and strong farms, there was mostly crop production, whose share in the first group ranged from 47.8% to 74.2%, and in the other it ranged from 53.3% to 85.0%. In the case of economically weak farms, Bulgaria and Romania were the exceptions; animal production in both countries had a greater share in the value of production: by 5.9 and 5.5 percentage points respectively. On the other

hand, Slovenia was an exception among the economically strong farms; the advantage in the structure of animal production amounted to 11.7 pp. (Table 4).

Table 4. Economic size and production structure in economically weak and strong farms in selected countries of Central and Eastern Europe on average in 2010-2012

Specification	Economic size of farms economically		Structure of production value in total, of which:			
			crop production in farms economically		animal production in farms economically	
	weak	strong	weak	strong	weak	strong
	(EUR thousand)		(%)		(%)	
Bulgaria	6.5	166.4	46.4	83.6	52.3	12.1
Estonia	11.1	133.3	57.0	64.7	26.3	27.4
Hungary	11.5	117.4	74.2	75.9	22.7	18.4
Latvia	11.2	134.5	47.8	66.2	44.9	27.6
Lithuania	9.3	119.5	55.7	72.7	41.9	25.8
Poland	10.9	102.8	62.6	53.3	35.0	46.0
Romania	5.9	134.2	47.1	85.0	52.6	14.5
Slovenia	10.7	89.9	57.9	42.8	27.7	54.5

Source: Own compilation based on FADN EU (Farm Accountancy…, 2015)[3].

The smallest UAA among economically weak farms was present in Romania (5.13 ha), and the largest in Latvia (35.02 ha). On the other hand, the smallest utilised agricultural area among economically strong farms was recorded in Slovenia (31.36 ha), and the highest in Bulgaria (323.90 ha). The span in terms of the utilised agricultural area in the first group was 6.8-fold, and in the second it was 10.3-fold (Table 5).

Table 5. Characteristics of basic farm resources in economically weak and strong farms in selected countries of Central and Eastern Europe on average in 2010-2012

Specification	Utilised agricultural area (UAA) in farms economically		Labour resources in farms economically		Annual work unit per 100 ha of UAA in farms economically		Total assets in farms economically	
	weak	strong	weak	strong	weak	strong	weak	strong
	(ha)		(AWU)		(AWU)		(EUR thousand)	
Bulgaria	5.86	323.90	1.72	9.28	29.5	2.9	24.89	1059.54
Estonia	32.57	295.29	1.04	2.64	3.2	0.9	56.50	419.19
Hungary	16.44	143.55	0.82	3.36	5.0	2.3	63.78	446.92
Latvia	35.02	276.93	1.49	4.59	4.2	1.7	43.90	435.98
Lithuania	23.79	224.54	1.46	3.50	6.1	1.6	57.33	497.65
Poland	10.95	64.57	1.46	2.98	13.4	4.6	95.60	512.92
Romania	5.13	276.94	1.26	4.87	24.6	1.8	28.35	394.82
Slovenia	8.09	31.36	1.37	2.70	16.9	8.6	151.43	464.89

Source: see table 4.

Manpower is an important resource of a farm. With its resources expressed as Annual Work Units (AWU), the largest employment was recorded in Bulgarian farms (1.72 AWU for economically weak, 9.28 AWU for economically strong farms). Conversely, the lowest

[3] Farm Accountancy Data Network, 2015. http://ec.europa.eu/agriculture/rica (accessed: February 2015).

employment among economically weak farms was found in Hungary (0.82 AWU), and among economically strong farms in Estonia (2.64 AWU).

Labour force in all countries was used in economically strong farms in a more rational way. With the labour force expressed as Annual Work Units (AWU) per 100 ha of UAA, it ranged from ranged from 0.9 AWU in Estonia to 8.6 AWU in Slovenia. However, in the economically weak farms it ranged within 3,2-29,5 AWU, in Estonia and Bulgaria respectively.

There is also a very high variation in terms of the value of assets between countries. The value of total assets per farm in the group of economically weak farms ranged from EUR 24,890 in Bulgaria to EUR 151,430 in Slovenia (the variation was 6.1-fold). In contrast, the asset value in the group of economically strong farms ranged from EUR 394,820 in Romania to EUR 1,059,540 in Bulgaria (the variation was 2.7-fold). When comparing the value of assets relative to each other in the two groups of farms, the smallest advantage of economically strong farms was recorded in Slovenia (3.1-fold), and the highest in Bulgaria (42.6-fold) as shown in Table 5.

3.3. Equipment consisting of technical means and efficiency of their use in agricultural holdings

It is necessary to own fixed assets in order to achieve production and economic objectives, but the level of obtained economic results depends, among other things, on the extent to which the property is used effectively.

For a more detailed analysis of the differences in the production potential of farms, the size of selected resources has been relativised against the agricultural land resources and labour force. Measures characterising saturation of land by farm assets and measures describing land utilities and labour infrastructure were used in the analysis (Table 6).

Table 6. Equipment consisting of technical means in economically weak and strong farms in selected countries of Central and Eastern Europe on average in 2010-2012

Specification	Per 100 ha of UAA						Per 1 AWU					
	Total assets in farms economically		Machinery and technical equipment in farms economically		Buildings and fixed equipment in farms economically		Utilised agricultural area in farms economically		Machinery and technical equipment in farms economically		Buildings and fixed equipment in farms economically	
	weak	strong	weak	strong	weak	strong	weak	strong	weak	strong	weak	strong
	(EUR thousand)		(EUR thousand)		(EUR thousand)		(ha)		(EUR thousand)		(EUR thousand)	
Bulgaria	424.63	326.85	59.58	39.25	58.42	17.79	3.41	34.92	2.02	13.73	1.98	6.22
Estonia	173.78	141.89	25.84	48.12	31.89	25.38	31.42	111.96	8.13	53.82	10.00	28.40
Hungary	391.72	312.00	50.19	61.99	53.58	49.07	20.00	42.70	10.02	26.43	10.72	20.91
Latvia	125.33	158.08	20.80	48.66	12.28	21.17	23.60	60.46	4.92	29.25	2.89	12.65
Lithuania	241.24	221.89	84.08	83.93	27.76	20.28	16.33	64.19	13.72	53.86	4.51	13.01
Poland	872.64	794.27	96.52	151.05	207.10	158.16	7.48	21.65	7.22	32.71	15.50	34.24
Romania	552.93	142.46	50.75	37.20	224.42	18.01	4.06	56.83	2.06	21.16	9.11	10.24
Slovenia	1868.89	1482.80	243.52	293.96	460.98	475.96	5.97	11.63	14.54	34.21	27.19	55.37

Source: see table 4.

The results indicate that a significantly higher value of total assets per 100 ha of utilised agricultural area was recorded in economically weak farms, and their value ranged from EUR 173,780 in Estonia to 1,868,890 in Slovenia. For comparison, the value of assets in the economically strong farms in these countries amounted to EUR 141,890 and EUR 1,482,800 respectively, and hence was lower by 18.4% and 20.7% respectively. A higher value of assets (by 26.1%) was recorded only in economically strong farms in Latvia.

An important role in farm assets is played by machines and technical equipment since they constitute land utilities. Equipment consisting of machinery and technical equipment varied to a great extent among the surveyed countries of Central and Eastern Europe; this applies both to economically weak and strong farms. In the first group it ranged from EUR 20,800 to EUR 243,520 per 100 ha of utilised agricultural area, and in the other one it ranged between EUR 37,200 and EUR 293,960. The research indicates that the machine use level of economically weak farms in the two countries, i.e. in Bulgaria and Romania, was higher than in economically strong farms, and the advantage amounted to 51.8% and 36.4% respectively. It was similar in both groups in Lithuania (the value of machinery and technical equipment per 100 ha of UAA amounted to EUR 84,080 and EUR 83,930). On the other hand, the burden on the land by machinery and technical equipment in other countries was higher in economically strong farms, the advantage over economically weak farms ranged from 20.7% in Slovenia to 133.9% in Latvia.

Farm equipment consisting of machinery and technical equipment also has impact on labour infrastructure; it is expressed by the value of machinery and equipment per 1 annual work units (1 AWU). The research results indicate that the level of labour infrastructure in economically strong farms compared to economically weak farms was much higher. When comparing agricultural holdings of the two groups relative to each, the smallest advantage was observed in economically strong farms in Slovenia (2.4-fold), and the highest in Romania (10.3-fold). It should be added that labour infrastructure features a much smaller variation – resulting from the comparison of extreme values – than the measure describing the machine use level on land (Table 6).

To protect production process, agricultural holdings must have buildings that should be adjusted to the size and structure of production. Therefore, the size and type of farm buildings should result from the area of the conducted activities. In order to demonstrate the equipment consisting of buildings in economically weak and strong farms, the burden on land by their value has been assessed. The results show that the value of buildings per 100 ha of UAA varied to a great extent among the countries; in the first group of farms it ranged within EUR 12,280--460,980, and in the second within EUR 18,010-475,960. Given the size of the burden, there is a clear advantage of economically weak farms. In six countries out of the total eight under examination (i.e. in Bulgaria, Estonia, Hungary, Lithuania, Poland and Romania), the total value of the buildings, including their permanent facilities, per 100 ha of utilised agricultural area was higher than in economically strong farms (from 1.1-fold in Hungary to 12.5-fold in Romania). The burden on the farms by the value of buildings was higher for economically strong farms only in Slovenia and Latvia: by 3.2 and 72.4% respectively (Table 6).

The evaluation also covered the utilised agricultural area per 1 AWU. This value in economically weak farms in four countries (Bulgaria, Romania, Slovenia and Poland) did not exceed 10 ha, while in the other (Lithuania, Hungary, Latvia and Estonia) it ranged from 16.33 to 31.42 ha. However, a low value thereof was recorded in economically strong farms

in Slovenia (11.63 ha) and Poland (21.65 ha), while in the other countries it was significantly higher (it ranged from 34.92 in Bulgaria to 111.96 ha in Estonia) (Table 6).

The differences between the groups of farms in terms of owned fixed asset may be the cause of different efficiency in the use of these assets. The examined agricultural holdings show differences in the structure of owned assets; the development of the share of fixed assets in total assets is shown in Table 7. A higher share of fixed assets – meaning the assets requiring a permanent freeze of capital – in total assets was observed in economically weak farms in almost all countries (except for Bulgaria). This share ranged from 65.3% in Hungary to 94.5% in Slovenia. On the other hand, in economically strong farms it ranged from 55.4% in Romania to 90.6% in Slovenia. The biggest difference in the share of fixed assets in total assets between the identified groups of farms has been observed in Romanian farms (23.6 percentage points), whereas the lowest in Hungary (0.1 percentage points).

The possession and use of fixed assets in the production process involves depreciation, which represents a cost that decreases farm income. Table 7 presents the share of depreciation in total costs incurred by farms. This share in most countries (except for Bulgaria and Latvia) was higher in economically weak farms and ranged from 12.8% in Hungary to 31.6% in Slovenia. On the other hand, in the economically strong farms it ranged from 8.5% in Romania to 22.1% in Slovenia. The biggest difference in terms of the size of this indicator in groups of farms was found in Polish agricultural holdings (11.0 pp), and the smallest in the Hungarian ones (0.6 pp).

Table 7. Selected indicators describing economically weak and strong farms in selected countries of Central and Eastern Europe on average in 2010-2012

Specification	Share of fixed assets in total assets in farms economically		Share of depreciation cost in total costs in farms economically		Total value of production per 100 EUR of depreciation in farms economically	
	weak	strong	weak	strong	weak	strong
	(%)		(%)		(EUR)	
Bulgaria	59.0	86.0	11.5	13.6	1042	741
Estonia	83.0	72.3	18.3	16.2	515	584
Hungary	65.3	65.2	12.8	12.2	932	938
Latvia	66.8	63.0	15.2	16.7	621	568
Lithuania	72.6	66.3	28.5	19.8	382	618
Poland	90.3	86.8	24.7	13.7	478	934
Romania	79.0	55.4	16.2	8.5	950	1525
Slovenia	94.5	90.6	31.6	22.1	274	464

Source: see table 4.

Depreciation is a measure of consumption of fixed assets and therefore is a cost of the conducted activities. However, depreciation in the form of cost does not entail expenditure, it is the funds left at the farm that should make it possible to replace the fixed assets consumed in the production.

A strong relationship was found between the share of depreciation in the total costs of farms and the level of income per the size of fixed assets subject to consumption in the production process. It is reflected by the production value per EUR 100 of depreciation of such assets.

This indicator was lower in farms in which the share of depreciation in total costs was higher. In this respect, economically weak farms in most countries were in a disadvantageous situation (except for Bulgaria and Latvia). The production value per EUR 100 of depreciation ranged from EUR 274 in Slovenia to EUR 950 in Romania whereas in economically strong farms for the same countries – EUR 464 and EUR 1,525 respectively.

In economically weak farms in Bulgaria and Latvia – in comparison to the economically strong ones – the share of the depreciation cost in total costs was lower by 2.1 and 1.5 percentage points respectively. Furthermore, current assets in total assets in economically weak farms in Bulgaria accounted for 41% (as compared to 14% in economically strong ones). This phenomenon is advantageous for the development of agricultural holdings. These relationships are expressed by a higher production value per 100 euros of depreciation; in Bulgaria it was EUR 1,042 (as compared to EUR 741 in economically strong farms) and in Latvia it was EUR 621 (as compared to EUR 568) (Table 7).

The value of total assets and the value of buildings and machinery were evaluated in terms of the effectiveness of their use in the production process. The measure was formed by the value of production per EUR 1 of total assets EUR 1 of the value of buildings and machinery (Table 8).

Table 8. Efficiency of use of assets and efficiency of product in economically weak and strong farms in selected countries of Central and Eastern Europe on average in 2010-2012

Specification	Total value of production per 1 EUR of:				Total costs per 1 EUR of total value of production in farms economically	
	total assets in farms economically		buildings and machinery in farms economically			
	weak	strong	weak	strong	weak	strong
	(EUR)		(EUR)		(EUR)	
Bulgaria	0.36	0.25	1.30	1.42	0.83	1.00
Estonia	0.21	0.41	0.63	0.79	1.06	1.05
Hungary	0.25	0.39	0.96	1.08	0.84	0.88
Latvia	0.32	0.48	1.21	1.09	1.06	1.04
Lithuania	0.23	0.40	0.49	0.85	0.92	0.81
Poland	0.13	0.26	0.37	0.66	0.85	0.78
Romania	0.30	0.54	0.60	1.40	0.66	0.77
Slovenia	0.09	0.21	0.25	0.41	1.16	0.97

Source: see table 4.

The efficiency of use of assets in economically weak farms in almost all countries (apart from Bulgaria) was worse than in economically strong farms. The difference in favour of economically strong farms ranged from 50.0% to 133.3%. The efficiency of use of total assets in both groups of farms was the weakest in Slovenia and Poland, and the best in Latvia and Romania. It is evidenced by the production value per EUR 1 of assets: in Slovenia and Poland in economically weak farms it was EUR 0.09 and EUR 0.13 respectively, and in economically strong ones it was EUR 0.21 and EUR 0.26 respectively. Conversely, it was in EUR 0.32 and EUR 0.30 respectively in Latvia and Romania in the first group of farms, compared to EUR 0.48 and EUR 0.54 in the second group.

The efficiency of use of buildings and machinery was also worse in economically weak farms (with the exception of Latvia). This means that the value of production per EUR 1 of their value – as compared to economically strong farms – was lower and ranged from 8.5% to

57.1%. The efficiency of use of buildings and machinery in both groups was the lowest in Slovenia and the highest in Bulgaria.

The measure of the efficiency of production is the cost of producing EUR 1 of production value. When comparing the results in the two groups of farms, the measure in economically weak farms assumed less beneficial values in five countries out of the eight in question (Estonia, Poland, Slovenia, Latvia and Lithuania), and it ranged from EUR 0.85 in Poland to EUR 1.16 in Slovenia. However, in three countries: Romania, Bulgaria and Hungary, it was more beneficial than in economically strong farms and amounted to EUR 0.66, 0.83 and 0.84 respectively (Table 8).

4. CONCLUSIONS

In 2010-2012, in eight countries in Central and Eastern Europe (namely in Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovenia), in the total number of agricultural holdings covered by the FADN study, there were predominantly economically very small and small farms, which have been identified as economically weak. The economic situation of these farms varied and was determined by numerous factors. One of the most important of such factors is the size of the farm's productive resources and the ability to use them. On the basis of the conducted analysis, the following conclusions were drawn:

- In weak farms – as compared to the economically strong ones – there was a higher saturation of land by total assets (with the exception of Latvia), and it ranged from 8.7% in Lithuania to 288.1% in Romania. In most countries (with the exception of Latvia and Slovenia) there was also more farm equipment consisting of buildings and structures – it ranged from 9.2% in Hungary to 12.5-fold in Romania. Besides, in two countries (in Bulgaria and Romania) there were more land utilities: by 51.8 and 36.4% respectively.

- Economically weak farms in all countries had a higher value of fixed assets than the value of current assets. The share of fixed assets in total assets ranged from 59.0% in farms in Bulgaria to 94.5% in Slovenia. Moreover, in economically weak farms it was higher in comparison with the economically strong ones (with the exception of Bulgaria), the difference ranged from 0.1 pp in Hungary to 23.6 pp in Romania. A high share of fixed assets in the total assets has a negative impact, it generates high fixed costs and is one of the main barriers that reduce the opportunities for effective use of resources.

- In economically weak farms – as compared to the economically strong ones – the efficiency of use of total assets was lower (with the exception of Bulgaria), and the difference ranged from 33.3% for farms in Latvia to 57.1% in Slovenia. The efficiency of use of buildings and machinery was also lower (with the exception of Latvia), and the difference ranged from 8.5% in Bulgaria to 57.1% in Romania.

An important element of the CAP and EU development in the coming years is the modernization of farms. The aim is to increase their competitiveness. The main element of competitiveness is to minimise production costs, in that situation – in view of presented results – optimisation of the use of technical equipment is becoming increasingly important.

A dominant share of fixed assets in total assets, and thus strong farm equipment consisting of buildings and machinery has a negative impact. Each of the technical means of labour affects the level of production costs and therefore should be purchased strictly according to the needs of a farm. Technical overinvestment causes deterioration in the financial result. Adaptability

of such farms to changes in market conditions is also reduced. Overinvestment means that technical measures are not fully utilized. Such a situation implies an increase in costs and leads to a decline in the profitability of production. The threat is the material risk, ie. the danger of incurring a loss. Preventing this from happening is a challenge for the science and practice for the XXI century.

Under the influence of economic factors resulting from the operation of the CAP, farms are still better adapting to the natural conditions and some of them can also exploit their advantages, such as relatively large labor resources, which stimulate the growth of environmentally friendly production. The reevaluation of the quantitative development concept takes place in favour of the qualitative solutions. The cultivation technology is improved taking into account not only the production and economic effects, but also the safety of the natural environment. The model of intensive farming in European conditions loses its importance. Different than only production perception of the agriculture appoint it to fulfill other tasks. The concern for human health, the environmental protection and cleanliness, and the preservation of landscape suggest a slightly different direction for the development of farms. By 2050, the global population is projected to be by 50% larger than at present. Further increases in agricultural output are essential for global political and social stability and equity. To maintain the food production at the appropriate level, is the major challenge. But doing so in such a way that do not disturb the environmental balance and public health is a greater challenge still. This direction of agricultural development, however, should predominate, the net benefits to society will be much higher in comparison to the highly intensive agriculture.

BIBLIOGRAPHY

Aczel A. D., (2006): **Statystyka w zarządzaniu [Complete Business Statistics],** Warszawa: PWN.

Baum, S., Weingarten, P., (2004): **Developments of rural economies in Central and Eastern Europe: an overview,** ***Rural Areas and Development*****,** 2: 8-29.

European Commission (2012): **The Common Agricultural Policy. A partnership between Europe and Farmers,** http://ec.europa.eu/agriculture/50-years-of-cap [Accessed 23.02.2015].

Farm Accountancy Data Network (2015), http://ec.europa.eu/agriculture/rica [Accessed 20.02.2015].

Kay, R. D., Edwards W. M., Duffy P. A., (2012): **Farm Management**, Singapore: McGraw-Hill.

Komarnicki, P., Stępień, B., Stopa, R., (2012): **Ocena kryterialna optymalnego doboru maszyn rolniczych [Criteria-based evaluation of the optimal selection of agricultural machinery],** ***Inżynieria Rolnicza***, 4: 145-155.

Kowalik, I., Grześ, Z., (2006): **Wpływ wykorzystania maszyn rolniczych na koszty mechanizacji w gospodarstwach rolniczych o różnej powierzchni [The impact of the use of agricultural machinery on costs of mechanisation in farms with various sizes],** ***Inżynieria Rolnicza*****,** 13: 201-208.

Kowalski, J., Szeląg, A., (2006): **Wpływ regionu i wielkości gospodarstwa na wyposażenie w park maszynowy [Impact of the region and the size of a farm on machinery equipment],** ***Inżynieria Rolnicza*****,** 11: 223-232.

Morgan, M., (1993): **Efficient combine harvesting,** ***Tillage Farmer*****,** 1: 10-12.

Mróz, M., (2006): **Kierunki przemian w wyposażeniu rolnictwa w ciągniki różnych klas mocy [Development trends in the agricultural equipment consisting of tractors of various power classes],** ***Problemy Inżynierii Rolniczej***, 3: 21-32.

Pawlak, J., (2005): **Wykorzystanie ciągników i maszyn samojezdnych w rolnictwie polskim [The use of tractors and mobile machinery in Polish agriculture],** ***Problemy Inżynierii Rolniczej***, 4: 51-56.

Skarżyńska, A., Abramczuk, Ł., Augustyńska-Grzymek, I., Żekało, M., Stalgiene, A., (2013): **The conditions of the development of dairy farms in Poland and Lithuania,** ***Transformations in Business & Economics***, Vol. 12, 1: 91-107.

Skarżyńska, A., Augustyńska-Grzymek, I., Abramczuk, Ł., (2014): **The use of capital and condition of economically weak farms in the selected Central and Eastern European countries,** ***Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*****,** Vol. 14, 2: 285-296.

Szuk, T., (2006): **Mechanizacja indywidualnych gospodarstw rolnych w aspekcie ich zrównoważonego rozwoju [Mechanisation of individual farms in the aspect of their sustainable development],** ***Zeszyty Naukowe Akademii Rolniczej we Wrocławiu,*** 540: 517-522.

Veveris, A., Krievina, A., Leimane, I., (2007): **Efficiency analysis of agricultural sector in Latvia compared to other EU countries, based on FADN data,** in: ***Economic Science for Rural Development,*** **Proceedings of the International Scientific Conference,** Latvian Academy of Agriculture and Forestry Sciences, Jelgava, 13: 13-19.

Zając, S., Stec, S., Kusza, D., (2006): **Wyposażenie gospodarstw rolnych na Podkarpaciu w maszyny rolnicze, wymagania i potrzeby [Farm equipment consisting of agricultural machinery in the Podkarpackie Voivodeship, requirements and needs],** ***Problemy Inżynierii Rolniczej,*** 2: 89-98.

IMPLEMENTING FAMILY –FRIENDLY ORGANIZATIONAL PROGRAMS: ANLAYZING THE EFFECTS ON WORK-FAMILY CONFLICT OF EMPLOYEES

Anja Svetina Nabergoj
University of Ljubljana, Faculty of Economics
Kardeljeva ploščad 17, 1000 Ljubljana
Phone: ++ 386 1 5892 400; Fax: ++ 386 1 5892 698
E-mail: anja.svetina@ef.uni-lj.si

Marko Pahor
University of Ljubljana, Faculty of Economics
Kardeljeva ploščad 17, 1000 Ljubljana
Phone: ++ 386 1 5892 400; Fax: ++ 386 1 5892 698
E-mail: marko.pahor@ef.uni-lj.si

Renata Valentina Adlešič
University of Ljubljana, Faculty of Economics
Kardeljeva ploščad 17, 1000 Ljubljana
Phone: ++ 386 1 5892 400; Fax: ++ 386 1 5892 698
E-mail: renata.adlesic@gmail.com

Key words: *work-family conflict, social support, spouse support, work-place support, family-friendly programs*

ABSTRACT

Successful balancing of work and family demands is impacted by factors on three levels including governmental, organizational and individual. In many economies the governmental support for balancing work and family demands has been decreasing and those countries are witnessing a rise in family-friendly programs that employers are offering to their employees, however it remains unclear how the support available in the workplace and support available at home affect the conflict between work and family demands. Based on the data collected from 1500 employees from nine companies that acquired the "Family-friendly company" certificate this paper examines how available support impacts the work-family conflict. We developed scales with the help of factor and reliability analysis and explored dependencies using OLS regression models. The study shows that work demands affect the work-family conflict, but much less to not at all the family-work conflict. Social support in the workplace is very important, but it is the emotional support one can expect at work and not just institutionalized and implemented family-friendly programs and practices, that is reducing the work-family conflict. In general both work and family support have a moderating effect on how demands affect the conflict. We argue that in order to become a family-friendly organization it is not enough to develop and practice family-friendly programs but it is crucial to truly adopt and internalize the family-friendly corporate culture throughout the organization, so that employees offer each other support when needed.

1. INTRODUCTION

Balancing work and family demands has been an increasing challenge for many individuals and families (Darcy et al., 2011; Ilies et al., 2009; Khallash & Kruse (2010); Kreiner et al., 2009). The discussion on how to reduce the conflict between work and private life has been active among politicians, managers and employees (Barling, 2005). Demographic and socio-economic movements like ageing population (Eby, Casper, Lockwood, Bordeaux, & Brinleya, 2005), higher women participation in the work market (Boyum-Breen, 2006), increasing age at retirement (Kohli, 1991), longer working days (Lewis, 2003), more men involvement in family life (Gambles, Lewis, & Rapoport, 2006), reduced institutional support for work life balance in transition economies (Poelmans & Kalliath, 2008; Trefalt, Drnovšek, Svetina-Nabergoj, & Adlešič, 2013) have caused that individuals find it harder to manage and balance competing demands (Hewlett & Luce, 2006; Valcour et al., 2011). People have many roles that can be separated in two domains, work and private of family life (hereafter we will use word family, to refer to the private life domain) (Frone & Russell, 1992a). Successful balancing of all demands is impacted by several factors that can be clustered in three levels including governmental (Saltzstein, Ting, & Saltzstein, 2001), organizational (Beauregard & Henry, 2009) and individual (Tausig & Fenwick, 2001). The role of employers and the support they provide to their employees is gaining importance (Goff, Mount, & Jamison, 1990) as companies around the world are introducing several practices to help their employees give their best at work and at home (Lau, Hem, Berg, Ekeberg, & Torgersen, 2006).

Socially responsible business practices in are no longer just about a humanitarian or charitable involvement in various events. They involve the integration of responsibility for different areas in the business environment into the company's strategy (Friedman, 2007). Fields of action include environmental protection, human rights, equal opportunities, health and safety, business ethics, and facilitating the balance of work and family life (Heslin & Ochoa, 2008; Otubanjo, Amaeshi, & Olufemi, 2008). Employers are showing an increasing degree of social responsibility to their employees (Bretherton, 2008), including internal communication, better working conditions, continuous training and education, providing equal opportunities and facilitating the reconciliation of work and family life (Webber et al., 2010). If employees experience a serious imbalance in their work-family divide, the employer faces additional costs due to absenteeism (Allen, 1983), staff turnover (Hinkin & Bruce Tracey, 2000), accidents at work (Monnery, 1998) and, even more indirectly, costs arising from employee dissatisfaction and lower commitment to work (Rusbult & Farrell, 1983), etc. It is becoming ever clearer that attitudes to the work-life balance and parenting cannot only be governed by legislation, but need to also be addressed at the organizational level (Bloom, Kretschmer, & van Reenen, 2006; Pärnänen, H. Sutela, & Mahler, 2007; Raskin, 2006).

Since the governmental support for balancing work and life demands has been decreasing in many economies due to economic downturn like for example Slovenia (Edlund, 2007; Trefalt et al., 2013) those countries are witnessing a rise in family-friendly programs and practices that employers are offering to their employees. Although the family-friendly organizational programs are being increasingly introduced in all continents including Europe (Klammer & Klenner, 2004), Australia (Parkers & Langford, 2008) and USA (Epstein, 2006) there is no clear understanding of how the support available at work and support available at home and the interplay between both affect the work-family and family-work conflict of employees (Goff et al., 1990; Kossek & Nichol, 1992).

This paper focuses on understanding the mechanisms that influence the conflict between work and family demands. Based on the data collected from more than 1500 employees from nine companies in Slovenia that acquired the "Family-friendly company" certificate this paper examines how the elements of social support inside and outside the workplace influence employees' conflict between work and family demands. We use off-the-shelf scales where available and develop our own as needed, using exploratory and confirmatory factor analysis. The model is then tested using OLS multiple regressions varying the dependent variable and using different sets of explanatory variables.

This paper contributes to existing literature in two ways. Firstly, we propose and empirically test the model that explains the influence of social support inside the organization (management and coworkers) as well as social support one has outside their job (spouse, family and friends) one one's perception of work-family conflict as well as family-work conflict. Secondly, we propose some recommendations for companies on how to successfully nurture family-friendly corporate culture.

2. LITERATURE REVIEW

2.1. Work-family conflict

In the literature on work and life the work-family conflict (WFC) remains one of the most elaborated concepts. We follow the Greenhaus and Beutell's definition that WFC is "a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect (1985). This is, participation in the work (family) role is made more difficult by virtue of participation in the family (work) role" (Greenhaus & Beutell, 1985, p. 77). The research of the work-family conflict suggests that multiple roles with its infinite demands are likely to cause a conflict for individuals because they have scarce resources such as energy and time to meet these demands (Goode, 1960). According to Greenhaus and Beutell's definition (1985), work-family conflict can occur in two directions: work can interfere with private life (work-family conflict, WFC) or private life can interfere with work (Family-work conflict, FWC). For example, a working parent might experience WFC due to long, irregular, or inflexible work hours, work overload and other forms of job related stress, extensive travel due to work, unsupportive supervisor, coworkers or organization (Voydanoff, 2004). For example, an unexpected meeting late in the afternoon may prevent a parent from spending quality time with children and spouse or preparing a meal for the family. On the other hand a working parent might experience FWC due to the primary responsibility for young children, responsibility for elderly family members, interpersonal conflict within the family or unsupportive family members (Hill et al., 2008). For example, a parent may need to take time off to care for a sick child or to accompany a sick family member to the hospital. Although in early studies work-family conflict has been conceptualized as a uni-dimensional construct (Kopelman, Greenhaus, & Connolly, 1983), later studies distinguish two distinct constructs (Michael R. Frone, Russell, & Cooper, 1992b; Kelloway, Gottlieb, & Barham, 1999) depending on the direction of the interference, namely WFC and FWC. Accordingly, in this paper we look at how family and work demands affect each of those conflicts and the moderating effect of family support and support at the workplace. The conflict between family and work is intensified with higher demands an individual faces and diminished with higher levels of support one receives both at the work place and in their family. However two types of conflict, namely WFC and FWC are expected to be influenced in different ways whether the demands are work or family related and whether support happens in the workplace or at home.

2.2. The role and nature of demands

Demands are defined by Voydanoff (2005, p. 823) as: "structural or psychological claims associated with role requirements, expectations, and norms to which individuals must respond or adapt by exerting physical or mental effort". Jones and Fletcher (1996, p. 34) define that demands are "the degree to which the environment contains stimuli that peremptorily require attention and responds" and "things that have to get done". Work demands refer to "physical, social, or organizational aspects of a job that require sustained physical or mental effort, and are therefore associated with certain physiological and psychological costs" (Demerouti et al 2001 in Beham & Drobnic, 2010). Work demands may consist of long hours, shift work, frequent travel or job pressure, while examples of family demands are for example household and care responsibilities for children and older family members (Schaufeli & Bakker, 2004).

There exists tight relationship between demands and work-family conflict. Antecedents related to work-family conflict include family demands (e.g., number and age of children or hours of care provided to aging parents) (e.g.Duxbury & Higgins, 1991) as well as work demands (e.g. job pressure) (Voydanoff, 2005). Schaufeli and Bakker (2004) find that job demands and private-life demands both put a pressure on the work-family conflict. Authors Beham, Drobnic, and Präg (2010) show that individual perception of work-family conflict derives from assessing the extent to which demands hinder, or resources enhance, the performance of work and family roles. In study of Yang and Zheng (2011) found that American employees experienced greater family demands than Chinese employees, and family demands had a greater effect on WFC among Americans whereas work demands had a greater effect on WFC among Chinese workers. However, two types of conflict have different (Byron, 2005) and need to be studied separately (Frone & Russell, 1992a).

In this paper we expect to prove that work demands affect primarily the work-family conflict, while private life demands affect primarily the family-work conflict.

H1a: Work demands will increase work-family but not family-work conflict.
H1b: Family demands will increase Family-work but not work-family conflict.

2.3. The role and nature of social support

Social support is broadly defined as the ability to help relationships and the quality of those relationships (Leavy, 1983 in Parasuraman, Greenhaus, & Granrose, 1992). Hobfoll and Stokes (1988, p. 499) have defined social support as a "social connection or relationship that allows individuals to participate in, or sense of belonging to a person or a group that is perceived as loving and caring". House (1981) cites that social support involves the exchange of resources between at least two persons, with the aim of helping the person who receives the support. The support elements can come from work, like for example managers or supervisors, co-workers and institutionalized family-friendly programs that are available to employees or the support available in one's private life, like for example spousal support, support from family members and friends and paid support (cleaning or childcare help) (e.g. Kossek, Pichler, Bodner, & Hammer, 2011).

The classification of social support goes even further than separating support depending from where it comes from (work or private domain) and some authors also differentiate between the different types of support, namely instrumental and emotional support (Abendroth & Den Dulk, 2011). Instrumental support refers to e.g. tangible support and assistance aimed at solving problem and emotional support refers to more intangible aspects e.g listening and

providing empathy (Adams, King, & King, 1996). Authors like Abendroth and Den Dulk (2011) differentiate between instrumental and emotional type of support in both the private domain and the workplace. Following their examples organizational family friendly programs available to employees can be seen as instrumental support in the workplace. While on the other hand, emotional support comes from managers and supervisors as well as from coworkers when they show empathy for the employee's work-life balance situation. In the private domain, emotional support comes from the spouse, family members and friends, while instrumental support comes from example from paid childcare or household help.

Given the focus of this paper it is important to look into the relationship between those two types of support in the workplace and how it affects the work-family conflict as well as family-work conflict. Research findings suggest that both instrumental as well as emotional supports are needed in the workplace. Instrumental support in the workplace is not enough to achieve a successful work-life balance (Abendroth & Den Dulk, 2011; Den Dulk & Peper, 2007; Lyness & B., 2005). The emotional support aspect coming from supervisors and coworkers is crucial for the actual take-up of workplace family-friendly programs and for successfully managing work and family life. Behson (2005) found that emotional support explains more variance in work-family conflict than work-family benefits. As Abendroth and Den Dulk (2011) prove that emotional and instrumental support in the workplace have a complimentary relationship. Emotional support alone is insufficient and family-friendly arrangements at the organizational level also appear to be necessary to help employees with work-family conflict.

In our paper we differentiate between instrumental and emotional support in the workplace, operationalizing the instrumental support with institutionalized family-friendly programs that the company offers to its employees. We measure emotional support in the workplace through the perception of support one gets from superiors and co-workers in the company, like for example having empathy and understanding for each other's work-family challenges and helping each other in times of high pressure related to balancing work and family responsibilities. Because of the post-socialist tradition in Slovenia we didn't include instrumental support within the private domain. Paid domestic help and similar arrangements are extremely rare, as well as paid childcare since public childcare options are available and affordable to basically everyone. Instead we decided to measure separately the emotional support from the spouse and support coming from other family members. We did that for two reasons – first we believe there is a different level of emotional support involved with spouse versus extended family and second, support from friends and neighbours is rarely used in work-life research.

Many authors mention the importance of support in connection with work-family conflict. For example, Anderson, Coffey, and Byerly (2002) identified the support of co-workers as an important coping mechanism in struggling to balance professional and family obligations. Furthermore, authors Pines and Aronson (1983) in their research discovered that professional employees are evaluating emotional support as one of the most important social support functions. Taken all together, social support has been proven to help reduce the conflict between work and private life demands. Among employed individuals there are two sources of social support –support at work and support in private life.

Studies have found that support people get affects the way demands influence the work-family conflict people experience. Thomas and Ganster (1995) found that work-family policies are negatively related to the work-family conflict. Allen (2001) suggested that the

availability of family supportive benefits might be indirectly related to work-family conflict through the perceived family supportiveness of the organization. Her results indicate that workers who perceived the organization as less family supportive experienced more work-family conflict and less job satisfaction than employees who perceived their organization as more family supportive.

Prominent in the research on the support in private life are studies on spousal support. Studies show both a direct and a buffering effect of spousal support on work- family conflict (e.g. Matsui, Ohsawa, & Onglatco, 1995; van Daalen, Willemsen, & Sanders, 2006). Other sources of support, such as help from friends, neighbors and paid domestic help are a less frequent topic of research.

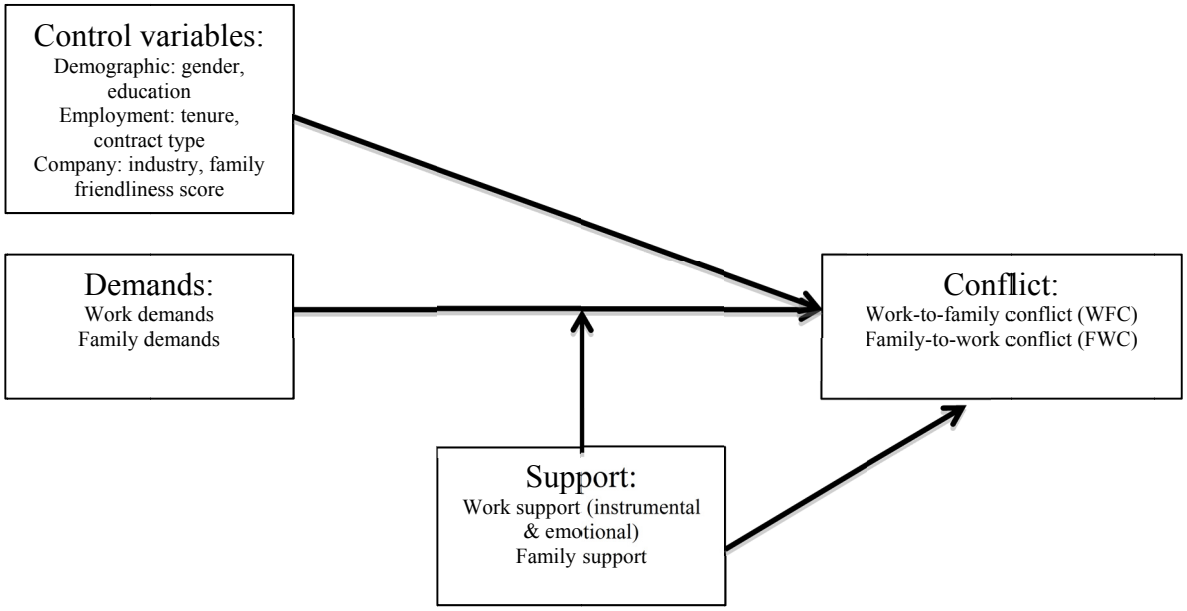
In the context of this research, we expect family-friendly programs in the company and supportive supervisors and co-workers make work responsibilities less overwhelming by offering support in times of high pressure from balancing work and family demands. Similarly, we expect support from souse and family members to help decrease the family-work conflict by offering understanding and taking over some family responsibilities when one faces hardship in coping with demands in both roles.

H2a: Work support will decrease work-family but not family-work conflict
H2b: Family support will decrease family-work but not work-family conflict

We want to support the relationship between constructs, where support (in the workplace and in private life) moderates the relationship between demands (at work and at home) and the perceived conflict between family and work demands (WFC and FWC). Based on the literature review, it is expected that different sources of support (in the workplace and in private life) help reduce the demands' pressure. As Abendroth and Den Dulk (2011) argue, work and life demands do not necessarily have a negative impact on work-life balance, when there are adequate mechanisms of support in place to help the individual cope with these demands. House (1981) argued that social support could mitigate or buffer the effect of potentially stressful objective situations by causing people to perceive the situation as less threatening or stressful. Schaufeli and Bakker (2004) therefore hypothesized a negative relationship between work demands and work resources in their study, since job resources potentially reduce job demands. Furthermore, authors suggest some examples of how family-friendly policies in the workplace can help employees accommodate their family responsibilities without reducing work hours or the amount of work that is performed (Voydanoff, 2005). Those include dependent care benefits and flexibility regarding when work is done, for example, flexible work schedules. Family-friendly work programs and practices make it easier for employees to accommodate family responsibilities by enabling workers to take time from work or to work part-time in order to meet family responsibilities. Accordingly, we expect the support (in the workplace and in the family) to moderate the effect of demands (in the workplace and in the family).

H3: Support will moderate the effect of demands, making it less intense.

Figure 1. Conceptual model



3. RESEARCH METHOD

The research approach we took to test the conceptual model presented above was quantitative analysis using secondary data sources. The data source we are using is a questionnaire, which is part of the on-going evaluation of companies that obtained the »Family-Friendly Company Certificate«.

»Family-Friendly Company Certificate« has been introduced to Slovenia as an extensive nationwide project in 2007 to help companies develop and implement family-friendly programs and practices. The basis for introducing the Family-Friendly Company certificate was the "European Family Audit" system developed by the German organisation Berufundfamilie. In Slovenia, the procedure for obtaining a certificate was introduced by the Ministry of Labour, Family and Social Affairs in partnership with the Ekvilib Institute, which is an audit institution. With government support the number of companies is growing each year, from 32 in 2007, to over 60 in 2011 and more than 130 in 2014 (Ekvilib, 2014). The »Family-Friendly Company Certificate« project offers a catalogue containing 150 family-friendly programs that are divided into eight thematic groups including: working time, organisation of work, workplace arrangements, information and communication, leadership skills, human resources development, compensation and rewards, and services for families. Some examples of family-friendly programs are shown in table 1.

Table 1. Groupings of the family-friendly programs the company can introduce

Groups of family-friendly programs	Examples of family-friendly programs the company can introduce
Working time	Flexible working time, shift work, part-time work, time bonus, condensed working week, job sharing, extra personal leave, shortened work time for parents, working time by life-phases, child-time bonus, flexible holiday planning, flexible work breaks
Organisation of work	Corporate team for WLB support, health and wellness programs, innovation in work processes and flows, employee replacement strategies, team work, job replacement, job sharing
Workplace arrangements	Telework, work from home, financial and technical support for remote work
Information and communication	WLB education programs, annual WLB survey, employee meetings, company open day, annual interviews
Leadership skills	Social skills, continuous education on WLB and wellness issues for the leadership, 360˚ analysis, share of women in leadership positions
Human resources development	Interviews, career planning, education programs during work time or with organised childcare, management training, gender equality opportunities, minorities employment, paternal leave
Compensation and rewards	Gifts for newborns, scholarships, loans, compensation for free time activities, psychological counselling, education for parents, housing support
Services for families	Counselling, child care, vacation offers, on-site childcare facilities, family room, family activities for employees, summer activities for school-aged children, relaxation room, New Year celebration and gifting for children

Source: BerufundFamilie (2015)

The above mentioned questionnaire collects data on the employee level, for a sample of employees in the companies that have the certificate. In total, more than 1500 employees from nine companies that acquired the "Family-friendly company" certificate participated in the survey, used for this paper. For practical reasons two modes of data collection were used – web or paper questionnaire – depending on the company and job position. We tested the differences between the two modes using group comparison tests and found no systematic differences between the two modes of collection, so we don't treat them separatelly. The number of employees in individual companies varied from 75 to just under 400. Sampling in individual companies varied from complete coverage to random sample, with cluster sampling, using departments as clustering units, was employed as the sampling method.

We first checked the consistency and reliability of existing scales and developed new scales using exploratory factor analysis and reliability testing. We used the scales in an OLS regression using the Matthews, Kath and Barnes-Farrell scale (2010) for "Work-to-life conflict" as the dependent variable. We included explanatory variables in a hierarchical manner, adding blocks of variables as follows: personal characteristics, work-place characteristics, perceived support from private life (spouse, family and friends) and perceived support at work.

4. FINDINGS

First we tested the consistency of scales that we used to measure demands, support and conflict. We argued that work-life conflict comes in two forms, as work-life conflict and as life-work conflict. We constructed a scale six items, half indicating work-life conflict and the other half life-work conflict. We tested the scale reliability using Crombach's alpha and the

nomological and discriminant validities of the scale. Discriminant validity was tested using exploratory factor analysis (maximum likelihood extraction, varimax rotation) which yielded two factors and confirmatory factor analysis for the factor model we got, which did not reject the model. All the tests show that using two separate scales is more appropriate than using a single work-life conflict scale.

Table 2. Scales and relevant Cronbach's alphas

Item	Work-life conflict scale	Life-work conflict scale	Work-life conflict scale
I have to miss family activities due to the amount of time I must spend on work responsibilities.	0.750		0.679
I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.			
The behaviors I perform that make me effective at work do not help me to be a better parent and spouse.			
I have to miss work activities due to the amount of time I must spend on family responsibilities.		0.711	
Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.			
Behavior that is effective and necessary for me at home would be counterproductive at work.			

To test our hypotheses, we ran four sets of three OLS multiple regression models. We varied the models by the dependent variable – we tested separately for work-family conflict (WFC) and the family-work conflict (FWC) as a dependent variable. Also, we separated the effect of work demands and support at work on one hand and family demands and family support on the other hand, which, together with the division of the work-family conflict into WFC and FWC, gave us the four sets of models.

In each set, the first model included (besides the control variables) the demand variable(s). Work demands and family demands variables are both scales of two items each on a response, how much time does people dedicate to each of the activities. In the family demands we also included a separate variable, child-age pressure, which is calculated as a sum (18 - child age) over all children. As control variables we used demographic controls including gender, and education, as employment controls we used employee's tenure in the company and type of work contract he/she has and as company controls we used industry, the perception of how family-friendly the employer (company) is and whether or not the employee has actually used family-friendly programs that are available to him/her within the company.

The second model of each set included social support variables. In the family support, two separate scales for spouse support and other family members' support were used. In the work support we used the instrumental support variable (a three-item scale measuring the employee perception of how family-friendly the company is) as well as emotional support in the workplace (a six item scale measuring the support employee can expect from co-workers and managers and supervisors).

The third model for each set added the interaction between work or family demands and work or family support respectively in order to control for the moderating effect of support on the relationship between demands and work-life conflict.

Table 3. Effect of work demand and support on work-life conflict

		Model 1	**Model 2**	**Model 3**
		b (t-value) Sig.	b (t-value) Sig.	b (t-value) Sig.
Controls	(Constant)	3.54 (11.8) ***	4.2 (11.9) ***	5.89 (5.8) ***
	Company family friendliness level	-0.32 (-9.2) ***	-0.21 (-4.5) ***	-0.21 (-4.6) ***
	Use of family-friendly programs	-0.06 (-0.9)	-0.07 (-1)	-0.08 (-1.1)
	Gender	-0.11 (-1.6)	-0.14 (-2) *	-0.14 (-2) *
	Tenure in the company	0 (0.5)	0 (0.1)	0 (0.2)
	Years of education	-0.02 (-0.9)	-0.02 (-1)	-0.02 (-0.9)
	Employment contract type	-0.19 (-1.6)	-0.21 (-1.7) *	-0.2 (-1.6)
	Banking Industry dummy	0.29 (2.4) *	0.34 (2.8) **	0.32 (2.6) **
	IT industry dummy	0.27 (3.4) **	0.28 (3.5) ***	0.29 (3.6) ***
Demands	Work demands	0.24 (4.2) ***	0.27 (4.7) ***	-0.28 (-0.9)
Support	Institutionalized family-friendly programs (instrumental support)		-0.02 (-0.3)	-0.03 (-0.5)
	Actual support in the workplace (emotional support)		-0.25 (-3.6) ***	-0.67 (-2.7) **
Interaction	Work demands * Actual support at work			0.14 (1.8) *
	R Square	0.213	0.233	0.237
	Adjusted R Square	0.2	0.219	0.221

The first model set shows the effects of work demands and support in the workplace on work-family conflict. As expected, higher work demands have a positive effect on work-family conflict (Model 1). Support at work lowers the work-family conflict (Model 2). Interestingly, it is not the institutionalized family-friendly programs and practices that the company has implemented but the actual support one gets or can expect from co-workers and superiors that has the effect. This leads to a conclusion that it is not enough to have the family-friendly programs in place (instrumental support), but what really matters in reducing the work-family conflict is how those programs are actually implemented through people in the company and home much support one gets or can expect from managers and co-workers (emotional support). Interaction, added in Model 3, changes the effects of support and demand quite dramatically. The demands' main effect becomes non-significant and even changes sign, the work support variable becomes even strongly negative, while the interaction coefficient is positive. We can therefore conclude that work support moderates the effect of work demands, so that they cause much less work-family conflict when adequate work support mechanisms are in place in the company.

Table 4. Effect of family demands and support on work-family conflict

		Model 1	Model 2	Model 3
		b (t-value) Sig.	b (t-value) Sig.	b (t-value) Sig.
Controls	(Constant)	4.77 (18.2) ***	4.77 (13.9) ***	4.2 (4.3) ***
	Company family friendliness level	-0.33 (-9.3) ***	-0.33 (-9.1) ***	-0.33 (-9.1) ***
	Use of family-friendly programs	-0.21 (-2.8) **	-0.21 (-2.8) **	-0.21 (-2.8) **
	Gender	-0.13 (-1.8) *	-0.15 (-2) *	-0.15 (-2.1) *
	Tenure in the company	0 (-0.5)	0 (-0.4)	0 (-0.3)
	Years of education	-0.01 (-0.2)	0 (-0.2)	0 (-0.2)
	Employment contract type	-0.14 (-1.2)	-0.15 (-1.3)	-0.15 (-1.3)
	Banking Industry dummy	0.09 (0.7)	0.06 (0.5)	0.06 (0.5)
	IT industry dummy	0.2 (2.4) *	0.21 (2.5) *	0.2 (2.4) *
Demands	Child age pressure	0 (2.1) *	0 (1.7) *	0 (1.7) *
	Family demands	-0.13 (-2.6) *	-0.13 (-2.5) *	0.1 (0.2)
Support	Spouse support		-0.05 (-0.9)	0.09 (0.4)
	Family support		0.09 (2.6) *	0.09 (2.6) *
Interaction	Work demands * Actual support at work			-0.04 (-0.6)
	R Square	0.213	0.233	0.237
	Adjusted R Square	0.2	0.219	0.221

The second model set shows the effects of family demands and family support on work-family conflict. Family demands have a mixed effect on the work-family conflict. Child age pressure has a slight positive effect, while family demands a negative one (Model 1). Spouse support doesn't seem to affect the work-family conflict, while the support from family members is even positively correlated with it (Model 2). We believe the causation here is reversed – higher work-family conflict triggers the need for more support from other family members. Interaction, added in Model 3, is not significant and does not affect the model substantially. It however eliminates the counter-intuitive negative effect of family demands on the work-family conflict.

Table 5. Effect of work demands and support on family-work conflict

		Model 1	Model 2	Model 3
		b (t-value) Sig.	b (t-value) Sig.	b (t-value) Sig.
Controls	(Constant)	2.33 (9) ***	2.54 (8.3) ***	2.58 (2.9) **
	Company family friendliness level	-0.15 (-4.9) ***	-0.11 (-2.7) **	-0.11 (-2.7) **
	Use of family-friendly programs	0 (-0.1)	0 (-0.1)	0 (-0.1)
	Gender	-0.05 (-0.8)	-0.06 (-0.9)	-0.06 (-0.9)
	Tenure in the company	0.01 (1.4)	0 (1.2)	0 (1.2)
	Years of education	0.01 (0.5)	0.01 (0.5)	0.01 (0.5)
	Employment contract type	0.13 (1.3)	0.13 (1.2)	0.13 (1.2)
	Banking Industry dummy	-0.12 (-1.2)	-0.1 (-0.9)	-0.1 (-0.9)
	IT industry dummy	0.17 (2.4) *	0.17 (2.4) *	0.17 (2.4) *
Demands	Work demands	-0.01 (-0.3)	0 (-0.1)	-0.01 (0)
Support	Spouse support		0.02 (0.4)	0.02 (0.4)
	Family support		-0.11 (-1.8) *	-0.12 (-0.5)
Interaction	Work demands * Actual support at work			0 (0)
	R Square	0.056	0.061	0.061
	Adjusted R Square	0.041	0.043	0.042

The third model set shows the effects of work demands and work support on family-to-work conflict. The R squares in models involving family-work conflict are three to four times lower than those involving work-family conflict – with this set of explanatory variables it is much harder to explain a substantial portion of the conflict in this direction, when work suffers because of family demands. Work demands don't have a significant effect on the family-work conflict (Model 1). Support at work lowers the family-work conflict slightly (Model 2), however, adding the interaction term in Model 3 eliminated this effect. In general, neither work demands nor work support seem to affect the family-work conflict substantially.

Table 6. Effect of family demands and support on family-work conflict

		Model 1	**Model 2**	**Model 3**
		b (t-value) Sig.	b (t-value) Sig.	b (t-value) Sig.
Controls	(Constant)	2.15 (9.7) ***	2.32 (7.9) ***	3.24 (3.9) ***
	Company family friendliness level	-0.13 (-4.4) ***	-0.13 (-4.1) **	-0.13 (-4.2) ***
	Use of family-friendly programs	-0.09 (-1.4)	-0.09 (-1.4)	-0.09 (-1.4)
	Gender	-0.03 (-0.6)	-0.05 (-0.8)	-0.04 (-0.7)
	Tenure in the company	0 (0.6)	0 (0.7)	0 (0.6)
	Years of education	0 (0.2)	0 (0.2)	0 (0.2)
	Employment contract type	0.04 (0.4)	0.04 (0.4)	0.04 (0.4)
	Banking Industry dummy	-0.25 (-2.4) *	-0.26 (-2.5	-0.27 (-2.5)
	IT industry dummy	0.15 (2.2) *	0.16 (2.3) *	0.17 (2.4) *
Demands	Child age pressure	0.04 (2.7) *	0.03 (2.4) *	0.03 (2.4) *
	Family demands	0.04 (0.9)	0.04 (1)	-0.25 (-1)
Support	Spouse support		-0.07 (-1.7) *	-0.29 (-1.5)
	Family support		0.06 (2.1) *	0.06 (2.1) *
Interaction	Work demands * Actual support at work			0.07 (1.2)
	R Square	0.065	0.077	0.08
	Adjusted R Square	0.049	0.058	0.059

The final set of models shows the effects of family demands and family support on family-work conflict. Child-age pressure has a significant positive effect on the family-work conflict (Model 1). Partner support lowers the family-work conflict slightly, while the support from other family members seemingly increases the conflict (Model 2). Again, we argue the reverse causality, meaning that higher family-work conflict triggers help from other family members. It may also be that the need to ask and receive help from other family members consequently triggers feelings of guilt and indebtedness, adding to frustration and conflict in individuals. The interaction term added in Model 3 is not significant, although it alters the family demands coefficient drastically.

To sum up, we found strong support for Hypotheses H1a and H1b in the first model of each set. The work demands affect the work-family conflict, but much less to not at all the family-work conflict. Family demands have a mixed effect on work-family conflict, but a positive effect on family-work conflict. Regarding hypotheses H2a and H2b, work and family support are important, but in the case work support (H2a) the actual emotional support one can expect at work (not just institutionalized and implemented family-friendly programs and practices) is successful at reducing the work-family conflict, but quite ineffective in mitigating the family-work conflict. Spousal support helps reduce the family-work conflict, but not the work-family conflict, while support from other family members is, in contrary to expectations, positively linked to both work-family and family-work conflict. However, we do believe that it is the

experience of increased conflict between work and family demands that causes individuals to seek extra support from family members and not vice-versa, although other mechanism (e.g. guilt) may be at play. As previously predicted by Abendroth and Den Dulk (2011) and formulated in the hypothesis H3, both work and private life support have a moderating effect on how demands affect the conflict.

5. DISCUSSION AND CONCLUDING REMARKS

In transition economies we are witnessing the decrease in institutional support for balancing work and non-work demands at the national level. Accordingly companies are increasingly implementing different family-friendly programs to help their employees successfully balance work and private life demands. In Slovenia so far more than 130 companies have introduced family-friendly programs through a national project "Family-friendly company". Due to external monitoring and continuous evaluation of the project implementation all companies have succeeded in implementing the chosen family-friendly programs at the instrumental level (i.e. informing employees of their options, offering a wide variety of family-friendly programs and practices in order to address different employee needs, etc.), however there seem to be an important difference between companies in how their employees embrace the family-friendly programs at the emotional level (i.e. having empathy for co-workers and offering support to co-workers when they face work-life challenges, not refusing to adapt their workflow and work load when co-workers use family-friendly programs, etc.).

Based on our findings we argue that in order to become a family-friendly organization it is not enough to develop, institutionalize and formally practice family-friendly programs but it is crucial to truly adopt and internalize the family-friendly corporate culture throughout the organization, so that all employees embrace the work-life challenges and offer each other instrumental as well as emotional support when needed.

The research is based on a fairly large sample, however because of practical limitations of the research the number of scales and items is limited. Mixed modes of collection were used and although no significant differences between the modes were found, this may have an effect on the results, as well as different sampling modes in different companies. However, we do believe that including company controls solves most of these problems. A further limitation is that we have a single instrument for collecting variables on both sides of the regression equation. However, Harman's single factor tests with a value of 0,17 doesn't suggest any problems with common method bias.

Since we found some interesting positive links between the work-family conflict and support from family members others than the spouse, which we believe is caused by the reverse causality, it would be interesting in the future to collect temporal data in order to test this theory even further.

BIBLIOGRAPHY

Abendroth, A.-K., & Den Dulk, L. (2011): **Support for the work-life balance in Europe: the impact of state, workplace and family support on work-life balance satisfaction.** ***Work, employment and society,*** *25*(2), 234–256.

Adams, G. A., King, L. A., & King, D. W. (1996): **Relationships of Job and Family Involvement, Family Social Support, and Work -- Family Conflict With Job and Life Satisfaction.** ***Journal of Applied Psychology,*** *81*(4), 411-420.

Allen, S. G. (1983): **How Much Does Absenteeism Cost?** ***The Journal of Human Resources,*** *18*(3), 379-393.

Allen, T. D. (2001): **Family-Supportive Work Environments: The Role of Organizational Perceptions.** ***Journal of Vocational Behavior,*** *58*(3), 414-435. doi: http://dx.doi.org/10.1006/jvbe.2000.1774

Anderson, S. E., Coffey, B. S., & Byerly, R. T. (2002): **Formal Organizational Initiatives and Informal Workplace Practices: Links to Work-Family Conflict and Job-Related Outcomes.** ***Journal of Management,*** *28*(6), 787-810.

Barling, J., Kelloway, E. Kevin, Frone, Michael R. . (2005): **Handbook of work stress.** ***Sage Publications,Thousand Oaks*****,** 147.

Beauregard, T. A., & Henry, L. C. (2009): **Making the link between work-life balance practices and organizational performance.** ***Human Resource Management Review,*** *19*(1), 9-22.

Beham, B., & Drobnic, S. (2010): **Satisfaction with work-family balance among German office workers.** ***Journal of Managerial Psychology,*** *25*(6), 669-689.

Beham, B., Drobnic, S., & Präg, P. (2010): **Work demands and resources and the work-family interface: Testing a salience model on German service sector employees.** ***Journal of Vocational Behavior,*** *78*(1), 110-122.

Behson, S. J. (2005): **The relative contribution of formal and informal organizational work–family support.** ***Journal of Vocational Behavior,*** *66*(3), 487-500. doi: http://dx.doi.org/10.1016/j.jvb.2004.02.004

Berufunfamilie. (2015). *http://www.beruf-und-familie.de/*. [Accessed: 2.2.2105]

Bloom, N., Kretschmer, T., & van Reenen, J. (2006): **Work life balance, management practices and productivity.** ***Center of Economic Performance.***

Boyum-Breen, T. L. (2006): **A phenomenological inquiry of the work and home life experiences of mothers who are college presidents.** ***Diss. University of Minnesota, 2006. Major: Educational policy and administration.,*** *2006.*

Bretherton, T. (2008): **Work and family policy: Spoilt for choice or spoilt by choise?** ***Journal of Management & Organization,*** *14*(3), 259–266.

Byron, K. (2005): **A meta-analytic review of work – family conflict and its antecedents.** ***Journal of Vocational Behavior*** *67*(169-198).

Darcy, C., McCarthy, A., Hill, J., & Grady, G. (2011). **Work-life balance: One size fits all? An exploratory analysis of the differential effects of career stage**. *European Management Journal*. doi:10.1016/j.emj.2011.11.001

Den Dulk, L., & Peper, B. (2007): **Working parents' use of work-life policies.** ***Sociologia, Problemas e Práticas****, 53*(51-70).

Duxbury, L. E., & Higgins, C. A. (1991): **Gender differences in work-family conflict.** ***Journal of Applied Psychology,*** *76*(1), 60-74.

Eby, L. T., Wendy J. Casper, Angie Lockwood, Bordeaux, C., & Brinleya, A. (2005): **Work and family research in IO/OB: Content analysis and review of the literature (1980–2002).** ***Journal of Vocational Behavior*** *66* 124-197.

Edlund, J. (2007): **The Work–Family Time Squeeze: Conflicting Demands of Paid and Unpaid Work among Working Couples in 29 Countries.** ***International Journal of Comparative Sociology,*** *48*(6), 451-480. doi: 10.1177/0020715207083338

Ekvilib. (2014). http://www.ekvilib.org/. [Accessed: 25.8.2014]

Epstein, J. L. (2006): **Getting punched: The job and family clock.** ***Center for law and social policy.***

Friedman, M. (2007): **The Social Responsibility of Business Is to Increase Its Profits. In W. Zimmerli, M. Holzinger & K. Richter (Eds.),** ***Corporate Ethics and Corporate Governance*** (pp. 173-178): Springer Berlin Heidelberg.

Frone, M. R., & Russell, M. (1992a): **Antecedents and Outcomes of Work-Family Conflict: Testing a Model of the Work-Family Interface.** ***Journal of Applied Psychology****, 77*(1), 65-78.

Frone, M. R., Russell, M., & Cooper, M. L. (1992b): **Prevalence of Work-Family Conflict: Are Work and Family Boundaries Asymmetrically Permeable?** ***Journal of Organizational Behavior,*** *13*(7), 723-729. doi: 10.2307/2488392

Gambles, R., Lewis, S., & Rapoport, R. (2006): **The myth of work-life balance: The challenge of our time for men, women and societies.** John Wiley & Sons.

Goff, S. J., Mount, M. K., & Jamison, R. L. (1990): **Employer-supported childcare, work/family conflict, and absenteeism: A field study.** ***Personnel Psychology****, 43*, 793-809.

Goode, W. J. (1960): **A Theory of Role Strain.** ***American Sociological Review,*** *25*(4), 483-496.

Greenhaus, J. H., & Beutell, N. J. (1985): **Sources of Conflict between Work and Family Roles.** ***The Academy of Management Review,*** *10*(1), 76-88. doi: 10.2307/258214

Heslin, P. A., & Ochoa, J. D. (2008): **Understanding and developing strategic corporate social responsibility.** ***Organizational Dynamics,*** *37*(2), 125-144.

Hewlett, S. A., & Luce, C. B. (2006): **Extreme Jobs The Dangerous Allure of the 70-Hour Workweek.** ***Harvard Business Review.***

Hill, E. J., Jacob, J. I., Shannon, L. L., Brennanc, R. T., Blancharda, V. L., & Martinengo, G. (2008): **Exploring the relationship of workplace flexibility, gender, and life stage to family-to-work conflict, and stress and burnout.** ***Community, Work & Family,*** *11*(2), 165-181.

Hinkin, T. R., & Bruce Tracey, J. (2000): **The cost of turnover: Putting a price on the learning curve.** ***The Cornell Hotel and Restaurant Administration Quarterly****, 41*(3), 14-14. doi: http://dx.doi.org/10.1016/S0010-8804(00)80013-0

Hobfoll, S. E., & Stokes, J. P. (1988): **The process and mechanics of social support**. *Duck, Steve (Ed); Hay, Dale F. (Ed); Hobfoll, Stevan E. (Ed); Ickes, William (Ed); Montgomery, Barbara M. (Ed), (1988).* ***Handbook of personal relationships: Theory, research and interventions.*** *, (pp. 497-517). Oxford, England: John Wiley & Sons, xvii, 702 pp.*

House, J. S. (1981): Work Stress and Social Support. Addison-Wesley, Reading, MA.

Ilies, R., Wilson, K. S., & Wagner, D. T. (2009). **The spillover of daily job satisfaction onto employees' family lives: the facilitating role of work-family integration.** ***Academy of Management Journal,*** 52(1), 87-102.

Jones, F., & Fletcher, B. C. (1996): **Job control and health.** ***in M. J. Schabracq, J. A. M. Winnbust, & C. L. Cooper (Eds.), Handbook of work and health psychology*** *(pp. 33-50). Chichester: Wiley.*

Kelloway, E. K., Gottlieb, B. H., & Barham, L. (1999): **The source, nature, and direction of work and family conflict: A longitudinal investigation.** ***Journal of Occupational Health Psychology,*** *4*, 337-346.

Khallash, S. & Kruse, M. **The Future of Work and Work-Life Balance 2025, Futures (2010),** doi:10.1016/j.futures.2012.04.007

Klammer, U., & Klenner, C. (2004): **Geteilte Erwerbstätigkeit — gemeinsame Fürsorge. Strategien und Perspektiven der Kombination von Erwerbs- und Familienleben in Deutschland. In S. Leitner, I. Ostner & M. Schratzenstaller (Eds.),** ***Wohlfahrtsstaat und Geschlechterverhältnis im Umbruch*** (Vol. 7, pp. 177-207): VS Verlag für Sozialwissenschaften.

Kohli, M. E. (1991): **Time for retirement: Comparative studies of early exit from the labor force.** Cambridge University Press.

Kopelman, R. E., Greenhaus, J. H., & Connolly, T. F. (1983): **A model of work, family, and interrole conflict: A construct validation study.** ***Organizational Behavior and Human Performance,*** *32*(2), 198-215. doi: http://dx.doi.org/10.1016/0030-5073(83)90147-2

Kossek, E. E., & Nichol, V. (1992): **The effects of on-site child care on employee attitudes and performance.** ***Personnel Psychology****, 45*(3), 485-509. doi: 10.1111/j.1744-6570.1992.tb00857.x

Kossek, E. E., Pichler, S., Bodner, T., & Hammer, L. B. (2011): **Workplace social support and work–family conflict: a meta-analysis clarifying the influence of general and work–family-specific supervisor and organizational support.** ***Personnel Psychology****, 64*(2), 289-313. doi: 10.1111/j.1744-6570.2011.01211.x

Kreiner, G. E., Hollensbe, E. C., & Sheep, M. L. (2009). **Balancing borders and bridges: negotiating the work-home interface via boundary work tactics.** ***Academy of Management Journal,*** 52(4), 704-730.

Lau, B., Hem, E., Berg, A. M., Ekeberg, Ø., & Torgersen, S. (2006): **Personality types, coping, and stress in the Norwegian police service.** ***Personality and Individual Differences,*** *41*(5), 971-982.

Lewis, S. (2003): **The integration of paid work and the rest of life. Is post industrial work the new leisure?** ***Leisure Studies****, 22*(4), 343-345. doi: 10.1080/0261436031000159413 1

Lyness, K. S., & B., K. M. (2005): **The relationships of national gender equality and organisational support with work-family balance: a study of European managers. .** ***Human Relations****, 58*(1), 33-60.

Matsui, T., Ohsawa, T., & Onglatco, M.-L. (1995): **Work-Family Conflict and the Stress-Buffering Effects of Husband Support and Coping Behavior among Japanese Married Working Women.** ***Journal of Vocational Behavior****, 47*(2), 178-192. doi: http://dx.doi.org/10.1006/jvbe.1995.1034

Matthews, R. A., Kath, L. M., & Barnes-Farrell, J. L. (2010): **A Short, Valid, Predictive Measure of Work-Family Conflict: Item Selection and Scale Validation.** ***Journal of Occupational Health Psychology,*** *15*(1), 75-90. doi: 10.1037/a0017443

Monnery, N. (1998): **The costs of accidents and work-related ill-health to a cheque clearing department of a financial services organisation.** ***Safety Science****, 31*(1), 59-69. doi: http://dx.doi.org/10.1016/S0925-7535(98)00054-X

Otubanjo, O., Amaeshi, K. M., & Olufemi, M. O. (2008): **Theorising the interconnectivity between corporate social responsibility (CSR) and corporate identity.** Available at SSRN 1455267.

Parasuraman, S., Greenhaus, J. H., & Granrose, C. S. (1992): **Role Stressors, Social Support, and Well-Being Among Two-Career Couples.** ***Journal of Organizational Behavior****, 13*(4), 339-356. doi: 10.2307/2488063

Parkers, L. P., & Langford, P. H. (2008): **Work-life balance or work-life alignment?** ***Journal of Management & Organization****, 14*(3), 267–284.

Pärnänen, A., H. Sutela, & Mahler., S. (2007): **Combining family and full-time work. Dublin: European Foundation for the Improvement of Living and Working Conditions**. Http://www.eurofound.europa.eu/ewco/reports/TN0510TR02/TN0510TR02.pdf

Pines, A., & Aronson, E. (1983): **Combatting burnout.** ***Children and Youth Services Review,*** *5*(3), 263-275. doi: http://dx.doi.org/10.1016/0190-7409(83)90031-2

Poelmans, S. A., & Kalliath, T. (2008): **Achieving work-life balance: Current theoretical and pratice issues.** ***Journal of Management & Organization****, 14*(3), 227-238.

Raskin, P. M. (2006): **Women, work and Family.** ***The American Behavioral Scientist,*** *49*(10), 1354-1381.

Rusbult, C. E., & Farrell, D. (1983): **A longitudinal test of the investment model: The impact on job satisfaction, job commitment, and turnover of variations in rewards, costs, alternatives, and investments.** ***Journal of Applied Psychology,*** *68*(3), 429-438.

Saltzstein, A. L., Ting, Y., & Saltzstein, G. H. (2001): **Work-Family Balance and Job Satisfaction: The Impact of Family-Friendly Policies on Attitudes of Federal Government Employees.** ***Public Administration Review,*** *61*(4), 452-467. doi: 10.1111/0033-3352.00049

Schaufeli, W. B., & Bakker, A. B. (2004): **Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study.** ***Journal of Organizational Behavior****, 25*(3), 293-315.

Tausig, M., & Fenwick, R. (2001): **Unbinding Time: Alternate Work Schedules and Work-Life Balance.** ***Journal of Family and Economic Issues****, 22*(2), 101-119. doi: 10.1023/a:1016626028720

Thomas, L. T., & Ganster, D. C. (1995): **Impact of family-supportive work variables on work-family conflict and strain: A control perspective.** ***Journal of Applied Psychology,*** *80*(1), 6-15.

Trefalt, Š., Drnovšek, M., Svetina-Nabergoj, A., & Adlešič, R. V. (2013): **Work-life experiences in rapidly changing national contexts: Structural misalignment, comparisons and choice overload as explanatory mechanisms.** ***European Management Journal,*** *31*(5), 448-463. doi: http://dx.doi.org/10.1016/j.emj.2013.04.006

van Daalen, G., Willemsen, T. M., & Sanders, K. (2006): **Reducing work–family conflict through different sources of social support.** ***Journal of Vocational Behavior****, 69*(3), 462-476. doi: http://dx.doi.org/10.1016/j.jvb.2006.07.005

Valcour, M., Ollier-Malaterre, A., Matz-Costa, C., Pitt-Catsouphes, M., & Brown, M. (2011). **Influences on employee perceptions of organizational work-life support: Signals and resources.** ***Journal of Vocational Behavior***, In Press, Corrected Proof.

Voydanoff, P. (2004): **The Effects of Work Demands and Resources on Work-to-Family Conflict and Facilitation.** ***Journal of Marriage and Family****, 66*(2), 398-412. doi: 10.1111/j.1741-3737.2004.00028.x

Voydanoff, P. (2005): **Toward a Conceptualization of Perceived Work-Family Fit and Balance: A Demands and Resources Approach.** ***Journal of Marriage and Family,*** *67*(4), 822-836.

Webber, M., Sarris, A., & Bessell, M. (2010). **Organisational Culture and the Use of Work-Life Balance Initiatives: Influence on Work Attitudes and Work-Life Conflict.** ***Australian & New Zealand Journal of Organisational Psychology***, 3(1), 54-65.

Yang, S., & Zheng, L. (2011): **The paradox of de-coupling: A study of flexible work program and workers' productivity.** ***Social Science Research****, 40*(1), 299-311.

THE MODELLING OF ENTERPRISE ZONE ALLOCATION IN CROATIA

Zdravko Šergo
Institute of Agriculture and Tourism /Scientific Adviser
Karla Huguesa 8, Poreč 51450
Telephone: ++ <+385 52 408 300>; Fax: ++ <385 52 431 659>
E-mail: < zdravko@iptpo.hr >

Pavlo Ružić
Institute of Agriculture and Tourism /Scientific Adviser
Karla Huguesa 8, Poreč 51450
Telephone: ++ <+385 52 408 300>; Fax: ++ <385 52 431 659>
E-mail: < pavlo@iptpo.hr >

Key words: *enterprise zone, count-data modelling, probit regression, municipalities, Croatia*

ABSTRACT

Using zero-inflated Poison and negative binominal models to account for zero observation and binominal regression in the data, this study examines how enterprise zone patterns in Croatia vary across municipalities with differing income levels, human capital, fiscal revenues, unemployment rates, development intensity and voting profiles. The target population was enterprise zones in Croatia, and the sample used for this study approximately overlaps that population. The study included 555 municipalities in Croatia. Enterprise zones are a form of targeted economic development policy that provides special tax incentives to attract and retain companies to a few relatively poor communities rather than the entire country. This research examines the following main hypothesis: Do municipalities in Croatia adopt enterprise zones to benefit economically depressed regions?

JEL codes: C51, R12

1. INTRODUCTION

1.1. General issues

Croatia started its own enterprise programmes with the aim of improving the economic prospects of the most economically distressed communities. It is now generally recognized that "institutions matter" and that associated incentive structures substantially influence economic performance. Thus, Croatia has made efforts in this direction. The Act on Improving Entrepreneurial Infrastructure, adopted in July 2013, defines enterprise infrastructure, enterprise zones, and business support institutions (SBA Fact Sheet CROATIA, EU Commission, 2014). As an institutional instrument, that act aims to improve regulatory initiatives aimed at supporting SMEs and clearly sets out the conditions and criteria for helping SMEs and for construction of enterprise zones.

In the past decade, many local communities in Croatia experimented with using enterprise zones to stimulate private sector investment in economically depressed areas. Enterprise zones provide major tax incentives and other financial assistance to induce firms to expand their operations or relocate to the most economically distressed areas of the county. Enterprise zones are one of the most important economic development policy innovations at the central state level. In some Croatian counties (usually areas where mass poverty is concentrated), poverty by any reasonable measure is so pervasive that implementing policies of poverty alleviation by EZ (furthermore, acronym for Enterprise Zone) programmes aimed at job creation and unemployment reduction seems to be a rational development policy. The number of municipalities employing enterprise zones has increased dramatically from 116, which were dispersed over approximately 3500 hectares in the period from 2006 to 2008, to 346 in the period from 2010 to 2012. The enterprise zone area now covers more than 12,000 hectares.

1.2. Literature preview

An excellent literature review about the economics of EZs is provided in a paper that is referenced for an analysis of the efficiency of enterprise zone programmes (Mayneris and Py, 2014). To date, scholars have extensively studied enterprise zones from a policy evaluation-framework point of view; the main issue is whether the zones attract new investment and create jobs (Wilder and Rubin 1996; Peters and Fisher 2002; Greenbaum and Engberg 2003). However, what have been overlooked are the political questions of when do states decide to adopt enterprise zone programmes to aid distressed areas and whether those programmes can maintain their focus on the distressed areas over time. In the case of enterprise zones, inter-state competition and urbanization have the most significant effects on state policy choices. States facing significant competition from neighbouring states with enterprise zones were more likely to adopt and subsequently expand their enterprise zone programmes (Turner and Casell, 2007).

In the case of France, one of the most important EU members, two studies evaluate the recent French enterprise zone programme – the Zones Franches Urbaines policy – on business creation. The studies suggest a positive effect of the French enterprise zone on the probability that plants locate in targeted areas and on the number of establishments in targeted zones (Mayer et al., 2012, Givord et al. 2012). Several studies have explored this dimension in the United States. Whereas Billings (2009) finds no significant effect of the designation of enterprise zones on the number of establishments in Colorado, Neumark and Kolko (2008)

find a negative effect in the case of the programme conducted in California, and Hanson and Rholin (2011) identify a positive effect of US federal enterprise zones. Hence, results concerning the effects of enterprise zones on business creation seem to differ widely in the US and in France and depend on the programme (state or federal policy in the US).

In evaluations of US enterprise zone programmes, many studies find no significant effect on employment growth in designated areas (Boarnet and Bogart, 1996; Bondonio and Engberg, 2000; Neumark and Kolko, 2008; Lynch and Zax, 2011). However, some studies observe a rather positive effect of some US enterprise zone programmes (O'Keefe, 2004; Ham et al., 2011; Busso et al., 2013). Studies on European countries identify a positive effect of enterprise zones on labour market outcomes, with some restrictions. Einio and Overman (2011) evaluate the effect of the Local Enterprise Growth Initiative in the UK. They find a positive effect on employment, obtained however at the expense of the immediate periphery of targeted zones. In the case of France, two studies have found a positive effect on employment growth, although only in the short term (Rathelot and Sillard, 2009; Givord et al. 2012). The authors interpret this result as a shock modifying the level of employment, but not the trend. Again, the overall results concerning the effect of enterprise zones on local employment growth appear to vary depending on the programme.

Several studies have tried to assess the effect of enterprise zones on the employment of zone residents; indeed, growing employment in targeted zones does not necessarily imply that firms hire local workers, due in particular to a potential spatial mismatch between the skills needed by firms and the skills available locally. In the US, whereas Elevery (2009) did not find evidence that the designation of enterprise zones in California and in Florida affected the employment probability of zone residents, Busso et al. (2013) concluded that federal empowerment zones have a significant and positive effect on the employment of zone residents. Engberg and Greenbaum (1999) analyse the impact of state enterprise zone policies on housing market outcomes in small cities across the United States. When combined with information on the location and timing of enterprise zones, the authors found that, on average, state enterprise zones have had little impact on housing markets. In the case of France, Gobillon et al. (2012) focused on the effect of French enterprise zones in the Paris region. They found a small effect on the rate at which unemployed workers in targeted areas find a new job, this effect being however significant in the short term only. Charlot et al. (2012) studied the evolution of socio-economic conditions in the zones targeted by the French programme and did not find evidence of any effect on the unemployment rate. Therefore, the evidence is mixed concerning the US and French experiences.

Most studies on enterprise zones rely on difference-in-difference approaches. They rely on before and after comparisons (Papke, 1994; Greenbaum and Engberg, 2004) combined with control groups consisting of areas qualifying for enterprise zones. However, areas that applied but were rejected (Boarnet and Bogard, 1996; Hanson, 2009), or areas later designated enterprise zones (see for instance Busso et al. 2013; Neumark and Kolko, 2008) were not included.

1.3. The research subject

The following research questions are asked in this paper:

1. What characteristics explain and predict the probability of a municipality in Croatia utilizing an entrepreneurship zone programme?

2. What characteristics explain the frequency of the designated sizes of those EZ programmes in Croatia?

The paper is organized as follows. The next section begins by mapping out the research strategy including the conceptual framework and dataset, model specification and variables. The following section presents and discusses empirical results, and the final section concludes by providing implications for economic policy and further research.

2. CONCEPTUAL FRAMEWORK

2.1. Economic theory

Enterprise zone programmes designate specific areas as "zones" that qualify for lower taxes and, in some cases, less government regulation. Basic economic theory suggests that lower taxes and less regulation will increase jobs and incomes in the zones by attracting capital, labour, and economic activity. However, this theory is built upon a number of key assumptions; more-complex theories might produce different conclusions (Hirusana, Michael, 2005).

Our theoretical model, which in this paper we attempt to verify, is based on the consequences of this orthodox economic theory augmented by specific political and regional factors.

2.1.1. Socio-economic Determinants

Municipality policy choices are the product of societal actors' response to changing economic and social conditions. The rational economic theory predicts that state decision-makers are more likely to adopt new economic development programmes under conditions of economic duress, although previous studies did not explicitly distinguish between geographically targeted versus balanced-growth policies (Rubin and Rubin 1987). We hypothesize that as economic conditions in a municipality worsen, officials are more likely to respond by enacting enterprise zone programmes. We operationalise economic distress using the annual unemployment rate (the CDLL database, 2014). We also include an annual measure of municipality per capita income and a development index to assess whether there any policy differences between more- and less-wealthy municipalities towards targeted economic development policies. In stronger municipalities, we assume that there will be less political pressure to design economic development programmes to address their needs. Larger government revenue per capita and a higher development index are associated with a lower probability of a municipality adopting an enterprise zone programme or increasing the number of enterprise zones. The reason we include human capital in the above specification is as follows. If local decision-makers are going to guide a municipality out of its underdeveloped state, they need a well-educated, skilled workforce to attract investment and human capital from outside the observation unit border. Therefore, to assess whether human capital stock positively affects the adoption of zones, we examined the link between the adoption of enterprise zones and human capital.

2.1.2. Partisanship/Ideology Determinants

Partisan or ideological models would suggest that changes in the composition of a state's political elite should lead to a change in economic development policy. Enterprise zones are redistributive economic development policies that provide public resources from the haves to

the have-nots (Tao and Feiock 1999). Because political elites have differing views on redistributive social programmes, we predict political elites are likely to have differing views on enterprise zones based on their partisan and ideological orientations. To assess whether enterprise zone policy are affected by partisan or ideological factors, we include a measure of local executive partisan control and ideology: our opinion transmission of voting results for the Sabor (Croat parliament). We use the number of valid votes for central parliament per municipality. A "1" as a dummy variable indicates unified right-conservative control of state government, whereas a "0" indicates unified left-liberal control of state government. Although the original supporters of enterprise zones were a conservative coalition in the past decade, we predict municipalities controlled by the SDP coalition are more likely to adopt enterprise zone programmes because the programmes target assistance to traditionally left-wing democratic constituencies in urban areas.

2.1.3. Regional Determinants

Finally, we include a dummy variable for the three large regions to control for tradition and historical patterns in policy outcomes. However, we lack a prior theory of mutual interactions that would correlate with the dummy response variable.

2.2. Dataset and sources

In this paper, secondary sources are used. The secondary data in this study are from various sources and refer to different variables later in this paper. First, we have available the Croatian values of development and the calculation of the index of development at the local level (henceforth the CDLL database). The CDLL is a cross-sectional, economic-topic, nationally representative list of municipalities that was designed and conducted with the technical assistance of the Ministry of Regional Development and EU Funds to measure micro-economic development in Croatia (2014, October 13). This dataset is retrieved from http://www.mrrfeu.hr. It covers 555 municipalities. The sampling frame of the CDLL is based on a list of all municipalities in Croatia. Second, the data on entrepreneur zones (EZs) stem predominantly from two main types of sources. Both are linked to the Ministry of the Economy (2014, October 7). Those datasets (furthermore abbreviated by: EZD) are retrieved from: http://www.strukturnifondovi.hr/.../prilog7.popispoduzetnikihzona2004-2013 and http://www.strukturnifondovi.hr/.../poduzetnicke_zone2015_obrazac_prijave. Finally, the ELECTORAL database, which covers the electoral results of Croatia's national parliamentary elections at the sub-national level, is sourced from Bochsler, Daniel (2010).

3. MODEL SPECIFICATIONS

The standard method of statistically proving facts is to test hypotheses. In our case, we formulate as the null hypothesis H0 the claim that EZ adoption is not related to the various socio-economic, political and regional determinants. The related, alternative hypothesis is denoted H1.

We use the following model specifications to test two sets of hypotheses that explain the creation and subsequent proliferation of enterprise zones:

$$EZ\_participation_{i,t} = \beta_0 + \beta_1 Per\ Capita\ Income_{i,t} + \beta_2 Per\ Capita\ Government\ Revenue_{i,t} + \beta_3 Unemployment\ Rate_{i,t} + \beta_4 Human\ Capital_{i,t} + \beta_5 Development\ Index_{i,t} + \beta_6 Ideology\ variables_{i,t} + \beta_7 Region_{i,t}$$

The above model with participation as a dependent variable will be estimated by probit regression:

$$Y^* = const + \sum X\beta + \varepsilon, \varepsilon \sim \mathrm{N}(0,1) \qquad (1)$$

if $Y^* > 0$, y =1; $Y^* = 0$, y = 0;

where Y^* = EZ participation (yes or no),
X = vector of independent variable.

The estimation of a size model will be performed by double-hurdle regression.

$$EZ\_size_{i,t} = \beta_0 + \beta_1 Per\ Capita\ Income_{i,t} + \beta_2 Per\ Capita\ Government\ Revenue_{i,t} + \beta_3 Unemployment\ Rate_{i,t} + \beta_4 Human\ Capital_{i,t} + \beta_5 Development\ Index_{i,t} + \beta_6 Ideology\ variables_{i,t} + \beta_7 Region_{i,t}$$

As the regression's name suggests, two hurdles must be crossed to designate a size (land plot in hectares in this case). The "first hurdle" must be crossed to be a potential distributor of EZ size. Because municipalities are potential planners of the new economic zones, their current circumstances dictate whether the municipalities do in fact enlarge and how much they enlarge plot size; this is the second hurdle.

This model is able to capture excessively large numbers of zeros (Kleiber and Zeileis, 2008), e.g., municipalities without an EZ programme or land plot design. The double hurdle model contains two equations that are written as follows:

$$d_i^* = Z_i'\alpha + u_i$$

$$y^* = X_i'\beta + v_i$$

The two error terms are assumed independently distributed.

The hurdle model consists of two parts (hence, it is also called a 'two-part model'). The first is a binary part (given by a count distribution right-censored at y =1): is y_i (size of EZ) equal to zero or is it positive? The second is a count part (given by a count distribution of the size variable left-truncated at y =1): if $y_i > 0$, how large is y_i?

Finally, the observed variable, yi, is determined by the interaction of both hurdles as follows:

$$y = d_i y_i^* \qquad (2)$$

Decisions concerning whether to participate in the EZ programme and about the size of zone Y can be jointly modelled. Questions to be answered include whether they are made simultaneously by the decision-maker; independently, whether they are made separately; or sequentially, whether one decision is made first and affects the other one (this is the dominance model, which will be used in this paper). Therefore, we consider below a regression of size on all further variables for the count part and model the inflation part as a function of the same variables.

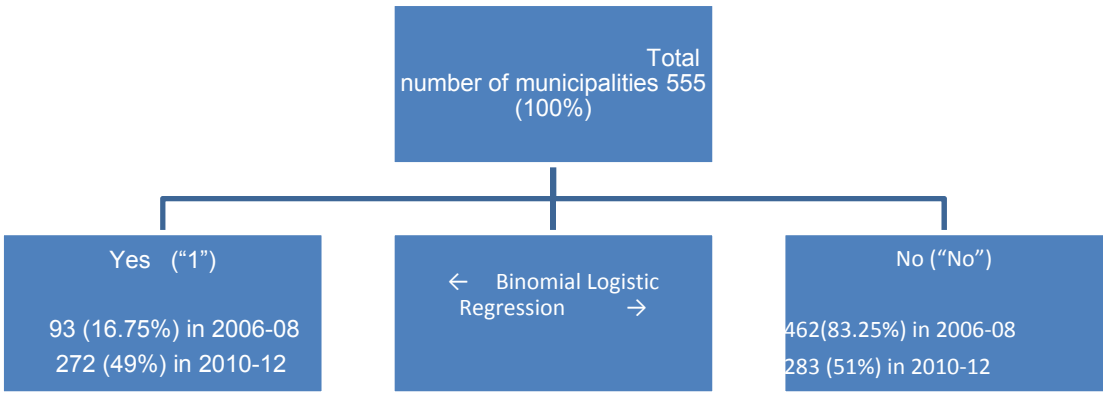
4. EMPIRICAL METHOD AND RESULTS

The research questions discussed earlier considered the utilization of EZ programmes a two-stage process in which decisions were sequential (see Figure 1). In the first stage, the decision was made by a municipality concerning whether to adopt an enterprise zone to benefit an economically depressed community. In the second stage, another decision was made by municipalities concerning the frequencies of the sizes of enterprises zones. For both stages, the decision was affected by the factors described in the conceptual framework. However, the effects of these factors on decisions can be different at different stages. Hence, we applied a two-stage model to investigate the determinants of utilization of EZ programmes.

In the first stage, we predicted the probability of a municipality utilizing EZ programmes. Our dependent variable is binary; therefore, the probability was modelled using a binary regression. In the second stage, we predicted the frequency of EZ by size of enterprise zones. Our dependent variable here is a count variable that reflects the number of ha used in EZ adoption. In this stage, as a dependent variable rounded to integer, we added the frequency of enterprise zone measured by discrete size of plot and expressed in ha.

4.1. Variables and descriptive statistics

Figure 1 Two-stage model of decision making concerning enterprise zone utilization



	Enterprise Zones					
	0	1	2	3	4	5
2006-08	462	81	8	1	1	2
	83.25%	15%	1.4%	0.2%	0.2%	0.4%
2010-12	283 times	218 times	39 times	11 times	3 times	1 time
	51%	39%	7%	2%	0.5%	1%

Source: Authors' estimations based on Prilog 7. Popis poduzetničkih zona 2004-2013

Because this study used a two-stage model, we employed two distinctive dependent variables. For the first stage, the dependent variable was whether a local government has adopted enterprise zone programmes to stimulate economic activity. This variable is a dummy variable that would take the value of 1 if the EZ concept were adopted. Conversely, it would take the value of 0 if such an enterprise zone programme did not come to life.

The distribution of this variable shows that approximately 17% of municipalities had an establish EZ programme at the first point of time observation (2006-2008), whereas 49% of the total population of all municipalities had adopted enterprise zones in 2010-2012. However, a significant share of total municipalities had no such programmes (see Figure 1). The distribution of this variable demonstrates that the highest proportion of municipalities had only 1 enterprise zone during both periods of observation, whereas a considerably smaller share, approximately 7% and 1.4%, had 2 adopted enterprise zones (see Figure 1).

As a secondary dependent variable, we added the frequency of EZ along municipalities measured by size. For the second stage, the dependent variable was a size variable indicating the frequency of land plot used in adoption of enterprise programme. This variable is continuous and varies from 0 to 543 (or 843).

The size frequency of averaged entrepreneur zone was considerably higher in 2010-12 than in 2006-2008, apparently because of the higher percentage of investors participating in entrepreneurship in the more-recent period. Additionally, we can see a somewhat different pattern of histograms in two cross-sectional points (see Figure 2 & 3, in Appendix). The result in Figure 4 indicates that the proportion of "false" municipalities (without EZ participation) decreases with income per capita, in 2006-2008. Figure 5 depicts that at higher levels of income per capita in the second time-period, a larger proportion of municipalities is linked to EZ.

That process resulted from the cumulative effects of earlier administrative, economic and political efforts and has no correlation with business success or failure. The data analysis linked to the dependent variable underscores the importance of the approach adopted in this research. First, the substantial differences in the mean of number and plot size frequencies across the different periods of phenomenon observations suggest that analysis at a disaggregated level (count and size) would be important for Croatian economic authorities. Second, the significant percentages of municipalities reporting zero frequency for a specific dependent variable (count variable) also necessitate the use of two-stage decision models. Last, the variable CVs (seventh columns in Table 1) indicate possible disparities in number and plot size of entrepreneur zones across the list of municipalities, warranting further investigation of the sources of the variation.

The local communities in this paper appeared to be typical for the mix of rural, urban and suburban communities the Croatia with certain exceptions (see Table 1). The communities' average per capita income in 2006-08 was approximately $US 19,700. Some of the local communities are poorer, but one has an average per capita income of approximately $US 39,700. When compared with per capita income figures for the later period of observation, one can see a decrease of the mean income per capita and the minor divergence among the poorest and wealthiest communities.

Table 1 Definitions and descriptive statistics of variables used in empirical model estimation

Variables	Definitions	Min	Max	Mean	SD	Coef. var
Dependent variable at 1st stage						
Binary variables ("1"/"0")	"1" if the enterprise zone concept is adopted, "0" in opposite case	0	1			
Dependent variable at 2nd stage		0	1			
Count_0	A count variable indicating the frequency of utilization (number of times an enterprise zone programme is adopted) from 1 to 5 in 2006-2008	0	5	0.213	0.578	2.776
Count_1	A count variable indicating the frequency of utilization (number of times an enterprise zone programme is adopted) from 1 to 5 in 2010-12	0	5	0.623	0.772	1.238
Size_0	A count variable indicating the frequency of plot size of enterprise zones per municipality (the amount of acres in a hectare linked to an enterprise zone) from 1 to 5 in 2006-2008	0	543	6.27	30.144	4.804
Size_1	A count variable indicating the frequency of plot size of enterprise zones per municipality (the amount of acres in a hectare linked to an enterprise zone) from 1 to 5 in 2010-2012	0	834	21.63	61.442	2.838
Independent variables						
INCPC_0	Average per capita income of municipality in 2006-2008	7267	39687	19657	5974	0.303
GPC_0	Average per capita revenue *of* municipality in 2006-2008	156	4237	2134	2653	1.243
UN_0	Average unemployment rate of municipality in 2006-2008	1.4	69.6	16.66	9.513	0.57
HK_0	Stock of human capital of municipality in 2006-2008	15.30	85	54.70	13.06	0.236
DI_0	Development index of municipality in 2006-2008	16.13	282.8	80.55	24.776	30.751
INCPC_1	Average per capita income of municipality in 2010-2012	7105	42175	21623	6084	28.13
GPC_1	Average per capita revenue *of* municipality in 2010-2012	223	10115	1984	1696	0.85
UN_1	Average unemployment rate of municipality in 2010-2012	4.5	54.8	18.88	9.16	0.48
HK_1	Stock of human capital of municipality in 2010-2012	31.65	90.41	68.6	11.07	0.161
NW (b)	Northwest Croatia (factor=1)		142 (25.6%)			
CEP	Central and Eastern (Pannonian) Croatia (factor=2)		197 (35.5%)			
AC	Adriatic Croatia (factor=3)		216 (38.9%)			
Dummy variable						
DI_1	Development index of municipality in 2010-2012	19.62	153.55	80.32	24.25	30.57
Categorical variables (a)			Frequencies			
LGC_0	Local government coalition dummy, taking the value of one if the authority is supported by a right-wing coalition (by more than half of valid votes) and zero otherwise (c)	0	1	0.59		

Source: Authors' estimation

Note: a) The frequencies with which the categories occur; b) Used as a base in the empirical model specification; c) The right-wing government in 2007 was a coalition of the following political parties: HDZ, HSS, ZS, ZDS, PGS, HSP, and HDSSB; the left-wing coalition comprised SDP, HNS, HSU-SU, and IDS party members.

Mean per capita fiscal revenue in 2010-12 was somewhat lower than that in 2006-08, showing that these trends occur because of a narrowing of the tax basis and may be a negative consequence of the ongoing great recession that began in 2009. Figure 7 shows that the proportion of number of municipalities that adopted enterprise zone and those who did not, changes considerably over the levels of fiscal revenue in 2010-12. There are comparatively much less variability among number of EZ and fiscal ravenous per capita relationship in the first time-period (see Figure 6).

At 15 per cent, the unemployment rate in 2006-08 was greater than the national average (16.66), although the range of unemployment was rather large (1.4% to 69.6%). In 2010-12, despite the growth of the average unemployment rate, we note a narrowing in the range between the worst and the best municipality. According to Figure 10 we see directly that the proportion of municipality without EZ adoption in the second time period declines monotonously from less than 10% to 25% unemployment rate, whereas earlier we can state prevalence of municipalities without EZ, in all ranges of unemployment discontinuity (see Figure 9).

Human capital was measured using share of population with a high school education (HC). A higher population share with education indicates a higher quality labour force in the local community. Furthermore, a higher quality labour force is expected to be more efficient and therefore reduces the average cost of unemployment, leading to higher entrepreneurship or other economic activity. Areas with high levels of human capital provide a solid base of employees for future manufacturing firms, making firms more likely to enter an EZ programme. Hence, a positive relationship between human capital and the entrepreneurship zone variable(s) was hypothesized.

Another measure of economic change was the change in development measured by the development index; this figure decreased by a small amount, only 0.5 per cent on average, with some of the worst communities showing an increase condition or the best substantial deterioration vis-à-vis development. Therefore, even as incomes were growing, the overall conditions of economic development worsened. The dependent variable (as in the previous similar Figures) is categorical: to have or not to have EZ and the independent is interval-scaled development index. We assume that EZ (absent or present) is the variable, which is influenced by development. The independent interval-scaled index is split up into the value ranges. The general impression that comes out from visualising Figure 11 (and something less from Figure 10) is that moderate level of development increase the proportion of municipalities with EZ adoption. In the cases of under or (extremely) over-development unit of observation that can not be confirm.

The mean values for human capital varied significantly between two time-points of observation. In short, in the later period, the mean value indicated more-specialized skills available to entrepreneurs. The plot (Figure 13) shows that group of municipalities who adopted or were never adopted EZ program have approximately equivalent proportion at a 60-65%, as well as at an 80-85% measured range of human capital. Otherwise, the same plot shows higher involvement of human capital in observation unit whit EZ then Figure 12 (that cast light on the first period 2006-2008).

Three major regions (Northwest, Central and Eastern, and Coastal) were delineated in line with internal administrative districts and county borders. Those regions emerged from associating Eurostat with the State department of statistics. The boundaries of administrative

districts overlap with those of statistical reporting districts where the municipality members reside. Following administrative boundaries and county borders, the formation of the three regions was guided by the location of mountain ranges and river flows, lowland parts and the Adriatic Sea coast. Furthermore, the regions reflect existing and potential economic differences across the country. For example, agriculture and many food industry plants are located in the Central and Eastern region, whereas the headquarters of government agencies, banks, industry and other major service sector organizations are located in the Northwest region. For calculation purposes, the Northwest region served as the base for the empirical model, allowing the comparison of regional effects. The economic force of the coastal region that stretches along the eastern part of the Adriatic Sea is based primarily on the tourism industry.

4.2. First stage: probability of utilizing enterprise zone programmes

4.2.1. Results of binary probit estimations for probability

Results of binary probit estimations for probability of adopting an enterprise zone are shown in Table 2.

Table 2 First stage: probit estimation of probability of having an enterprise zone

Independent variables	Count_0	Count_1
Constant	-20.052*** (-5.068) [0.000]	-13.612 *** (-4.512) [0.000]
Log(GPC)	0.145 (0.723) [0.481]	-0.159 (-0.975) [0.329]
Log(INCPC)	**1.085* (2.483) [0.013]**	**1.017 ** (2.752) [0.005]**
Log(UN)	0.268 (1.175) [0.241]	-0.236 (-0.974) [0.329]
Log(HK)	**1.081 # (1.866) [0.063]**	**1.488 * (2.254) [0.024]**
Log(IDEV)	0.489 (0.504) [0.614]	-0.2108 (-0.289) [0.772]
IDEOL_RIGHT	**0.374* (2.057) [0.039]**	**0.277 * (1.971) [0.048]**
REGION_CEP	0.113 (0.492) [0.624]	0.156 (0.824) [0.413]
REGION_AC	**-0.504 * -(2.431) [0.014]**	**-0.492 ** (-2.807) [0.005]**

Source: Authors' estimation

Notes: *Null hypothesis rejected; Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '#' 0.1 '; Numbers within parentheses () denote asymptotic t-values, and within [ ] p-values. The dummy variable for Region_NW, with 142 observations in sample ≈ 555, was omitted. This facilitates comparison of adoption probabilities in Region_NW with the other two regions: Region_CEP and Region_AC. The similar political variable was also omitted.

We considered a sample of 555 municipalities that exist in Croatia. Not all municipalities adopted an EZ programme. It was therefore interesting to investigate what causes authority to decide to apply such programmes.

For both samples in different periods, the log of income per capita had a significantly positive coefficient in our probit regressions. Municipalities with a higher standard of living were more likely to accept applications for enterprise zones, although theoretical expectations predict the opposite – that is, that depressed areas would be more prone towards entrepreneurial zones. The latter counter-intuitive result brings to light one of the issues concerning the use of cross-sectional data. Instead of establishing causality, effects, determinants, or effects, our regression results may be read as implying correlations, relationships, and associations. However, the "correlations" presented assume ceteris paribus conditions. The sign of coefficient for human capital as independent variables in the model was as expected. The results indicated that the accumulation of human capital had a great positive effect on the likelihood of using an entrepreneur zone programme (with the marginal effect of 23% and 55%, in relation to the time of observation, respectively), which confirms that a deterioration of access to secondary education may result in a deficit concerning required professional skills.

The variable for Region_AC was significant at the 5% level and negative in the Count_0 (and Count_1) equation, with a marginal effect of -0.11 (and -0.18). This indicated that estimated in isolation, this region (coastal municipalities of the following counties: Istarska, Primorsko-Goranska, Splitsko-Dalmatinska and Dubrovačko-Neretvanska) was approximately 11-18% less likely to adopt an entrepreneur zone relative to counties in Region_NW. As for the ideological orientation of voters, we see the following. The positive and significant IDEOL_RIGHT as a coefficient indicated that estimated in isolation, more conservative units of observation were slightly more motivated to adopt an EZ programme relative to the liberal part of the sample.

The results of a probit regression indicate that log (GPC) did not affect adoption of an EZ programme with either definition for the study time-periods. Additionally, unemployment rate, development level, and dummy for the central-east region were not significant factors in determining adoption of EZ programmes for the study years.

Table 3 Marginal effects for the probit model

Independent variables	**Count_0**	**Count_1**
Constant	-4.402	-5.080
INCPC	0.238	0.377
HK	0.237	0.552
IDEOL_RIGHT	0.081	0.102
REGION_AC	-0.112	-0.181

Source: Authors' estimation

Table 3 presents the marginal effects for our probit models. The effects in Table 3 can be given a quantitative interpretation and are measured in units of probability. We consider here only the effect of significant variables. Here, the average effect of log of income per capita in the 2006-2008 sample of municipalities is 0.24; this figure increases in the later period. These results tell us that the probability of increasing income per capita occurrence for municipalities that adopted enterprise zones was 0.24 higher than that in municipalities without an entrepreneur zone, and with other variables staying intact, ceteris paribus. In the

sample that covers the 2010-12 period, that probability is somewhat greater, ceteris paribus, and amounts 0.38.

4.2.2. Predictive performance

The maximum and minimum values of the standardized residuals reported in Table 4 for the probit model did not indicate the presence of outliers. To test for the possible presence of heteroskedasticity, we have performed the Breusch-Pagan test. This test provides some evidence for the presence of heteroskedasticity in the regression that considers the Count_1 sample. The two models had very modest pseudo-R2, but relatively low fit is typical for models explaining individual behaviours in cross-section datasets.

Table 4 Diagnostic test results of the Probit models

		Count_0	Count_1
Standardized residuals:	minimum	-1.493	-2.023
	maximum	6.106	2.345
Heteroskedasticity LM	test value (df = 8)	55.964	10.927
	corresponding P-value	< 0.001	> 0.001
Psudo-R2		0.14	0.07

Source: Authors' estimation

4.3. Second stage: probability of designating EZ

4.3.1. Two-stage models vs. single-decision models

Prior to choosing a hurdle model with the most suitable distribution in modelling frequency of EZ size, we will make some selection tests.

Hurdle models and single-decision models, using each of the Poisson, geometric and Negbin II, were estimated by maximum likelihood estimation (using the Newton-Raphson algorithm) for frequencies in ha of entrepreneur zones, rounded to an integral number.

Imposition of parametric restrictions on two-stage models resulted in single-decision models and implied that the latter were nested in the former models (Winkelmann, 1997).

Table 5 shows likelihood values for two- and single-stage models based on Poisson, geometric and Negbin II distributions, and χ^2 statistics. The likelihood ratio (LR) statistics test supported the choice of two-stage decision models. The calculated χ^2 statistics across that type of endogenous variable exceed the critical value (21.67) at $\alpha = 0.01$ with 9 degrees of freedom, confirming that the size in ha frequency data are characterized by over-dispersion and excess zeros. Additionally, the over-dispersion tests for Poisson regression suggest that those models in generalized linear regression form are not well specified because there appears a substantial amount of over-dispersion (Table 6). The test results also indicated that zeros and non-zeros come from two different data-generating processes, consistently stressing the importance of two-stage behaviour in modelling frequency data of ha concerning entrepreneur zone adoption in Croatia.

Table 5 Likelihood ratio statistics for testing two-stage decisions vs. single-decision in Hurdle model

Dependent variable	Poisson model			Geometric model			Negbin II model		
	Log Lu	Log Lr	-2λ	Log Lu	Log Lr	-2λ	Log Lu	Log Lr	-2λ
Size_0	-2362.6	-3017.7	-1310.2	-636.17	-684.53	-96.72	-636.0	-681.2	-90.4
Size_1	-8774.7	-10749.0	-3948.6	-1609.5	-1667.8	-116.6	-1602.2	-1648.1	-91.8

Source: Authors' estimation

Note: Log Lu are maximized log likelihood values from hurdle models, Log Lr are maximized log likelihood value from single-decision models, and λ = Log Lu, -Log Lr. The critical X^2 value is 21.67 at $e_t = 0.01$ with 9 degrees of freedom.

Table 6 Dispersion test of Poisson regression

Dependent variable	Poisson GLM model	
	Dispersion z-test	p-value
Size_0	2.96	0.001
Size_1	3.982	0.000

Source: Authors' estimation

4.3.2. Vuong's non-nested tests

The next task was to choose a discrete distribution that best fitted the collected data. We used the non-nested model selection procedure proposed by Vuong (1989), assuming that the true data-generating process of size frequency in ha is unknown. Vuong's procedure tests the null hypothesis that two competing models equally well resemble the true data-generating process against the alternative hypothesis that one model outperforms the other. The three pairs of tested hypotheses were (i) Poisson hurdle model vs. geometric hurdle model; (ii) Poisson hurdle model vs. Negbin II hurdle model; and (iii) geometric hurdle model vs. Negbin II hurdle model.

Table 7 shows computed Vuong statistics, which had a standard normal distribution under the null hypothesis that the two models were equivalent. We focus primarily on the results linked to the size variable. The results decisively rejected the Poisson hurdle model in favour of geometric and Negbin II hurdle models, respectively in the case of the size variable. Additionally, the geometric hurdle model was rejected in favour of the Negbin II hurdle model in the case of Size_1 modelling, indicating that the Negbin II distribution is a good match for the observed distribution. In the case of the Size_0 model, we will choose the geometric hurdle model that appears better.

These test results illustrate that in addition to the hurdle framework incorporating two different data-generating processes, accounting for unobserved heterogeneity is important in modelling the frequency data, as is the plot size in ha, used in this study. It is likely that there are unobserved sources of heterogeneity that contribute to the differences in plot size frequency across municipalities. Accordingly, we report parameter estimates for Geometric and Negbin II hurdle models.

Table 7 Vuong's non-nested model selection tests among Poisson, geometric and Negbin II hurdle models

Dependent variable	Vuong's statistics		
	Geometric vs. Poisson	Negbin II vs. Poisson	Negbin II vs. geometric
Size_0	3.223[0.001]	3.221[0.001]	0.308[0.383]
Size_1	6.787[0.000]	6.775[0.000]	1.794[0.036]

Source: Source: Authors' estimation; [ ]p-value

Note: A large, positive test statistic with p-value < 0.05 provides evidence of the superiority of model 1 over model 2.

4.3.3. Results of the double hurdle model

The statistically significant role of income per capita in the participation and frequency decision is somewhat puzzling given the primary role an EZ programme should have in overcoming economic depression in a part of the country (see Table 8). The log of income per capita had a statistically significantly positive influence on the decision to participate in the EZ programme, and that influence is discussed in the previous part of this paper. Here in the second stage of the research, we find and repeat that the size plot frequency of EZ as a response variable is positively linked to the log of income per capita. According to the results, municipalities with higher income per capita were more likely to consume land that will be designated for the needs of enterprise zones than were low-income per capita municipalities. These results are found in both time-intervals and clearly illustrate the importance of budget constraints in determining how large the size of EZ programmes should be. The higher-income population may be more likely to have been exposed to an entrepreneurial tradition in which the strong desire to succeed leads to more land used in an EZ programme than in municipalities with low income per capita.

The most striking result is that human capital, as measured by secondary school education, has a significant, positive and strong effect on the probability of the EZ's size frequency, compared with municipalities in 2010-12 (as in the binominal regression). Because education levels are likely to respond to growing employment opportunities within the EZ structure, Table 8 confirms the previous regression results when binominal model techniques are applied.

Regional differences in land plot frequencies designations for EZ are pronounced and suggest that residents of the Adriatic region are less likely to be users of land units and, if they are users, to have available smaller ha units than are those living in the NW region. In addition, municipalities leaning more towards right-wing ideology are more likely to include more units of ha in their EZ programme and develop one more often than municipalities of the opposite party. That independent variable is weakly significant at the P<0.19 level.

Table 8 Maximum likelihood estimates from hurdle model

Intercept	Geometric distribution	Negbin II distribution
Response variable	Size_0	Size_1
Constant	-36.117*** (-5.365)	-21.482** (-4.301)
Log(INCPC)	**1.909*** **(2.416)**	**1.679**** **(2.767)**
Log(GPC)	0.269 (0.712)	-0.229 (-0.858)
Log(UN)	0.551 (1.348)	-0.418 (-1.063)
Log(HK)	**2.029 #** **(1.903)**	**2.197*** **(2.022)**
Log(IDEV)	0.901 (0.524)	-0.398 (-0.334)
IDEOL_RIGHT	**0.563 #** **(1.743)**	**0.436 #** **(1.912)**
REGION_CEP	0.165 (0.405)	0.275 (0.924)
REGION_AC	**-0.994**** **(-2.678)**	**-0.816**** **(-2.868)**
Log Likelihood	-636.2	-1602
AIC	1308.331	3247.8

Source: Author's calculations

*Null hypothesis rejected; Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '#' 0.1 '

5. CONCLUSION

Using EZ participation and frequency data collected in Croatia in 2006-2008 and 2010-2012, this study uses binominal probit and hurdle count-data models to analyse dislocated zones among municipalities in a transition economy undergoing major structural changes in that field.

We estimate three discrete single-decision and hurdle models for Poisson, geometric and negative binomial distributions to test simultaneously for over-dispersion and excess zeros concerning number of hectares covering EZs. Hurdle models were shown to outperform single-decision models across the three distributions, suggesting that accounting for over-dispersion and excess zeros is essential in this study. From an economic behavioural viewpoint, the results confirm that zeros and non-zeros come from two different data-generating processes. Subsequently, Vuong's non-nested model selection tests identified Geometric and Negbin II hurdle models as the best fit to the 2006-2008 and 2010-12 datasets, respectively, across the land plot frequencies, indicating that accounting for unobserved heterogeneity is required in addition to addressing over-dispersion and excess zeros.

An advantage of the two-stage decision model is the ability to address municipalities who reported zero frequency of land assigned to an EZ purpose. Given the significant percentage of zero reports for most municipalities, distinguishing the decision of whether to designate plots of land for EZ programmes is an essential component of this research.

For both samples in different periods, the log of income per capita has a significantly positive coefficient in binominal regressions and in hurdle models. A municipality with a higher standard of living is more likely to accept enterprise zones as a development strategy. Poorer municipalities in Croatia, as measured by per capita income, are less likely to increase the number of enterprise zones, presumably to include more economically distressed areas. It is more difficult politically to justify targeting enterprise zones in economically distressed areas in poorer municipalities when depression hits the entire national economy. Croatia is plagued by the recession that started in 2009. Richer municipalities are more agile in bad times and less risk-averse towards investing in EZ programmes. The results of binominal (and hurdle) regression indicate that the accumulation of human capital has a positive effect on the likelihood of using an entrepreneur zone programme, stressing the importance of professional skills in finishing EZ projects.

The estimated results for land frequencies illustrate the importance of using the two-stage behavioural model. We thus obtain confirmation of the results of the probit regression on participation in EZ programmes; the insignificant effect of unemployment and fiscal revenue per capita on the probability of participating land demand indicates that local authorities are not driven to expand EZ programmes as a weapon in the battle against unemployment or to collect more taxes.

As stated, the estimated hurdle models confirm the results of probit regressions and clearly establish that income per capita, human capital stock, and conservative ideology concerning voting directly affect the participation decision to adopt EZ programmes and frequency of land in hectares. These results confirmed our expectation that EZ adoption patterns would differ across the various socio-economic units that constitute the average municipality in Croatia. In addition, this study revealed a noticeable difference in EZ adoption patterns across geographic regions. The economic effect of the transition towards a market economy in times

of homeland war on the fragile economies of coastal Croatia was equivalent to a strong negative external shock that further aggravated their economic situation. This region is characterized by lesser initiative in EZ adoption as an instrument of industry development than is the north-western region. This result is consistent with cognition implying a coastal reorientation away from a more- to a less-industrial region in the long term, in which EZ zones are relatively absent compared with the central part of Croatia.

We didn't use a longer series of data about EZ, as well as time-series methods to make the included variable comparisons, neither to test our main hypothesis. When this study on topic began, 2006-08 and 2010-12, were the earliest and most recent time, respectively, available and adequately geo-coded data years. Therefore, we used regression models for binary and count data as micro-econometric instruments in our research. We recommended using time-series (or panel) methods to examine the relationship between periodic changes in unemployment rates, income, etc. and activity within EZ if the future source of adequate data would permit. In some future study, we recommended including a fuller accounting of benefits and costs both in terms of effects on public finances, provision of services, and economic impacts (for example on real estate prices) from project investments and employment in the enterprise zone.

BIBLIOGRAPHY

Charlot, S., Dujardin, C., Goffette-Nagot, F., Havet, N., Sidibé M. (2012), **Accès à l'emploi dans les territoires des politiques de la ville: un appariement entre emplois et populations,** Report for the French Ministry of Labor.

Einio, E., Overman, H. (2011), **The Effects of Spatially Targeted Enterprise Initiatives: Evidence from UK,** LEGI, mimeo.

Givord, P., Quantin, S., Trévien, C., (2012), **A Long Term Evaluation of the First Generation of the French Urban Enterprise Zones**, Institut National de la Statistique et des Etudes Economiques, DESE, Working Papers of the DESE, g2012-01.

Hirasumna, D. and Joel, M. (2005), **Enterprise Zones: A Review of the Economic Theory and Empirical Evidence,** Research Department of Minnesota House of Representative, January 2005.

Mayer, T., Mayneris, F., Py, L. (2012), **The Impact of Urban Enterprise Zones on Establishment Location Decisions: Evidence from French ZFUs,** CEPR DP n° 9074.

Mayneris, F., Py, L. (2014), **The Efficiency Of Enterprise Zone Programs Some Conflicting Results?,** Working Papers, The Banque De France, mimeo.

Neumark, D., J. Kolko, (2008), **Do Enterprise Zones Create Jobs? Evidence from California's Enterprise Zone Program,** NBER Working Paper 14530.

Peters, A., P. S. Fisher (2002), **State Enterprise Zone Programs: Have They Worked**.Kalamazoo, MI, W.E. Upjohn Institute for Employment Research

Billings, S.(2009): **Do Enterprise Zones Work? An Analysis at the Borders,** *Public Finance Review,* 37(1): 68-93.

Boarnet, M. G., Bogart, W. T. (1996): **Enterprise Zones and Employment: Evidence from New Jersey,** *Journal of Urban Economics,* 40:198-215.

Bondonio, D., Engberg, J. (2000): **Enterprise Zones and Local Employment: Evidence from the States' Programs,** *Regional Science and Urban Economics,* 30:519-549.

Busso, M.., Gregory, J., Kline, P., (2013): **Assessing the Incidence and Efficiency of a Prominent Place-Based Policy,** *American Economic Review,* 103: 897-947.

Engberg, J., Greenbaum, R. (1999): **State Enterprise Zones and Local Housing Markets,** *Journal of Housing Research,* 10:163–187.

Elvery, J. (2009): **The impact of enterprise zones on residential employment: an evaluation of the enterprise zone programs of California and Florida,** *Economic Development Quarterly,* 23(1): 44–59.

Gobillon, L., Magnac, T., Selod, H. (2012): **Do Unemployed Workers Benefit from Enterprise Zones? The French Experience**, *Journal of Public Economics*, 96:881-892.

Greenbaum, R. T. and J. B. Engberg (2003): **The Impact of State Enterprise Zones on the Establishment of Urban Manufacturing Establishments**, *Journal of Policy Analysis and Management,* 23(2): 315-339.

Hanson, A. (2009): **Local Employment, Poverty, and Property Value Effects of Geographically-Targeted Tax Incentives: an Instrumental Variables Approach,** *Regional Science and Urban Economics*, 39:721–731.

Ham, J. C., Swenson, C., İmrohoroğlu, A., Song, H.(2011): **Government programs can improve local labor markets: Evidence from state enterprise zones, federal empowerment zones and federal enterprise communities,** *Journal of Public Economics,* 95:779-797.

Hanson, A., Rohlin, S. (2011): **Do Location-Based Tax Incentives Attract New Business Establishments?,** *Journal of Regional Science,* 51(3): 427-449.

Lynch, D., Zax, J. S. (2011): **Incidence and Substitution in Enterprise Zone Programs: The Case of Colorado,** *Public Finance Review,* 39:226-255.

O'Keefe, S. (2004): **Job Creation in California's Enterprise zones: A Comparison using a Propensity Score Matching Model,** *Journal of Urban Economics,* 55:131-150.

Papke, L. E. (1994): **Tax Policy and Urban Development: Evidence from the Indiana Enterprise Zone Program,** *Journal of Public Economics,* 54:37-49.

Rathelot, R., Sillard, P. (2009): **Zones Franches Urbaines: quels effets sur l'emploi salarié et les créations d'établissements ?,** *Economie et Statistique,* 415(1):81-96.

Rubin, H. and I. Rubin (1987): **Economic Development Incentives: The Poor Pay More,** *Urban Affairs Quarterly***,** 22: 32-62.

Tao, J. L. and R. Feiock (1999): **Directing Benefits to Need: Evaluating the Distributive Consequences of Urban Economic Development,** *Economic Development Quarterly,* 13(1): 55-65

Turner, R.C., Cassell, M.K. (2007): **When Do States Pursue Targeted Economic Development Policies? The Adoption and Expansion of State Enterprise Zone Programs,** *Social Science Quarterly,* 81(1):86–103.

Vuong, Quang H. (1989): **Likelihood Ratio Tests for Model Selection and non-nested Hypotheses,** *Econometrica,* 57 (2): 307–333.

Wilder, M., B. Rubin (1996): **Rhetoric Versus Reality: A Review of Studies of State Enterprise Zone Programs,** *Journal of the American Planning Association***,** 42(4): 473-491.

Bochsler, Daniel (2010): **Territory and Electoral Rules in Post-Communist Democracies,** Houndmills: Palgrave

Kleiber, Ch., Zeileis, A. (2008), **Applied Econometrics with R**, Springer-Verlag

Winkelmann, R. (1997), **Econometric Analysis of Count Data,** Springer-Verlag

CDLL database (2014), http://www.mrrfeu.hr [Accessed 8.12.2014]

EZ database (2014),
http://www.strukturnifondovi.hr/prilog7.popispoduzetnikihzona2004-2013.
[Accessed 11.11.2014]

EZ database (2015),
http: //www.strukturnifondovi.hr/poduzetnicke_zone2015_obrazac_prijave.
[Accessed 1.02.2015]

ELECTORAL database (2010), //www.bochsler.eu/ceedata [Accessed 05.09.2014]

SBA Fact Sheet CROATIA, EU Comission (2014),
ec.europa.eu/.../facts...sheets/2014/croatia_en.pdf [Accessed 05.09.2014]

APPENDIX

Figure 2

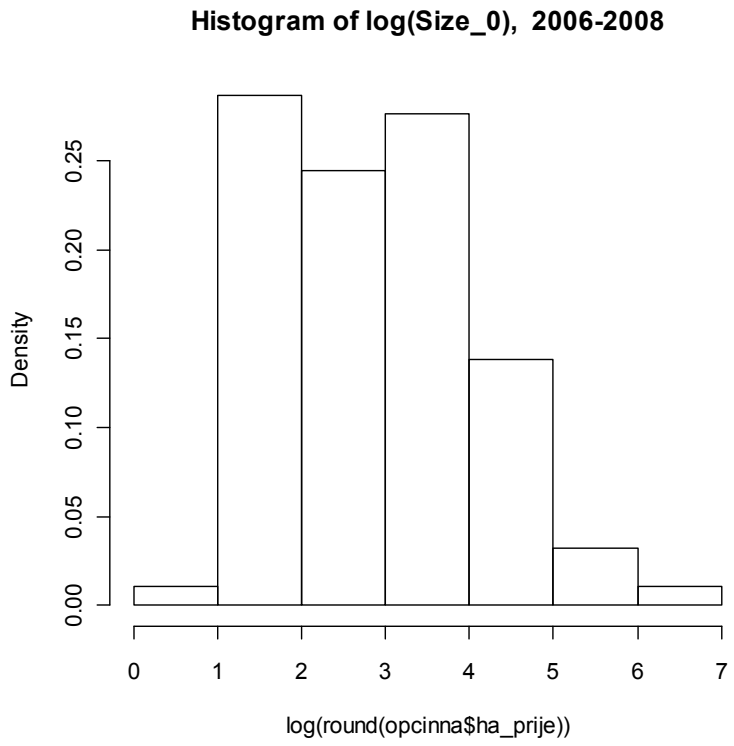


Figure 3

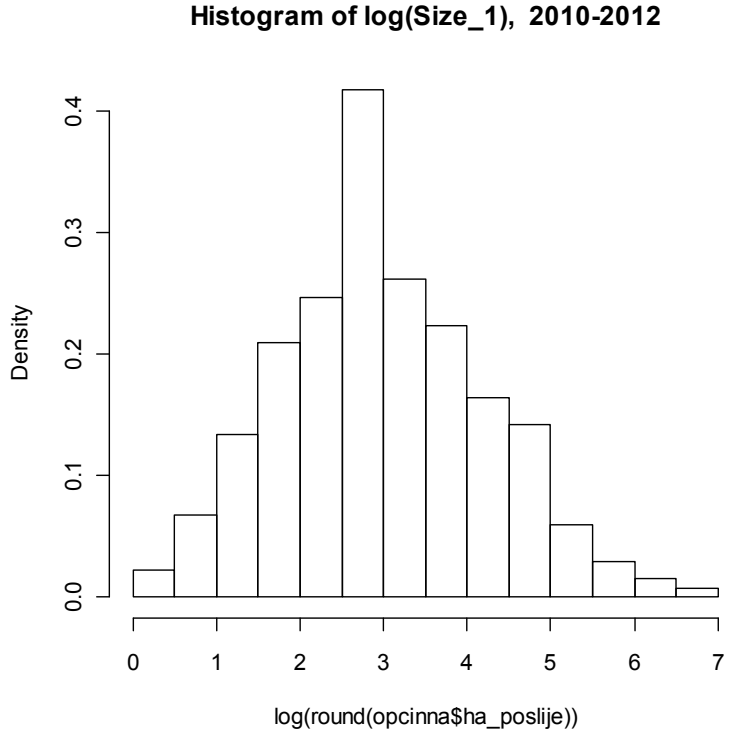


Figure 4

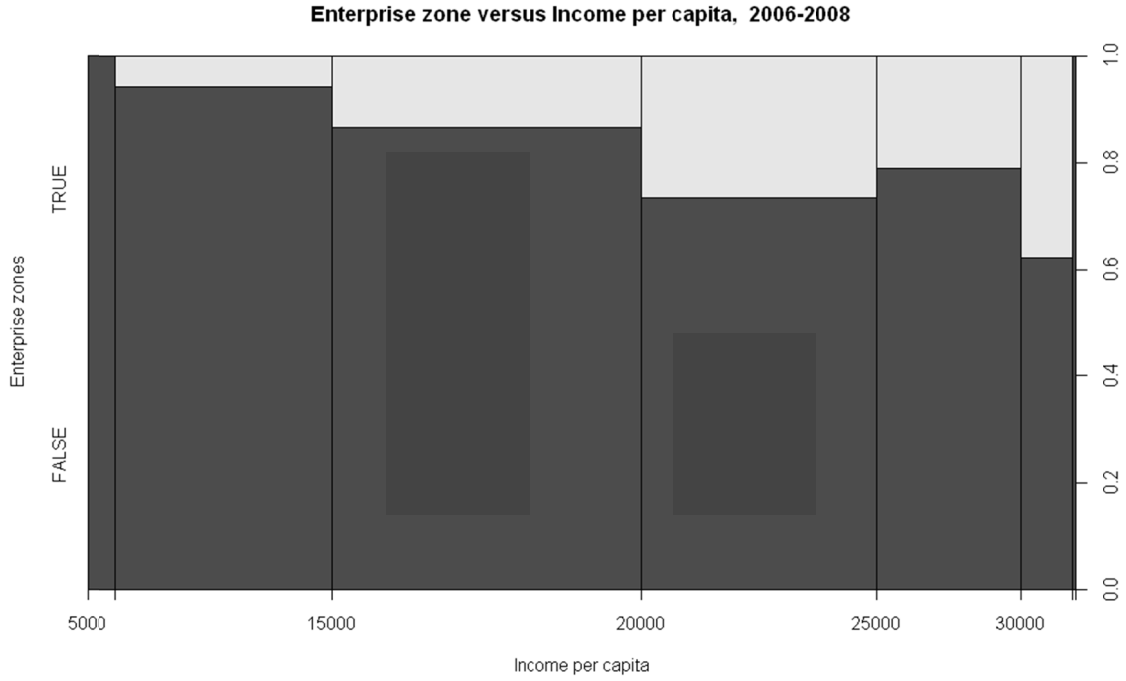


Figure 5

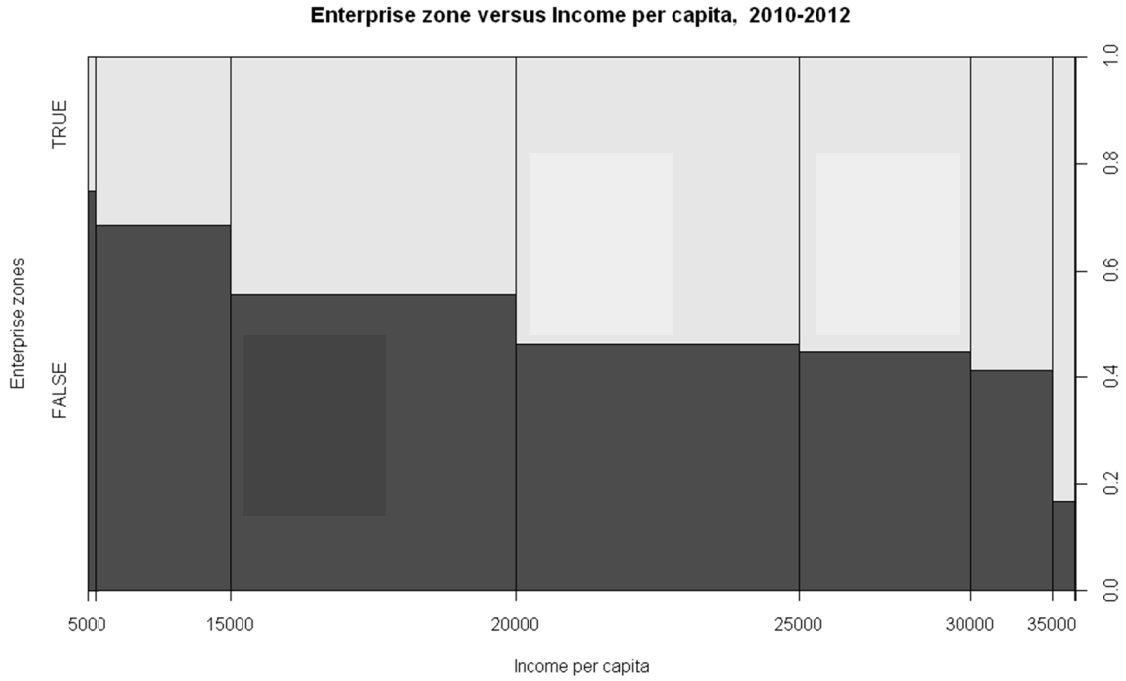


Figure 6

Figure 7

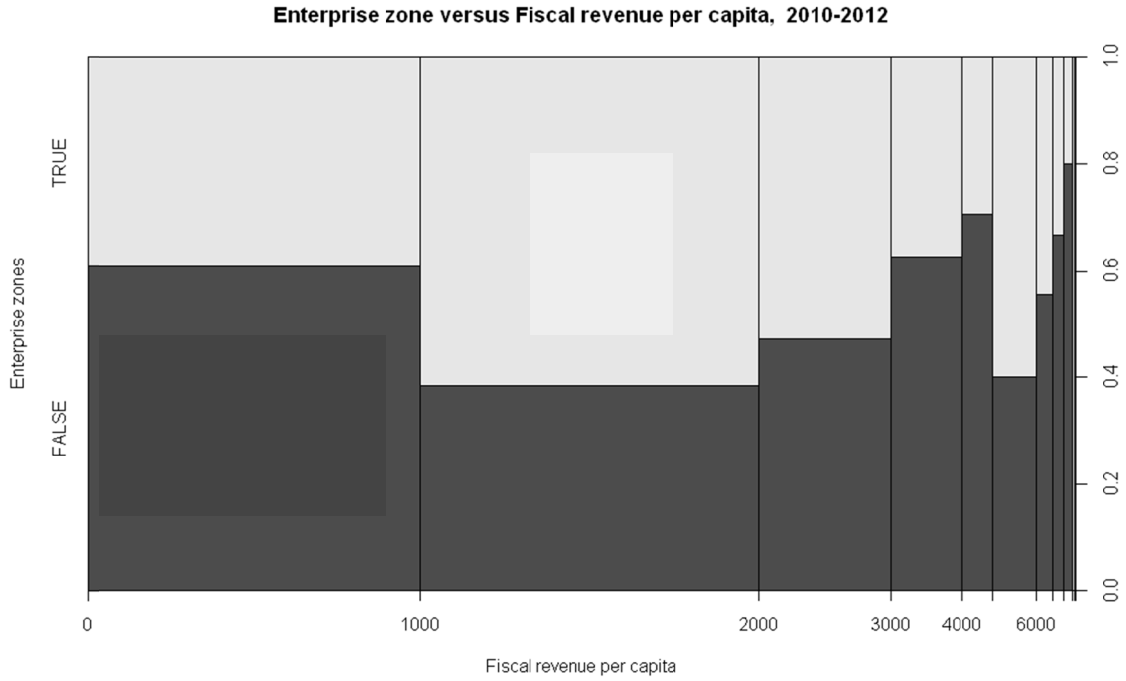


Figure 8

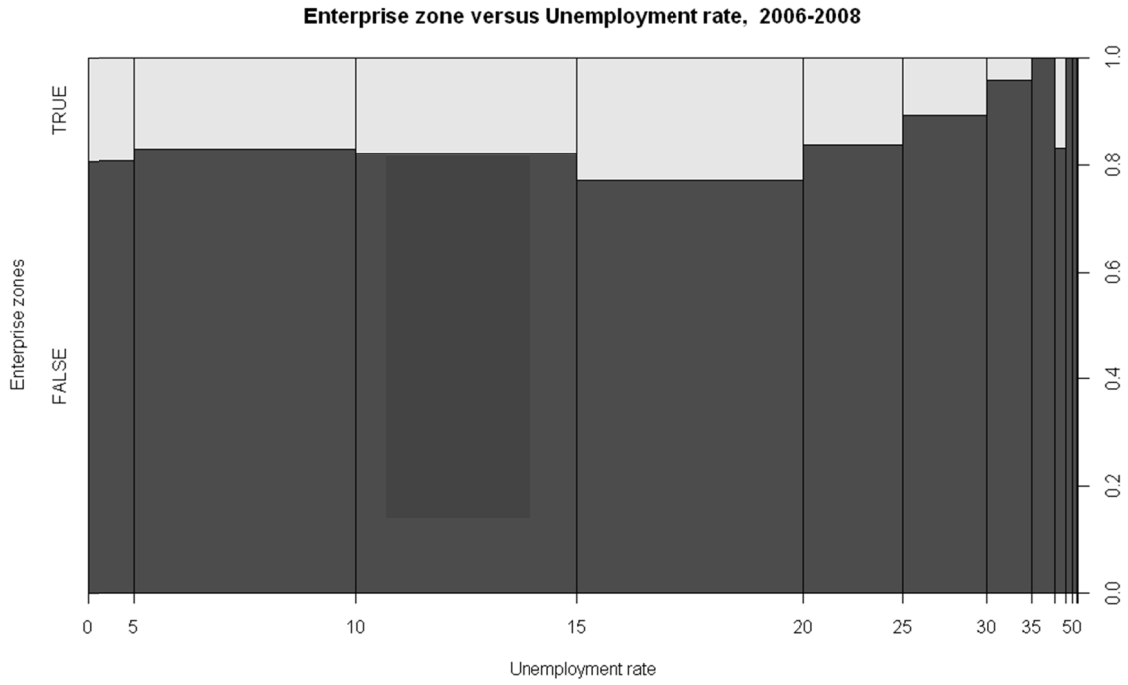


Figure 9

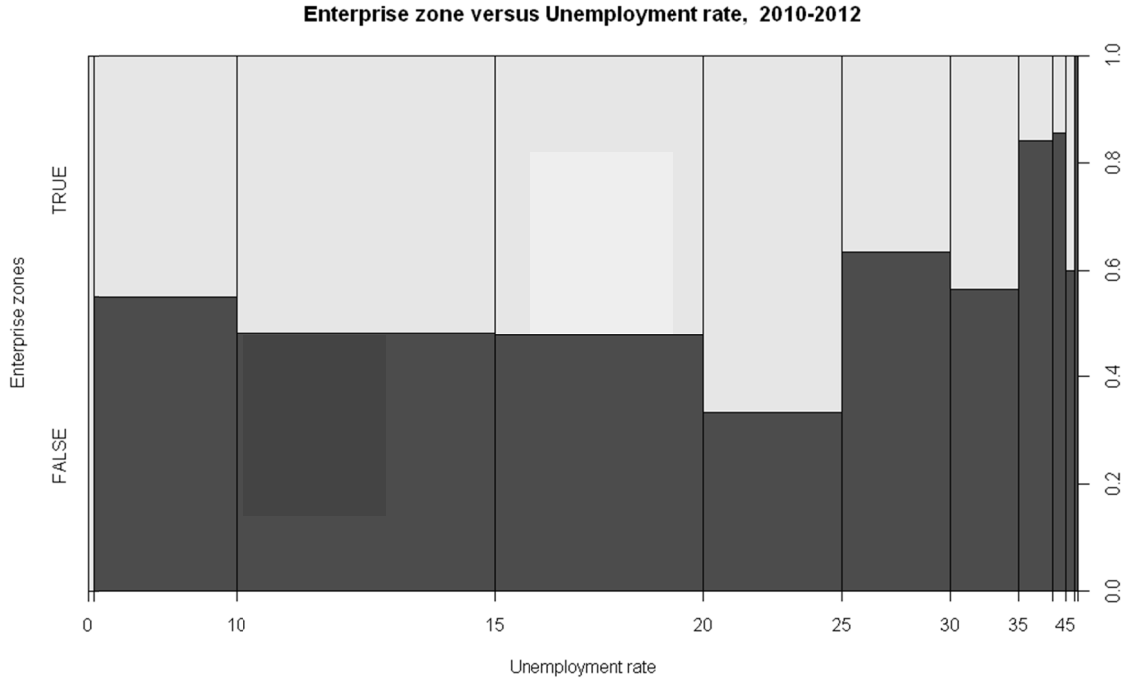


Figure 10

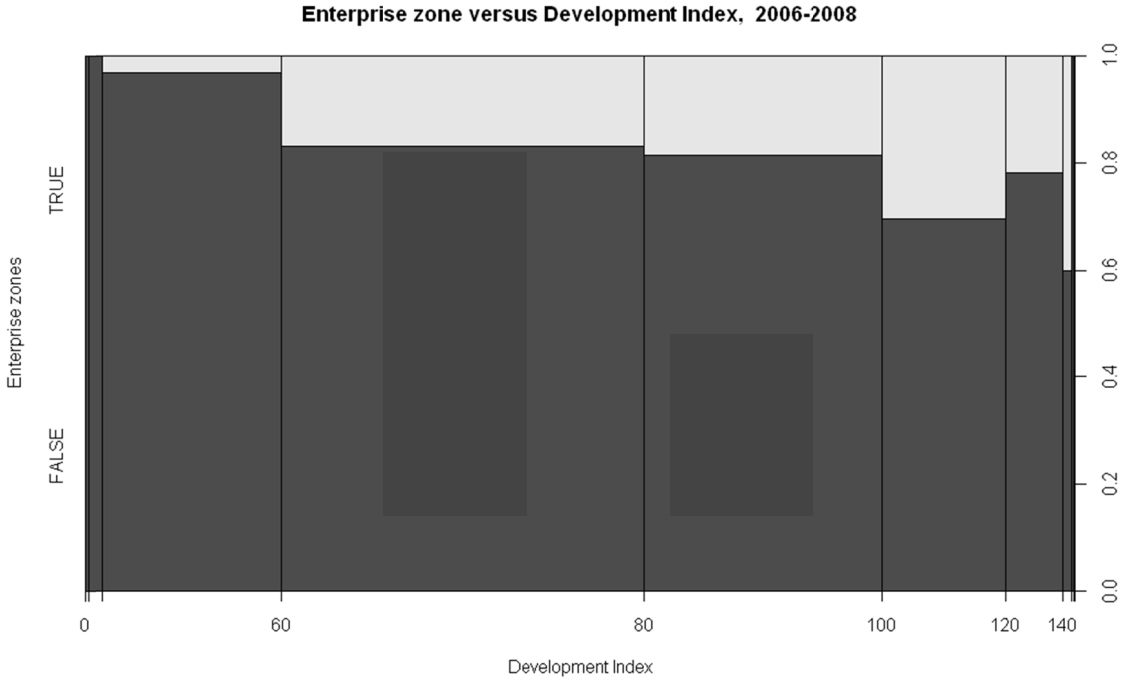


Figure 11

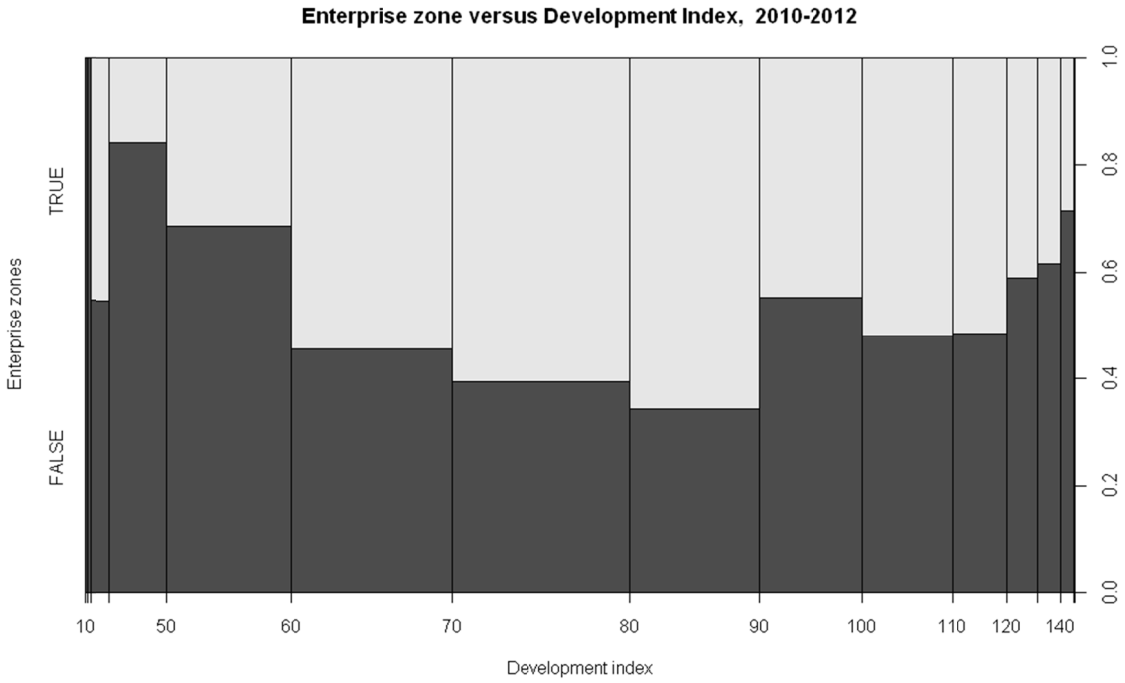
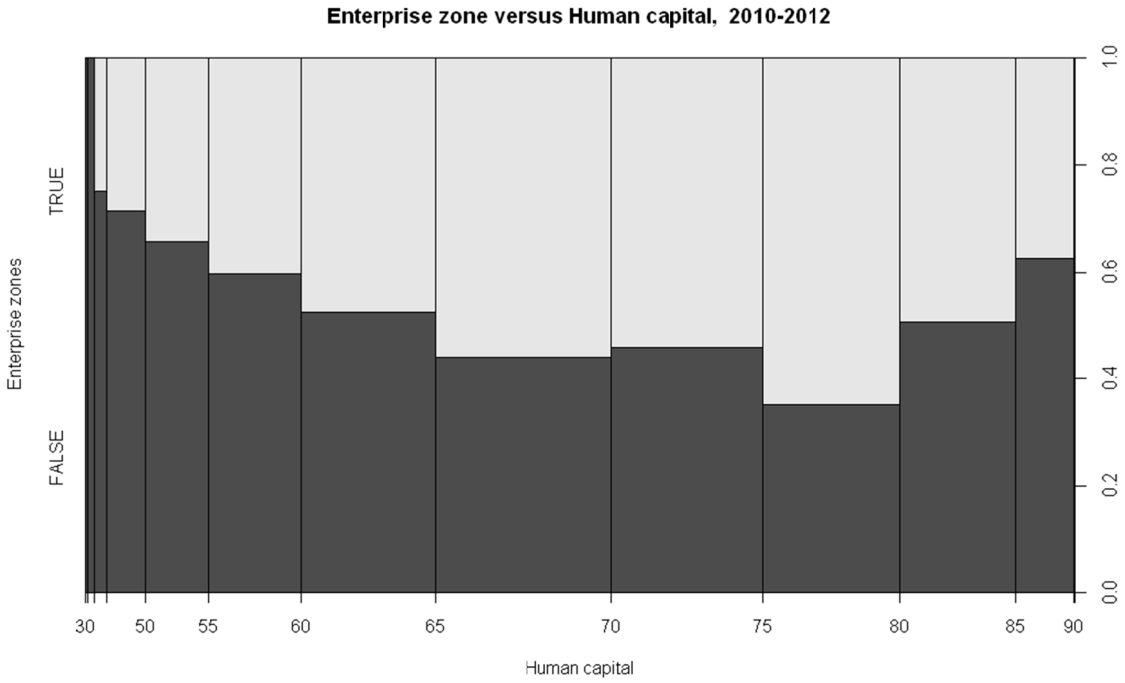


Figure 12

Figure 13



EVALUATION OF THE TOURIST RESORT STRATEGIC MANAGEMENT MODEL IN THE EASTERN ADRIATIC LITTORAL

Neven Šerić, PhD
University of Split/Faculty of Economics
Cvite Fiskovića 5, Split, Croatia
Phone: ++ 385 21430659; Fax: ++ 385 21 430 701
E-mail: nevseric@inet.hr

Martina Jerković, E. Sc.
University of Split/Faculty of Economics
Branitelja domovinskog rata 8, Šibenik, Croatia
Phone: ++ 385 915640879
E-mail: martajerkovic@hotmail.com

Jasenko Ljubica, PhD
Instituto Technologico y de Studios Superiores de Monterrey
Campus Guadalajara, Mexico
Phone: 01 33 804322171
E-mail: jasenko@itesm.mx

ABSTRACT

As opposed to the large tourist areas in the Mediterranean, eastern Adriatic littoral is characterized by the spatial boundedness on one hand and the diversity of valorised and potential tourist resources on the other. The misuse of that diversity is reflected primarily in the eastern Adriatic resort´s orientation towards bathing tourism and the economies of scale. In addition, the collision between the necessary level of annual income of the hotel resorts and revenue generated by existing (standardized) business model, prevents the implementation of economies of scale. These facts represent a stimulus for the re-evaluation of the key variables of the tourist resort strategic management model, which reflects the research problem. Accordingly, the research focuses on the findings of the longitudinal research undertaken by the authors within the two year period (2013/2014). Based on those findings, a new, sustainable tourist resort strategic management model is proposed.

Key words: *model, strategy, management, tourist resort*

1. INTRODUCTION, PURPOSE & METHODOLOGY

In the Eastern Adriatic area, over the last decade, introduction of regulatory processes in spatial planning related to the (re)construction of tourist resorts resulted with an investment slowdown. These processes aid changes in trends of unplanned, irresponsible tourism construction. The current global tourism trends show increased interest for tourist visits to the eastern Adriatic coast and interest for holidays in the tourist resorts (Avraham, Ketter, 2008, 1338). The growth of the tourist industry based primarily on the major tourist resorts of the Mediterranean countries (Hall, Smith, Marciszewska, 2012, 317, 384, 418) has a negative impact to the competitiveness of the national tourist offer. Resorts often sustain economy of operations through the economy of scales. Investments are focused on the expansion of accommodation and primary board content (Butler, 2006, 237). The management of Mediterranean tourist resorts is characterized by standardized model of strategic management based on economies of scale and the promotion of mass tourism (Hall, Smith, Marciszewska, 2012, 317, 384, 418). Such model cannot be applied successfully in the tourist resorts located in the areas with geomorphological constraints for expansion of accommodation and beach facilities and services. Due to this fact it is necessary to re-evaluate the strategic management model of tourist resorts in this area. Customization of the standardized model, according to new tourism trends, contributes to the strengthening of competitiveness. On this basis, research in this field is useful for all tourist resorts in the Mediterranean and beyond (Evans, Campbell, Stonehouse, 2003, 241).

The number and diversity of commercialized and potentially usable tourist resources in the coastal areas of the eastern Adriatic represents the platform for sustainable and responsible tourism development. This has particular importance for maintaining the competitiveness of the tourism offer in zones with geomorphological constraints (Aqarwal, 2002, 25). Studies have shown that standardized tourist resort strategic management model does not give specific meaning to geomorphological constraints variable (Hall, Smith & Marciszewska, 2012, Seric & Lukovic, 2008). Eastern Adriatic area is characterized by hilly hinterland that, in some places, rises only few kilometers from the coastline. However, this area is also characterized by diversity and variety of tourism resources, many of which are not commercialized (Seric & Talijancic, 2009). Standardization of Mediterranean tourist resort strategic management model marginalizes the importance and utilization of such resources (Baxter, Kerr, 2010). Inadequacy of intensity and modes of exploitation of available tourism resources in the tourist resort environment have negative repercussions on competitiveness (Butler, 2006, 306). For example, standardized model ignores variable of historical identity of the environment which is particularly useful for the creation of specialized and diverse tourist offer. Such offer is an important catalyst of sustainable and responsible tourism development. Due to its impact on strengthening of the competitiveness of all subjects, it is recommended to implement it in the tourist resort management (Avraham, Ketter, 2008, 817, 860). The same is, often, not subject of interest of tourist resorts due to the unplanned development of tourism economy during the second half of the 20th century. Consequently, standardized model of strategic management is recognized in these areas today.

Standardized model is primarily based on economies of scale. This approach enables the use of a broader range of pricing policies in terms of seasonal business (Hall, Smith, Marciszewska, 2006). Price lowering of tourist offer does not allow the accumulation of capital necessary for the development of new facilities, particularly those that are precondition for developing year-round tourism (Evans, Campbell, Stonehouse, 2003). The consequences of low rates of accumulation are reflected in the mature stages of the life cycle of tourist

resorts (Butler, 2006). These examples are present and increasing in the Mediterranean area (Hall et al. 2012). Such tourist reality imposes the need for changes in the image management of receptive tourism entities (Seric, 2014). These facts served as a stimulus for research focusing on the re-evaluation of variables of the standardized tourist resort strategic management model in the Eastern Adriatic littoral.

Due to rising price competition, new tourism trends and unused resource potential in the eastern Adriatic coast, it is advisable to modify the standardized tourist resort strategic management model. Focusing destination offer primarily on beach tourism does not contribute to extension of the tourist season (Evans, Campbell, Stonehouse, 2003). Business optimization based on economy of scale ignores a number of criteria for responsible and sustainable tourism development (Fennell, Weaver, 2005). The negative repercussions of such approach are evident in terms of natural environment. There are also consequences to valuable cultural and historical heritage. These resources are one of the foundations of competitiveness in eastern Adriatic littoral. Negligent management of these resources generates negative publicity of the destinations and the country. Such publicity results in a decrease of interest from environmentally conscious tourist clientele (Pike, 2008).

Taking into account all the facts it is reasonable to conclude that the object of study, i.e. the evaluation of a standardized Mediterranean tourist resort strategic management model, with aim of its modification to the eastern Adriatic coast area, is encouraging for the research. The research problem is reflected in the fundamental research question:

Does standardized Mediterranean tourist resort strategic management model contribute to the tourist resort's competitiveness and season extension in the eastern Adriatic littoral?

Based on the above, the basic aim of this paper is to analyze the weaknesses of the standardized model in the context of the research question and, based on research results, propose improved model of tourist resort strategic management model. Accordingly, a longitudinal study was conducted during the peak tourist seasons in 2013 and 2014. The first phase of the research (preliminary survey, 2013) includes an analysis of financial records of selected tourist resorts, in-depth interviews with management representatives of those subjects, and exploration of perceptions and attitudes of guests of those resorts. The sample (N=1600) is composed exclusively of loyal guests visiting the resort for numerous years. They were offered participation in longitudinal research for a term of two years, for which the resort approved various benefits and bonuses. Based on the results of preliminary research upgraded tourist resort strategic management model was constructed. The questionnaire for the guests participating in the survey was also designed in order to test the new model. Testing of the modified model was conducted in the second phase of the study (primary research) during the peak tourist season in 2014 on a sample of 160 expert ratings obtained using the funnel and pre-test survey on a sample of 1600 guests from the first phase of research.

2. THE PRELIMINARY RESEARCH

2.1 Tourist resort and destination offer of the receptive market

Selection of competitive markets is of particular importance for the performance of the tourist resort (Pike, 2008). Traditionally, tourist market is called the *sellers' market*. This market is characterized by standardized offer, primarily in seasonal form. Market leaders are receptive

operators with large accommodation capacity. Such subjects are optimizing performance by means of economies of scale (Lewis, 2007). Competitive price with standardized tourist services are fundamental force of leaders. Different requirements and desires of new, as well as traditional tourist market segments over the last twenty years created a special market that can be called the *buyers' market*. These market standards of specialized tourism products and services are set exclusively by tourist demand. The competitiveness of supply depends on the match between supply and expectations of targeted tourist segment. The higher level of compliance with the expectations enables higher prices. The interest of the target clientele should be forecast, according to the current tourism trends (Evans et al., 2003). The tendency of year-round tourism offer development assumes positioning in the buyers' market. Resorts have an important role in this process. For this purpose it is necessary to modify the standardized tourist resorts strategic management model, since it has been tailored for the sellers' market (Pike, 2008).

2.2 Standardized tourist resort management model

What runs as fundamental thought through one of the first books that scientifically investigated the phenomenon of tourism (Krapf, 1955), is confirmed by many recent studies - tourist market is ″sui generis″ (market with specific characteristics). In that context we should observe differences between tourist market of sellers and buyers. The principal difference is the market focus. The focus of the sellers' market is on tourist industry, while focus of the buyer's market are tourists. Sellers' market defines the determinants of supply and pricing policy for certain products and services. The competitiveness of the tourism offer, including tourist resorts, significantly depends on standardization of supply and adaptation of pricing policies of the leaders. Standards of tourism promotion in the sellers' market restrict some promotional activities (Pike, 2008). These limitations are particular problem in an effort to encourage year-round visits. Optimization of the tourist resort position in the sellers' market implies the possibility of extending receptive capacity to reduce operating costs.

The success of positioning on the buyers' market depends on the accuracy of assumptions about the needs and expectations of targeted tourist segment (Pike, 2008). For this purpose, complex analytical approaches are required (Evans et al 2003). Since focusing on emerging trends and changing attitudes of wealthy tourist clientele is not a requirement for effective positioning in the sellers' market, the ability of standardized tourist resort strategic management model in the buyers' market is questionable. Research findings presented in this paper suggest that the standards in the buyers' market are determined bilaterally within the interaction between supply and demand. The model of strategic management of tourist resorts in this respect should allow and encourage this interaction. Each receptive entity can, in accordance with the vision and the resources available, create a specific integrated offer in order to stimulate year-round visits. Positioning in the buyers' market assumes specialization in order to ensure greater content differentiation. The process of tourist resort positioning on the buyers' market should start by redefining the standardized model of strategic management.

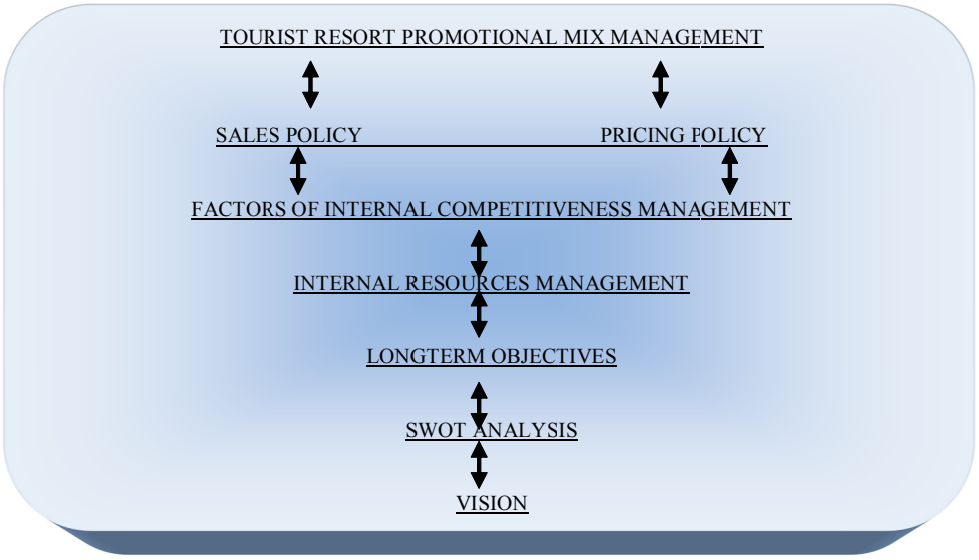
Accepting subordinate role in the sellers' market limits the positioning of tourist resorts on the desired emissive markets that function as buyers' market (Evans et al.2003). Adaptation of the tourist resort offer to the value system of the buyers' market connotes sustainable and responsible development of the tourism offer. At the corporate level, positioning the tourism entity in a buyers' market implies changes in the sphere of business and development policy. It is necessary to strengthen the synergy with the local environment (Pike, 2008). Resorts that

have no possibility to expand the capacity to preserve and increase market share may be based solely on the extension of the tourist season. In such scenario, continuity of development of specialized year-round tourism products remains necessary. The basic criteria for positioning in the tourism buyers' market are met this way. The tourist resorts strategic management model needs to be improved for such action.

2.3 The Mediterranean tourist resort strategic management model

In most Mediterranean tourist countries, tourist zones are located in areas without geomorphologic constraints and the expansion of accommodation facilities and supporting infrastructure represents no problem. Consequently, standardized tourist resort strategic management model adapted for sellers' market is established and practiced. It primarily offers seasonal tourism product. The growth of competition is matched by enhanced relationship of supply and prices. Optimization is performed with tools of economies of scale. The liquidity problem, generated by seasonal operations, seeks to be amortized by the maximization of tourist consumption. Such strategic commitment targets to concentrate tourist consumption within the tourist resort during the whole period of their stay. Depending on the size of the tourist resort there are minor differences in the strategic management of the resorts, but the underlying variables are shown in Figure 1.

Figure 1: Standardized tourist resort strategic management model



Source: own, based on research conducted by authors in 2013

Using the proposed model in practice is confirmed by preliminary research through four in-depth interviews with representatives of top management of four hotels in Croatia belonging to international hotel chains (Falkensteiner, Radisson Blu, Sheraton, Hyatt). Four hotel chains covered by this part of the research manage multiple resorts on the Mediterranean coast of Italy (Adriatic and Tyrhenian Sea), France and Spain. Based on the collected information and corporate documents, it is evident that Mediterranean resorts, managed by these chains, are optimizing performance by increasing the accommodation capacity and expanding the non-board facilities. Their business strategy is based on economies of scale and simulations of the required tourist traffic in the main tourist season. Revenue growth in that period neutralizes poor occupancy in the remaining period of the year. Two of four mentioned hotel chains that

already operate in Croatia, still have not decided to take over resorts on the coast. Their principal argument for such emittance are limitations of spatial expansion in the future, due to the land ownership fragmentation and geomorphological complexity of the Croatian coastal region. These findings paved the primary research focus on the repercussions of management strategies of coastal resorts exclusively in the corporate sphere. The preliminary research proved that geomorphological specificity and fragmentation of land ownership in an environment of existing large resorts in the Croatian coastal, limit the implementation of standards of economies of scale. Strategic management model applied by 4 hotel chains implies standards of economies of scale in order to reduce business risks in circumstances of seasonal business. Is this fact the cause for which the InterContinental, the Ritz Carlton, JW Marriott, Grand Hyatt and other world famous chains do not show interest in taking the big hotels on the Adriatic? The aim of this work is not to provide the answer to this question, but to offer modifications to management strategies of hotel resorts in circumstances where the existing accommodation capacity and content cannot be augmented.

The model is characterized by insufficient focus on changes in the global tourism market. The rationale for defining tactical and strategic direction is modest (based only on SWOT analysis), in particular for defining the decision to position the tourist resort on the sellers' market. The management is aware of this momentum and directs promotional activities primarily (and often exclusively) towards the sellers' market. Findings of the benchmarking research of the authors (2009-2014) established the prevailing business objectives of tourist resorts that apply this model of strategic management: market share increase in existing source markets by adapting policy sales, maintenance of existing tourist image on the 4 P (product, price, promotion and sales) platform, strengthening the competitiveness by combining different pricing policies and the range of tourism products and identity management through activities of tourist resort brand management. Variables of the standardized model have limited, and the competitors have made predictable, marketing strategy that resorts practice: low cost strategy, limited type differentiation strategy and marketing mix adaptation strategies according to the sellers' market standards.

Tourism zones in the Mediterranean differ in accommodation facilities, infrastructure, resources, tradition and, especially, indigenous destination identity. Resorts in the eastern Adriatic have less accommodation capacity than average Mediterranean resorts. Restrictions of capacity expansion represent a problem if operations have seasonal character. Efforts to safeguard the share of traditional sellers' market generate annual revenue insufficient for balanced operations for resorts that operate seasonally. Due to these business realities modifications of tourist resorts strategic management model is necessary.

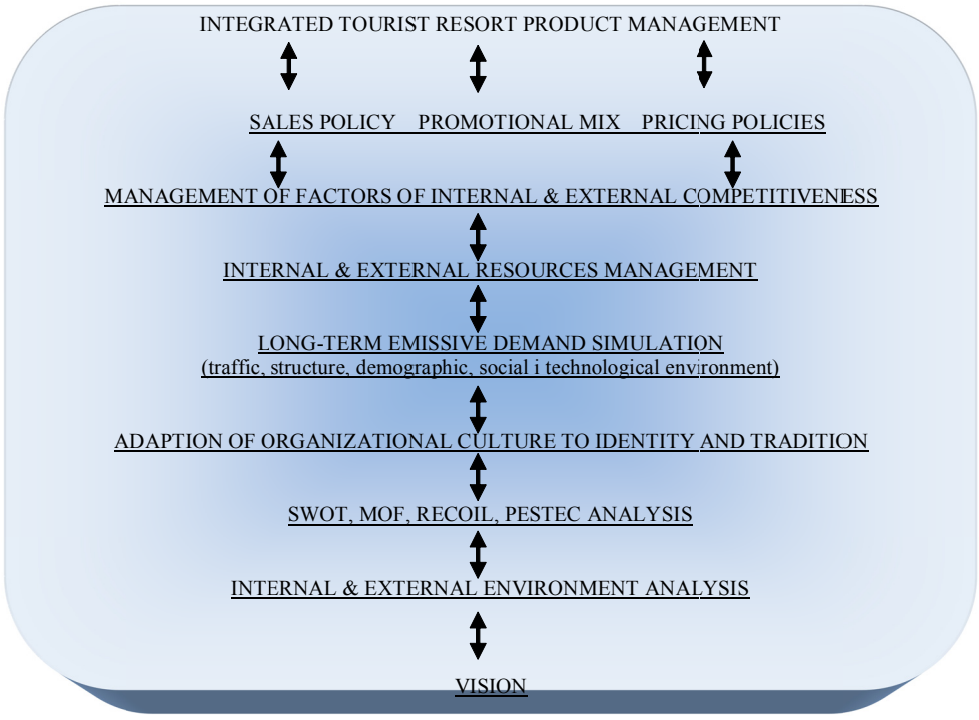
The four resorts (Murter, Split, Makarska & Dubrovnik) included in the research are characterized by similar model of strategic management and similar desires for improving the structure of guests and season extension. All four resorts surveyed have weathered the difficulties of transition and the global recession. Conducted segmentation and focusing on emissive countries, in accordance with the level of supply differentiation, ensure the position in the sellers' market which enables them to operate without losses even in conditions of recession. The ratio of permanent and seasonal employees is 40% to 60%. Their capacity reaches 500 beds, and more than 90% of annual turnover is realized by foreign guests. Decades of tourist experiences have standardized specific management and sales promotion policy. There is an evident growth in earnings, but it is still insufficient for the required investment in the expansion of mainly internal tourism offer. In the environment of all surveyed tourist resorts there are fully and partially utilized resources suitable for tourist

valorization. In this context, re-evaluation of strategic management model of resorts through (new) proposals of guidelines for its modification is essential in order to eliminate the detected weaknesses.

3. THE PRIMARY RESEARCH

Tourist resort strategic management model, directed towards year-round tourist visits implies a clear psychological differentiation of integrated tourism facilities. In most Mediterranean resorts that level of differentiation is not achieved. The result is mutual similarity of tourist offer from similar but also different countries. In such competitive clash competing is possible by pricing policies exclusively. Visibility of the tourist resort image is based on the effective implementation of environmental resources in integrated offer. Such approach allows co-branding of the tourist resorts with external resources in the environment. On this platform, tourist resort promotional mix can be optimized and managed. Effective promotional mix is created by diverse resources from the environment, rather than isolated internal identity of the tourist resort. The components of tourist resort strategic management model should allow effective positioning on the tourist buyers' market. Efficient management of the integrated tourist offer that has positioned resort´s offer on the buyers' market is contributing to the growth of off-season visit. In eastern Adriatic, pleasant climate that allows swimming for 6 months annually is important prerequisite for this type of strategic orientation.

Figure 2: Improved tourist resort strategic management model



Source: own, based on research conducted by authors in 2013.

Findings of the preliminary study indicated that the focus in the design of the resort offer is based on internal resources. Those are adapted primarily for the main tourist season while resort´s direct and indirect promotion highlights beach tourism. Marketing departments and management do not have the authority to design complementary, integrated tourism products that could attract visitors to periods outside the main tourist season. Neglecting of external factors in the environment of the resort and the destination to which the resort gravitates is

further underpinned by lack of more detailed methods of evaluation of resources in the environment. With aim to reduce seasonality effects for the business of resorts in the Croatian coastal region, it is necessary to modify the standardized strategic management model. Based on the findings of a preliminary research, improved tourist resort strategic management model has been proposed, expanded with additional variables, as shown in Figure 2:

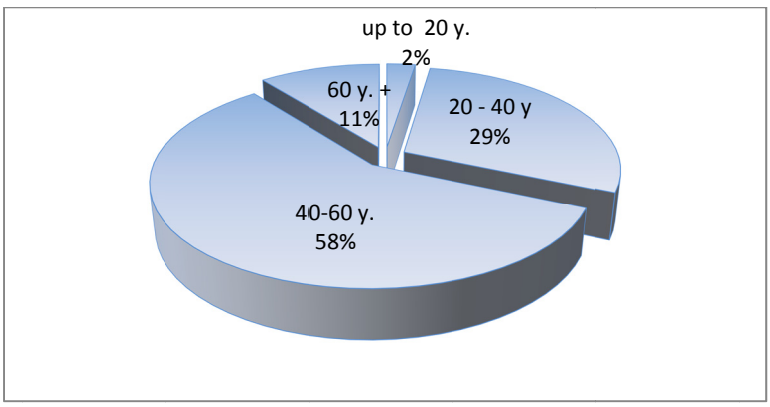
Proposed model was tested in the second phase of longitudinal study during the peak tourist season in 2014 on expert sample of 160 guests from the four tourist resorts. The findings of these longitudinal studies showed the lack of information among the guests of four resorts about potentially attractive facilities in the environment in periods outside the main tourist season, as well as their interest to visit the presented content of the wider environment in the off-season.

3.1 Findings of the primary research for the purpose of testing of the improved model

During the peak tourist season 2014, testing of the proposed additional variables for the improved tourist resort strategic management model, which due to geomorphologic and other restrictions cannot be achieved by extending the accommodation facilities but should strive for year-round operation, was conducted. In this study, the expert intentional sample of 160 guests (40 guests from each of the four resorts) was selected. The selections of the sample were executed on the basis of pre-test and funnel method on a sample of 1600 guests from the first phase of the research. The sample included guests from emissive countries that management of surveyed tourist resorts preferred. The criteria for the inclusion of individuals in the sample was interest in a variety of destination amenities outside the tourist resort and willingness to visit in periods outside the main tourist season if tourist resort offer included a diverse range of products and services.

The age structure of respondents is approximately in line with the age structure of the whole set. It is a population which should be offered active tourism products (identify and select resources in the external environment of the tourist resort, which can be used for the development of new tourist attractions and products, and to include the same in the various forms of active tourism - hiking, bicycle tours, kayaking etc).

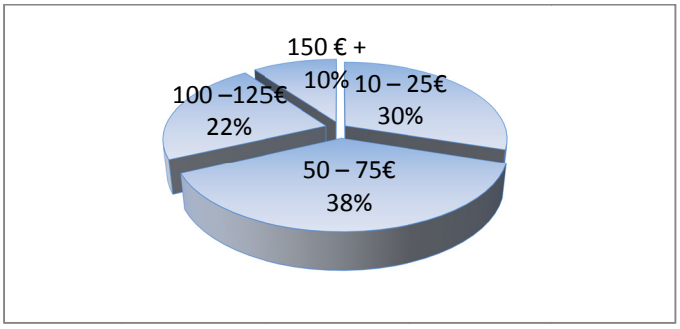
Graph 1: Age structure of respondents



Source: author's research 2014.

On the basis of additional daily consumption structure, it is evident the sample includes higher standard guests who spend in the periods outside the main tourist season if offered facilities and specialized tourism products. This observation indicates the need for more complex and detailed analysis with aim to the design new tourism products and expansion of the product range (inclusion of the MOF, RECOIL PESTEC analysis in the model).

Graph 2: The average daily consumption (€) of respondents during the stay in a tourist resort



Source: author's research 2014.

Educational attainment structure indicates the need for greater creativity in designing additional tourist attractions in order to foster the change of this structure in favor of more educated and wealthier clientele.

Table 1: Sample structure by educational attainment

Educational attainment	No. of respondents	%
Colledge diploma	32	20,0%
Bachelor degree	20	12,5%
High school	96	60,0%
Rest	12	7,5%
Total	160	100,0%

Source: author's research 2014.

As noted before, this pattern included guests in tourist resorts originating from countries which management evaluates as desirable, provided that the current structure of guests represent more than 1% on annual basis. Simulation of long-term emissive demand with aim to manage the guest structure is the variable which is of particular importance.

Table 2: Sample structure by emissive country

Emissive country of the respondents	No. of respodents	%
Italy	14	8,8%
Denmark	2	1,3%
Holland	5	3,1%
Czech Republic	32	20,0%
Germany	107	66,9%
Total	160	100,0%

Source: author's research 2014.

Concerning the research findings regarding the information acquisition about tourist resort offer, it is evident that marketing mix management should be in the function of an integrated tourist resort product management, and not the end in itself (promotion through tourism fairs). Priority should be internet marketing due to the potential of social networks (39.4% of respondents received the information from relatives) and information about tours through the web site (21.9%). Forcing this type of promotion implies synergy of promotion activities with the sales and pricing policies for different periods of the year (year-round tourism). Concerning the standardized model, sales and pricing policy are defined in an isolated manner, and are argued by marketing promotion of the tourist resort offer. In the modified model quality and content of the integrated tourism products determine the width of sales and pricing policies. Wider possibilities of combination allow more efficient coping with competition. Marketing mix management should also be elastic, in accordance with the changing price and sales policies, depending on the time of year.

Table 3: Sample structure by information source about the tourist resort offer

Information source	No. of respodents	%
Friends	63	39,4%
Media (press,tv)	4	2,5%
Internet	35	21,9%
Rest	58	36,2%
Total	160	100,0%

Source: author's research 2014.

Research findings indicate modest impression of the tourist resort before the first arrival. The result of using tourist resort strategic management model is evident. In this model, the role of promotion is defined by standards of the stay offers in the resort. Recent research on first impressions of guests of typical tourist resorts on the Mediterranean express significantly higher rate of disappointment. This is due to the potential difference of external resources of the (destination) tourist resort. This potential of many tourist resorts in the eastern Adriatic is insufficiently promoted through their offer, thus, limiting the price level. This finding points to the importance of the variables of analysis of internal and external environment of the tourist resort, and implementation of all destination resources in an integrated tourism product that is being promoted.

Table 4: First impressions after the first arrival in the tourist village

First impression	No. of respodents	%
Poor	15	9,4%
Good	40	25,0%
Very good	78	48,7%
Excellent	27	16,9%
Total	160	100,0%

Source: author's research 2014.

These findings suggest the usefulness of complex analysis of attitudes, opinions and desires of, especially, loyal visitors of the tourist resort. What contributes to the loyalty should be used in the development of pre-season and post-season content of tourist attractions. What loyal guests complain about should be rectified with aim of positioning in the tourist buyers' market.

Analysis of experiential components of the tourist resort offer provides guidelines for necessary improvements aimed at extension of the tourist season, but also at the introduction of premium price during peak season, due to the high rate of loyalty of existing guests. Experience components of the tourist resort offer surveyed guests evaluated in the ranking scale of 1 (poor) to 5 (excellent) as shown in table 5;

Table 5: Assessment of experiential components of the tourist resort offer

		N	Mean	Std. Deviation
Climate and weather conditions	Good/bad	15	2,73	1,831
	Good	67	3,99	1,297
	Good/excellent	58	4,48	0,682
	Excellent	17	4,76	0,437
	Total	157	4,13	1,220
Beauty of nature	Good/bad	15	2,53	1,457
	Good	67	3,93	1,185
	Good/excellent	58	4,34	0,807
	Excellent	17	4,47	0,717
	Total	157	4,01	1,163
Interesting historical and cultural monuments	Good/bad	15	2,47	0,990
	Good	66	3,44	0,930
	Good/excellent	58	3,55	0,753
	Excellent	15	3,53	1,407
	Total	154	3,40	0,973
Comfort accommodation	Good/bad	14	2,34	1,158
	Good	67	3,48	1,035
	Good/excellent	56	3,68	0,741
	Excellent	17	4,18	0,809
	Total	154	3,53	1,004
Courtesy of the catering staff	Good/bad	14	2,57	1,158
	Good	67	3,61	1,086
	Good/excellent	57	4,05	0,718
	Excellent	17	4,24	1,348
	Total	155	3,75	1,091
Courtesy traders	Good/bad	14	2,43	1,222
	Good	67	3,48	1,005
	Good/excellent	58	3,76	0,802
	Excellent	17	4,35	0,702
	Total	156	3,58	1,022
Sport and recreational facillities	Good/bad	12	2,42	0,900
	Good	63	3,33	0,916
	Good/excellent	48	3,23	0,928
	Excellent	17	4,00	1,061
	Total	140	3,30	0,994
Evening and night entertaiment	Good/bad	12	2,33	1,073
	Good	57	3,02	1,142
	Good/excellent	49	2,90	0,895
	Excellent	17	3,59	1,372
	Total	135	2,99	1,113
Empathy of employees	Good/bad	12	2,75	0,866
	Good	65	3,48	1,213
	Good/excellent	55	3,95	0,826
	Excellent	17	4,65	0,493
	Total	149	3,72	1,090

Source: author's research 2014.

For hydro-meteorological conditions, the average score is very good. Score 1 (poor) gave 6.9% of guests dissatisfied with hydro-meteorological conditions, and more than 82% of guests are satisfied with these conditions (an excellent score was given). This finding indicates that most of the guests represent potential for visits in early and late season. It is necessary to provide them with facilities that will replace less swimming and sunbathing.

Comments praising the values of the landscape have very good average score and more than 94% of respondents are hereby satisfied. The development of new tourism products should be connected with landscape attractions as much as possible.

All age groups of respondents gave historical-cultural heritage good marks. This finding indicates a homogeneous views, it is also useful when creating new content and specialized tourism products. This assessment outlines insufficient information guests have about heritage. Therefore, a more aggressive implementation of destination identity in integrated tourism offer is recommended, especially if it fosters a year-round tourist offer.

The satisfaction degree of guests with accommodation is satisfying (very good), and more than 17% are very satisfied with it, while 3.2% of guests evaluated accommodation as 1 (poor).

Courtesy of the catering staff score has an average of 3.75 (very good) given by most of the guests, while 5 (excellent) score gave 27.2% of guests. The majority of guests are satisfied with the hospitality of retailers while 3.8% were not satisfied and gave a rating 1 (poor).

Guests are mainly satisfied with sport and recreational facilities, 46% of the guests gave a good grade. This data indicates the need for expansion of these facilities, especially the linking of the tourist resorts with amenities within the destination it operates in.

Guests are not satisfied with entertainment despite existing seasonal tourist events in the area. The average score was 3 (good). Most of the guests assessed this in low grades, and 23.9% of guests gave a score of 2 (enough).

The compassion (empathy) of service staff of the tourist resort was scored by guests as averaged (3.72). 3.3% of them gave a poor rating (1), 9.9% of the them gave sufficient score (2), 28.3% gave good (3) grade, 29.6% staff evaluated staff empathy as very good(4), and 28.9% graded it with 5 (excellent) score. Maintenance and improvement of these ratings can contribute to the adaptation of organizational culture, identity and tradition of destinations. The integration of these features is usable platform for the development of year-round tourism offer (experiences of destinations that have already been developed for all year tourism).

Satisfaction degree of guests during their stay in the tourist resort due to the deficiencies is shown in Table 6. Respondents have evaluated the satisfaction with individual content on a scale from -3 (disappointed) to 3 (excellent). The overall score is good (1.39).

Table 6: Satisfaction level of guests of the tourist resort related to a particular content

	N	Minimum	Maximum	Mean		Std.
	Statistic	Statistic	Statistic	Statistic	Std. Error	Deviation Statistic
Cleanliness	160	-3	3	1,09	,133	1,676
Architecture building and the enviroment	160	-2	3	1,56	,089	1,125
Opening hours of tourist facilities	160	-3	3	1,79	098	1,236
Office Hours Exchange	156	-2	3	1,71	,095	1,182
Time organized for entertaiment	153	-3	3	1,07	,109	1,348
Informing guests about events	137	-3	3	1,14	,114	1,335
Valid N (listwise)	136					

Source: author's research 2014.

Scores of the tourist resort offer components suggest that it is necessary to improve the quality if it tends to compete in the buyers' market for the purpose of a year-round tourist visits. The average score that customers rated the degree of satisfaction with the overall tourist resort offer expresses satisfaction, but lower scores of individual components point towards the causes of seasonal business. The average scores of individual elements of the offer, such as cleanliness, information about events, entertainment, cultural and sport facilities etc. are lower than the average score of the total supply, which is a prerequisite for the stimulation of interest for staying in the tourist resort outside the main tourist season.

3.2 Conclusions in the context of testing a modified tourist resort strategic management model

Based on the research findings, the components for strengthening the competitiveness of the tourist resorts are presented in the following tables. Through such action conditions for new features are created, but risks that are reality of business practices of tourist resorts should always be in mind.

Table 7: Strengths, weaknesses, opportunities and threats appropriate for competitiveness strengthening

STRENGHTS	EXPLANATION
Beauty and diversity of landscapes in the region	Preservation of indigenous flora and fauna in the Surroundings of the tourist resort
Favorable climate conditions	Enable the prolongation of the tourist season
Tourism tradition	Experience and openness towards tourists
Indented coast	Attractive sea landscapes
Experience and hospitality	Preconditions for the quality upgrade of the tourism offer
Liquidity of operations and favorable image	Tourists resorts ar attractive partners
Acquatorium	Development of the specialized tourists products
Traffic connections	Road infrastructure, air and naval ports
Cultural & historical heritage	Archaeological findings, sacral objects, fortifications folk heritage
Good working atmosphere	Satisfied employess, satisfied guests
Cuisine	Diversity in indigenous dishes and drinks
Certitude	High level of security for inhabitants and guests

WEAKNESSES	EXPLANATION
Existing staff	Deficiency of the expert hospitality staff
Inadequate structure of the tourism offer	Uniformed offer based on bathing tourism
Value for money	High prices of certain products and services in comparison with competitive countries
Horticulture	Need to arrange the green surfaces
Insufficient strenght of the electrical grid	Insufficient electrical power supply during high season
Overcrowding of the beaches in the surroundings of the resorts	Increase of the tourists outside tourist resorts
Modest retail offer in the store within the resorts	Narrow and shallow product range
Insufficient diversification of the tourist offer and insufficiently recognized image	Resembles the offer of other destinations on the eastern Mediterranean
Insufficient offer during night hours	Modest and uniform entertaimnet program
OPPORTUNITIES	**EXPLANATION**
Creation of new products	Diverse resources as a basic for the creatin of new products
Accommodation quality upgrade	Rise of the integrated touris product quality, rise of the offer quality and tourist satisfaction
Development of the entertaiment programs	Adjusment to the actual trends
Enlargement of the educative contents in the resorts	Beauty programs, detox programs, nutrition programs
Promotion of the cultural-historical attractions	Development of the specialized tourist products
EU membership	Co-funding programs
Sustainable development	Synergy of the tourism development with the social development and ecological sustainability
Indigenous products	Strenghtening of the perception of indigenous identity and tourist experience
THREATS	**EXPLANATIONS**
Competitiveness of the other tourist subjects	Receptive subjects in the destination and the surroundings
Visual pollution	Unplanned construction of the tourism infrastructure in the surroundings (dry marinas, parking lots, devastated objects, communal waste etc.)
Increase of the work force expenses	Rise of the integrated tourist product price
Slow adaptation to the modern tourist trends	Resistance to changes on all management levels
Inadequate legislative solutions	High VAT and other similar dues in comparison with the competitors
Recession, inflation	Negative impact on tourist supply and demand
Insufficient education of the employees	Necessity of education and adjustment to the offer standards
Unsatisfactory collaboration with the other tourism stakeholders in the surroundings	Problems in the relations with the local authorities
Working hours of the subjects in the outboard offer of the resorts	Unadjusted working hours of the supplementary content in the resorts

Source: Analysis based on the research of the authors, 2013, 2014

On the basis of the findings presented in Table 8, an overview of the current framework of the eastern Adriatic tourist resort offer is given (left side), and guidelines that need to be taken into account when positioning in the buyer's market. Surviving and maintaining the market share in the seller's market will be increasingly difficult and, in long-term, unprofitable mission given the capacity of much larger competitors in the Mediterranean.

Table 8. The Adriatic tourist resort, today and tomorrow

Tourist resort	
Today	**Tommorow**
Standardized traditional offer resembles other tourist resorts in the Mediterranean; Unused socio-cultural environmental resources; Business-oriented traditional emissive markets; Unfavorable structure of guests; Lack of quality offers for wealthy clientele; Outdated concept of supply management; Limitations due to infrastructure.	Necessary offer differentiation; Recognizable image and brand; Criteria of sustainable development; Emphasized specificity of the tourist resort; Management and development of offer quality; Qualitative improvment of accommodation capacities; Offer extension; Creative and empathic management.

Source: Analysis based on the research of the authors, 2013, 2014

For the realization of the objectives on the left side of the table 13 it is necessary to expand the marketing mix of tourist resorts, from 4P concept to 7P concept which includes partnerships with all stakeholders in the environment, procedural actions in order to encourage processes necessary for the development of tourism at the destination and, finally, integrated tourist progress whose dynamics should also be systematically managed. Tourist resort and destination passes their life cycles. They may or may not be controlled. For the control of the life cycle of the tourist resort development, presented model of strategic management can be used. By its application the following facts actual tourist reality are being accepted:

- Global tourism demand over the past periods shows significant qualitative and quantitative changes;
- There is a continuation of the intensive growth of supply compared to demand;
- Tourist destinations that reported profit growth, continue intensive work to strengthen differentiation, explore new segments and sub-segments in the global tourism market, introducing new content and new standards in accordance with the defined objectives and established trends;
- Strategic and tactical objectives of the tourist destinations offer are efficiently achieved on the destination management level;
- Marketing strategy based on 7P model is a prerequisite for a higher level of guest satisfaction;
- The satisfaction rating is usable starting point for the growth of tourism;
- Standards predicted by categorization of the receptive subjects are prerequisite for the positioning in the buyer's market, but do not provide sufficient competitiveness;
- Application 7P model is increasing with receptive operators in developed tourism markets.

Based on these insights tactical guidelines for tourist resort management improvement are proposed:

i. Tourist resort should preserve and further emphasize natural, cultural, human and other values which strengthen differentiation of integrated offerings;
ii. Continuously build the content and coordinate it with targeted tourism image;
iii. Implement own outboard content in integrated destination offer;
iv. Standardize all components of tourist resort strategic management
v. Harmonize internal infrastructure of the tourist resort with the target image.

The implementation of these guidelines is possible through improved tourist resort strategic management model. We argue that potential contribution of additional variables in the model can be considered proven. Research findings point to the necessity of introducing radical changes in the management of tourist resorts in the eastern Adriatic. The proposed model is also usable for the activities of brand management. Application of improved model strengthens the destination icon and valuable identity components. This strengthens the perception of tourist resort offer quality. The same can have positive repercussions on competitiveness and offer recognition in a buyer's market. An alternative approach, based on the standardized model, which implies continuity of investment in the restoration of accommodation in order to maintain seller´s market position, does not guarantee survival. Conducted research indicate the complexity of the problem of tourist resort management in the eastern Adriatic. Problems identified by research are result of the lack of cooperation between tourist resort management and other tourist destination stakeholders. On internal level of tourist resort management weaknesses in the field of project and crisis management and lack in the medium and long-term business planning were found. Tourist resort and destination should be coordinated in order to create an integrated tourism product. Development of specialized tourism products promotes the growth of interest of new guests and contributes to the loyalty of existing ones. Competing in the seller's market implies price competition. Lower prices do not provide sufficient accumulation, and it is essential to develop new specialized products within and outside the resort. In this regard it is essential to position in the buyer´s market. For this purpose, modified model is usable. By applying the proposed model more accurate selection of available resources is enabled in order to create integrated year-round tourist attractions. This charts the guidelines for responsible and sustainable tourism development. Such development is needed to preserve biodiversity and evaluation of cultural and historical heritage.

4. CONCLUSION

The goal of tourist resort strategic management model is definition of standards of long-term satisfaction of guests. The guest should be provided with attractive facilities that contribute to the competitiveness of supply and strengthen loyalty. Achievable goals of tactical application of the proposed model are higher satisfaction in order to strengthen customer loyalty, increase emissive market share, enter new markets, custom 7P concept, increasing competitive advantage by expanding the range of internal and external offer, creating and maintaining a recognizable brand image, expanding the number of partners in receptive markets and sales channels in the emissive markets, adapting to marketing communications trends, growth of life quality within tourist destinations and responsible and sustainable way of managing resources of destination. Tactical objectives indicate aspiration towards continuous offer restructuring for maintaining positions in selected niche in the buyer's market. The components of improved model presume higher operating costs but also the potential for

revenue growth by season extension and the possibility of premium prices introduction for selected products and services.

Improved model reflects strategies of differentiation, innovation, brand management, sustainable and responsible development, 7P, vertical and horizontal integration and new relationships. These strategies enable effective and fast re-positioning which is a precondition for preserving the buyer's market share. Identified quality of tourism services determines the price that can be achieved, but also the overall occupancy rate. On those basis and with regard to the principal research question, we argue that *standardized model of tourist resort strategic management in the eastern Adriatic does not contribute to the tourist resorts competitiveness and season extension nor is optimal or adequate to potential resources and does not allow positioning in the buyer´s market*. Transformation of tourist resort strategic management model connotes growing profits and tourist season extension. Knowledge that can be reached by using this model suggests the need for segmentation of the global buyers' market. To achieve this goal it is necessary to position the tourist resort in a buyer's market. Standardized model of strategic management is based on economies of scale and competitive price. Resorts with no possibility of accommodation optimization (upgrade) do not generate significant earnings in the seller's market. Low accumulation prevents investment in the development of additional specialized tourism products. Development of such products is a prerequisite for positioning in the tourist buyers' market. The rationality of such repositioning is realized exclusively on the buyer's market. On such markets, original and innovative components can be sold at premium prices. The implementation of all available resources in the offer creates an integrated, all year tourism product. Transport infrastructure exists; climatic conditions are favorable, it is necessary only to stimulate interest in the off-season. This intention would be achieved by using the 7P, instead of a standardized 4 P model.

Standardized model of tourist resort strategic management was tested in this research and guidelines for its adaptation to the standards of the buyer´s market have been proposed. The research has identified weaknesses of standardized model for all tourist areas without possibility of enlarging the number of units. Research points that year-round tourist visits are based on a complex, integrated tourism offer. The integrated tourism product goes beyond the scope of the tourist resorts and the existing local competitors become partners. Our research has tested the impact and contribution of existing and preferred offer components in order to improve the strategic management model for the purposes of a year-round tourist valorization. Implementation of complex contents from resort surroundings is an important assumption of year-round visits. On the basis of improved model it is possible to classify components of the resorts offer.

The scientific contribution of the research is reflected in the analysis of the weaknesses of a standardized model and the guidelines for improved tourist resort management model in order to position in the tourism buyers' market. Improved model is practical for use in the area of eastern Adriatic but, also, in all other tourist areas where geomorphologic and other restrictions prevent capacity expansion. Research findings represent answers to dilemmas related to the possibility of implementation of existing and potential tourism resources in integrated offer. On that basis it is possible to co-brand of the resorts with the contents in the environment. This strengthens the competitiveness and stimulates interest in new tourism segments.

BIBLIOGRAPHY

Avraham, E., Ketter, E., (2008), ***Media Strategies for Marketing Places in Crisis***, Elsevier Inc., Oxford

Aqarwal, S., (2002), **Restructuring seaside tourism: The Resort Lifecyle***, **Annals of Tourism Research***, 29/1, p. 25-55

Baxter, J., and Kerr, G., (2010), ***The meaning and measurement of place identity and place image,*** University of Wollongong, Australia

Bramwell, B., Lane, B., (2000), ***Tourism collaboration and partnership: policies, practice and sustainability,*** Channel View Publications, New York

Butler, R., (2000), ***Modelling tourism development, Evolution growth and decline,*** Tourism, Development and Growth, Routledge, Great Britain, p. 109-123.

Butler, R.W., (2006), ***The tourism area life cycle,*** Cromwell Press, Great Britain Davidson, R., Maitland, J., (1997), ***Tourism destinations,*** Hodder and Stoughton, London

Dwyer, L., Teal, G., Kemp, S., (2007), **Organisational culture & strategic management in a resort hotel***, **Asia Pacific Journal of Tourism Research***, 3/1, p. 27-36

Evans, N., Campbell, D., Stonehouse, G., (2003), ***Strategic Management for Travel and Tourism,*** Butterwort Heineman, Oxford, Great Britain

Fennell, D., Weaver, D., (2005), **The Ecotourism Concept and Tourism Conservation Symbiosis, *Journal of Sustainable Tourism***, 13/4, p. 373-390

Hall, D.R., Smith, M.K., Marciszewska, (2006), ***Tourism in the new Europe,*** Elsevier, Great Britain

Hall, D.R., Smith, M.K., Marciszewska, (2012), ***European Tourism Planning and Organisation Systems,*** Elsevier, Great Britain

Kapferer, J., N., (2008), ***The New Strategic brand management,*** Kogan Page, London and Philadelphia.

Krapf, K., (1955), ***Der touristiche Konsum,*** West Germany

Lewis, J.P. (2007), ***Fundamentals of Project Management***, AMA, New York

Pike, S., (2008), ***Destination marketing: an integrated marketing communication approach***, Elsevier, Oxford

Stock, J.R., i Lambert, D.M., (2001), ***Strategic Logistics Management,*** McGraw – Hill, Singapure, New York

Šerić, N., Luković, T., (2008), ***Modeling of the marketing strategy on tourism destination with a special ambience value,*** **The International Tourism Research Conference "Sustainable Tourism Development"** Stockholm, Sweden

Šerić, N., Talijančić, (2009), ***Identity of national heritage in function of specialised tourist offer of Croatia*****, Journal of economic science**

Šerić, N., (2014), **Branding strategy for specialized tourist product***, **Advances in management,*** 7/1, p. 8 – 12

MARINE LITTER MANAGEMENT IN FISHERIES SECTOR IN CROATIA: SOCIAL INNOVATION FOR CIRCULAR ECONOMY

Sanja Tišma
Institute for Development and International Relations / Research Advisor, Director
Lj. F. Vukotinovića 2, 10000 Zagreb, Croatia
Phone: ++ 385 1 4877460; Fax: ++ 385 1 4828361
E-mail: sanja.tisma@irmo.hr

Ognjen Škunca
Geonatura group – Granulum salis Ltd.
Trg senjskih uskoka 1-2, 10000 Zagreb, Croatia
Phone: ++ 385 (0)91 513 1273; Fax: ++ 385 (0)1 550 7101
E-mail: oskunca@oikon.hr

Ana-Maria Boromisa
Institute for Development and International Relations / Senior Research Associate
Lj. F. Vukotinovića 2, 10000 Zagreb, Croatia
Phone: ++ 385 1 4877460; Fax: ++ 385 1 4828361
E-mail: anamaria@irmo.hr

Helena Čermak
Institute for Development and International Relations / Senior Research Associate
Lj. F. Vukotinovića 2, 10000 Zagreb, Croatia
Phone: ++ 385 1 4877460; Fax: ++ 385 1 4828361
E-mail: helena@irmo.hr

Key words: *Marine litter management; Circular Economy; ALDFG Management; Fishing for Litter; Social Innovation*

ABSTRACT

Circular economy and social innovation are increasingly being recognized as elements of a new paradigm emerging in response to ongoing global development and governance crises. The European Commission proposed ambitious programme towards a circular economy, including an aspirational target of reducing marine litter by 30% by 2020 (EC, 2014). Abandoned, Lost or Discarded Fishing Gear (ALDFG) management and Fishing for Litter (FfL) are practices through which fisheries sectors can contribute to the prevention and removal of marine litter, i.e. to zero waste environment and more circular economy. The analysis of the situation in Croatia shows that their introduction would result in triple win scenario, with: strengthening of recycling sector; decreased pressures on environment and biodiversity; modernized and more sustainable fisheries sector. An analysis of the governance within the sector suggests that social innovation approach is not only preferable to command and control approach, but the only feasible approach. A set of recommendations for the introduction of the two practices is proposed, based on the customization of the established best practice in social innovations for environment in the Croatian fisheries context.

1. INTRODUCTION

A conceptual framework of circular economy has recently become one of the main strategic guides in thinking about the future of the EU economy (EC, 2014) (EREP, 2014). Similarly, there is also a growing recognition and expectations from social innovations as an approach to addressing social needs in the context of ongoing crises and failing old models (BEPA, 2010) (BEPA, 2014). Their significance in the EU policy framework reflects in the fact that they are both supported by the Flagship Initiatives of the Europe 2020 Strategy (EC, 2011a) (EC, 2011b).
Marine litter has recently become increasingly recognized as a growing global environmental issue requiring more attention and efforts for its tackling. The topic entered EU environmental policy framework as one of the eleven descriptors of Good Environmental Status (GES), within the EU Marine Strategy Framework Directive (2008/56/EC), which aims to achieve GES of the EU's marine waters by 2020. A recent EC Communication Towards Circular Economy (EC, 2014) includes the proposal for aspirational target of reducing marine litter by 30% by 2020 for the ten most common types of litter found on beaches, as well as for fishing gear found at sea.

Croatia as EU member state has an obligation with regard to all the above listed policy frameworks.

This paper investigates the opportunities for more circular economy in Croatian fisheries sector, through the introduction of practices contributing to more recycling and less marine litter, while recognizing that the most feasible way to do that is through social innovation approach and methods. The objective is to catalyze and educate desired sectoral changes by insights from the two conceptual frameworks with the central status in EU policy framework, thus contributing to their effectiveness and efficiency.

The paper starts with the presentation of the concept of circular economy and a review of the level to which reducing marine litter by management of abandoned, lost or discarded fishing gear and fishing for litter support the development of circular economy approach in fisheries, based on Croatian case study. The second part of the paper deals with social innovation approach to environmental challenges and identifies the key success factors for social innovation. The two serve as a point of departure for formulating recommendations for practices which would result in strengthening recycling sector, decreasing pressures on environment and biodiversity and modernising the fisheries sector.

2. CIRCULAR ECONOMY

2.1. The concept

The idea of a more circular economy – i.e. an economy which resembles “zero-waste” Nature’s operations, where all material outputs from processes get used as input resources to some other processes – has been around in the contexts of various proposed frameworks since the birth of the environmental movement in 1960s. Some of the best known examples include: The Economics of the Coming Spaceship Earth (Boulding, 1966) and The Potential for Substituting Manpower for Energy (Stahel & Reday, 1977), commissioned by European Commission, explaining, in the EU context, already in the late 70s, circular economy’s intrinsic potential for the creation of new jobs, energy savings and waste prevention; and

more recent conceptual frameworks, such as Industrial Ecology, Cradle to Cradle, Biomimicry and Blue Economy, that further developed the general idea.

The concept got made its way in the main development strategies and policies at the turn of the century, including Japan's circular economy initiative (Davis, Hall, 2006), China's 11th five-year plan (Feng & Yan, 2007) and more recently within the EU (EC, 2014). This development is driven by, on one hand, prolonged and still unresolved economic crises and widening suspicion regarding the viability of the current linear take-make-consume-dispose model, and on the other hand, by the appearance of more convincing quantitative analysis demonstrating economic and business case for transition to a new restorative, circular model. In the EU context, these were arguably three reports recently issued by the Ellen MacArthur Foundation (McKinsey & Company, 2012, 2013, 2014).

The key rationale behind the idea was compellingly conveyed by the EC Environment Commissionaire in his remark that "there is gold in waste, literary.… (as) … it takes a tonne of ore to get one gram of gold (while) you can get the same amount from recycling the materials in 41 mobile phones" (Potočnik, 2014). However, the list of benefits is much longer, with structural contributions to economy competitiveness, the reindustrialization of the EU economy with the creation of new jobs and competencies and decrease in pressures on environment and biodiversity. It is estimated (EC, 2014; EREP, 2014) that realistically achievable transition towards more circular EU economy – with recycling rate raised from the current 42% to 70%, and 30% improvement in the resource efficiency by 2030 – would create 2 million new jobs, 20% reduction in total material requirements and 1% boost to GDP. These numbers seem too convincing to be ignored, especially in the mid and long term, as the global trends are such that the case for shift to circular economy only becomes stronger. Consequently, an explanation for recent withdrawal of the circular economy package (EC, 2015) stating that it will be "replaced with more ambitious legislation in 2015" (EC, 2015) is most probably genuine, especially considering that already this temporary postponement provoked strong protests both within the European Parliament and among EU MS.

2.2. Marine litter and fisheries sector

Although marine litter (ML) – i.e. "any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment" (UNEP, 2009) – has been rather visible form of pollution for a long time, it has come into the focus as a serious global environmental threat relatively recently – arguably since Capt. Charles J. Moor brought public attention to it by his 1997 article describing his encounter with the Great Pacific Garbage Patch. It is now well established that ML threatens marine environment and ecosystems by harming many marine species including birds, turtles, mammals, fish due to entanglement, ingestion, covering and by serving as vector for transfer of pollutants and NIS. It presents human health threat through the potential impact of micro-plastics ingested by marine fauna consumed later on by humans, POPs, sharp litter on beaches. Finally, it also damages economy, primarily sectors of tourism and fisheries. Hall (2000) estimated that total economic losses on Shetland Islands – a relatively small touristic area in Scotland, with population of 20.000 – caused by ML are up to £5.6 million per year. Tourism is also the main source of ML in the regions with developed tourism. It is estimated that up to 50% of ML in the Mediterranean comes from tourism related activities.

Fisheries sector is arguably the second most important sector, with regards to ties with the ML. It is directly negatively impacted by ML through degraded fish stocks (primarily by

"ghost fishing"[1] and degradation of habitats), wasted fishing time on cleaning ML caught in the fishing gear, snagged nets on ML on the seafloor, navigation hazard and damaged vessel parts (fouled propellers and blocked intake pipes). Recent study estimated the total cost of ML impacts on Scottish fisheries at 5% of its total revenue, or in average £15.000 - £17.000 annually, per vessel (Mouat et al, 2010).

Fisheries sector is also a significant source of ML, including Abandoned, Lost or Discarded Fishing Gear (ALDFG), made of synthetic materials that can last decades before degrading in micro plastics, expandable polystyrene (EPS) boxes, ropes, buoys, garbage from vessels, etc. Macfadyen et al (2009) estimated that only ALDFG – which is especially harmful – makes up around 10% of all marine litter.

Finally, fisheries is also a sector which can contribute to the removal of ML, as fishing activity unintentionally also collects ML from marine environment.

2.3. 3Rs in fisheries sectors

3Rs (standing for reduction, reusing and recycling) are in the core of circular economy.

There are two main types of measures that transform fisheries sector towards more circular "zero waste" economy: the minimization of various organic waste (e.g. bycatch avoidance and management, reusing of organic waste created in fish processing); and the minimization of non-organic waste streams associated somehow with fishing practices. Clearly, the latter are of direct relevance for the ML issue.

Taking into account the level of damage caused by ALDFG, the single most important ML prevention measure in the fisheries sector is the introduction of effective ALDFG management framework. The ultimate measure would be transition to the fishing gear made of biodegradable materials. In the meantime, the framework should include: onshore collection of the fishing gear at the end of its life cycle, fishing gear marking, the promotion of fishing practices that minimize chances for losing fishing gear, reporting on lost gear, the establishment of the registry of ALDFG, the removal of ALDFG from the sea, the recycling and recovery of collected ALDFG. Namely, the recycling of the materials of which the nets are produced – Polyethylene (PE), Poly Amide (Nylon) (PA), and Polypropylene (PP) – is already well established technological process that generates materials used for the production of carpets, socks, swimmer, fabrics used on car seats, etc.

The second practice by which fisheries sector can contribute to the mitigation of ML issue is the collection and organized disposal of "ML by-catch" – i.e. so called Fishing for Litter (FfL) practice. The oldest and most experienced FfL initiative within the EU is the one initiated by NGO KIMO among the fishermen in Netherlands, Scotland, England, Belgium, Denmark and Sweden. The established scheme is quite simple. Fishermen voluntarily collect ML they catch into their fishing gear, temporary dispose it on-board in big bags that they receive for free and, once back in their fishing port, land it onshore. Fishing ports secure the space and infrastructure for temporary disposal of collected ML. Further processing of collected and landed ML is done by existing onshore waste-management system. As an illustration, FfL project that run in Scotland in period 2008-2011, with the budget of around £200.000, managed to involve 162 fishing vessels, 17 harbours, and collect 242 t of ML

[1] Ghost fishing is prolonged catches of fish and other animals, including turtles, seabirds, and marine mammals by ALDFG, although nobody is actively operating the gear.

(KIMO, 2012). On average, a fishing vessel collected 10 kg of ML per week, which is clearly not much of a burden and impediment to its regular fishing operations. Although this is currently commonly not the case, it is conceivable that fishermen get some compensation for their "ML cleaning" activities, from some fund filled in by the "polluters", in which case, FfL would also become a way of diversification of the fishermen incomes.

EU fisheries policy framework has already introduced provisions supporting the establishment of both ALDFG management systems and FfL practices. E.g. Council Regulation (EC) No 1224/2009 stipulates fishermen's responsibilities and procedures in case of the lost fishing gear. Commission Implementing Regulation (EU) No 404/2011 specifies the responsibility for marking and identification of fishing gear. EU Regulation No 508/2014 on the European Maritime and Fisheries Fund (EMFF) stipulates that "the EMFF may support … collection of waste by fishermen from the sea, such as the removal of lost fishing gear and marine litter". Regional Plan on Marine Litter Management in the Mediterranean (UNEP/MAP, 2013) obliges contracting parties to Barcelona Convention to "explore and implement to the extent possible the Fishing for Litter practices …" by 2017. EU Strategy for Adriatic-Ionian Region foresees ML-related measures and guardians of the sea initiative (Vella, 2014). The EU aspirational target of reducing marine litter by 30% by 2020 (EC, 2014) applies also to ALDFG. However, as majority of these are relatively recent developments, their realization is still in early stage, practiced on voluntary bases by more progressive and environmentally aware pioneers.

2.3. Croatian fisheries sector

Fisheries contribution to Croatian GDP is estimated at 0,2-0,7%, if only fishing, aquaculture and fish processing industry are taken into account, or around 1%, if all the other associated activities are included (RH, 2013). Despite this modest contribution, it is an important sector for Croatia, as it is a part of the tradition and an important employer, especially outside the core touristic season, in coastal and island communities, and positive contributor to the balance of trade.

Estimates on capacities and activities within the sector are as follows. Total number of employees in the sector is around 10.000 (without 10.000-13.000 involved in small subsistence fisheries), out of which 7.000 in fishing and the rest in aquaculture and fish processing. Only around 1/3 of the total value of fisheries comes from fishing, which implies low productivity and traditional character of the activity. The fishing fleet includes over 4.000 vessels (without vessels used for small subsistence fishing), with gross tonnage of 45.000 GT and total engine power of 325 kW (which is around 2.5% and 4.5% respectively, of EU fishing fleet, relative to Croatia's around 0.9% share in EU population). Over 80% of 4.000 vessels and 50% in total engine power of the fleet are vessels with length bellow 12 m. Almost 50% of vessels are registered for various fishing practices (which is typical for the Mediterranean). Total catch varies from around 50.000 t (e.g. in 2008 and 2010) to 70.000 t (in 2011): over 85% caught by circa 300 vessels using surrounding nets (primarily sardines and anchovies); less than 10% by circa 500 trawlers; and only 1-2% by circa 1.500 vessels using gillnets and entangling nets. Catch is currently landed in 264 landing ports, over 95% of which in 20-30 major ports (Vrgoč, 2012) (RH, 2014) (Defishgear, 2015).

Governance within the sector is dominantly traditional top-down, command and control, i.e. regulation and enforcement type. Such approach is very demanding on the inspection and enforcement, due to the large number of actors, the dispersion of activities within the vast

area, and the fishing tradition of using many fishing gears and targeting different stocks. The consequence is that existing inspection and enforcement capacities are chronically weak and insufficient and the level of non-compliance relatively high. It is estimated that up to 30-50% of the trawlers catch is not accurately reported (Defishgear, 2015), There are also activities dealing with fishermen awareness raising and education regarding the importance of compliance for sustainability of the sector and their own future, however, these are still perceived even among their proponents and implementers as supplementary, soft governance measures, with very limited potential to influence outcomes.

2.4. Impacts of 3Rs on Croatian fisheries sector

An annual ALDFG from fishing activities with nets in Croatia is estimated at 25 t (Defishgear, 2015). There are couple of hundreds spots that fishermen are aware of, on which nets get snagged and lost more frequently, as they are very attractive fishing sites with morphology that pose high risk of entangling and snagging. An amount of fishing nets annually reaching the end of the life cycle, being replaced and disposed onshore is estimated at 170 t.

Currently there is no systematically organized neither removal of the ALDFG from the sea nor selective collection of end-of-the-life-cycle nets for recycling. In addition to pilot activities organized within the Defishgear project, there were a couple of ALDFG removals organized in the last couple of years as awareness raising events by several diving centres. There were also a couple of instances of recycling company buying nets (altogether a couple of tons) for recycling.

Arguably, current situation justifies the initiation of systems which would secure sound management of these waste streams. It primarily includes the establishment of a system for selective collection of end-of-the-life-cycle nets, as this would increase feasibility and attractiveness of recycling. Namely, as demonstrated by a couple of reported instances, the interest for old nets as material for recycling exists, total estimated quantities also justifies it, but current barrier is the cost of collection which is prohibitively high if it has to be done solely by recycling operators. However, the establishment of network of spots for selective collection would practically eliminate this cost. With regard to ALDFG, potential measures include primarily awareness raising on environmental consequences of ALDFG, the promotion of practices preventing it, the establishment of registry of ALDFG and removal activities – focusing primarily on the spots which have both high concentration of ALDFG and high value as habitats for stock regeneration and for marine biodiversity in general (e.g. reefs and ridges, but also shipwrecks which function as artificial reefs).

The establishment of the system would benefit not only environment (by decreasing ghost fishing) and the recycling sector of economy (by creating new job opportunities), but also the fisheries sector itself, which should be especially emphasized when communicating the idea to fishermen. Namely, it would save fishermen from all the known negative impacts of ALDFG, and also raise sector's sustainability by increasing its modernity and capability for functioning within the EU policy framework.

Currently, there is no organized FfL practice and supporting infrastructure, with the exception of the pilot activities initiated within the Defishgear project (Defishgear, 2015). However, based on interviews (Defishgear 2015), FfL has already been practiced by a portion of fishermen, especially when encountering larger ML on which they snag their nets, while some

of them collect also smaller ML (plastic bags, etc) caught in their nets, and dispose it in regular communal waste collection infrastructure back in ports.

Survey among fishermen on ML quantities as a bycatch in the nets revealed that required additional activities on the side of the fishermen joining FfL initiatives would not be overly demanding – namely, temporarily deposing and landing onshore, in designated areas within the fishing ports, 10-20 kg of ML per week (not including extra-large ML pieces, which are more sporadic events) (Defishgear 2015). Required onshore infrastructure is just an additional standard waste collection container dedicated for ML, within the designated area in the fishing port area. Required surface is minimal, and should be next to other existing waste related infrastructure, including a container for selective collection of old fishing nets. The cost of equipping a fishing port with such an infrastructure is a couple of thousands Euros. Finally, FfL would not put significant burden on existing onshore waste management system, as the total annual amount of collected ML – even for the completely mainstreamed FfL, with all vessels participating – would be around 1000 t, which is around 2‰ of the amount of the MSW currently generated within the Croatian coastal area.

On the other hand, there are multiple benefits. Clearly, it would be beneficial for environment. Although in its pioneering phases the amount of removed ML may not sound impressive – e.g. annual amount of ML collected in reasonably developed KIMO FfL activities in Scotland is around 80 t, which is 4‰ of estimated 20.000 t of annual ML load into the North Sea – it is estimated (OSPAR, 2007) that if mainstreamed within the sector, FfL can realistically, in very cost-effective way, significantly contribute to the solution of ML issue, by removing around 10% of annually generated ML, which is comparable with the percentage removed from the beaches (if these are regularly cleaned), as the estimates are that around 70% of ML ends on the sea floor, 15% floats and 15% ends washed up on the beaches. Besides, FfL is removing ML from the sea floor, which cannot be removed in other way. As continual removal of ML caught within some area makes that area cleaner and therefore more appropriate for fishing activities, without nuisance caused by ML (snagged nets, cleaning of nets), FfL is also beneficial for the fisheries sector itself. Finally, it would also significantly improve both the image of the fishermen within the community and their self-image, as net contributors to the common good.

Regarding the preferable way of implementing these two systems, it is well established that behavioural change of the key stakeholders is a prerequisite for effective enforcement of enacted ML related legislation (UNEP, 2009) (OSPAR, 2007), i.e. that effective ML management requires some combination of legislative binding instruments and non-binding "soft" mechanisms, such as voluntary agreements and environmental awareness raising initiatives (Kershaw et.al, 2013). Further on, Pomeroy and Douvere (2008) emphasised that stakeholder participation and empowerment are critical for achieving sustainable marine environment and marine litter management policies. Consequently, and especially in the context of current governance challenges in Croatian fisheries sector, it is clear that preferable mode for the introduction of these two practices is not one relying on strict regulation and in reality impossible enforcement, but an approach which for its efficiency and effectiveness relies on stakeholders themselves – engaged, informed and thus aware of their co-responsibility for the outcome, less regulated and inspected and more empowered to work together in their best interest.

3. SOCIAL INNOVATION APPROACH TO ENVIRONMENTAL CHALLENGES

3.1. Social Innovations Movement

The concept of social innovation has been a common element of major social scientists studying a societal change. However, more recently, the term has been used for a variety of initiatives and activities, dealing with almost all areas of societal wellbeing, which can be described as "innovations that are social in both their ends and their means (…) new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations (…) innovations that are not only good for society but also enhance society's capacity to act" (BEPA, 2010). Social innovations are addressing not only social demands, but also their underlying causes on the level of societal and systemic challenges. Namely, with regard to its drivers and objectives, social innovations can be divided in: 1) grassroots initiatives addressing urgent social demands of vulnerable groups; 2) initiatives addressing broader societal challenges, directed towards society as a whole, with both social and economic aspect; and 3) systemic initiatives that propose fundamental changes in attitudes, values, strategies, policies, institutional set-up, activities and services, seeing society as "a more participative arena where people are empowered and learning is central" (BEPA, 2010). Observed in the wider context, it is clear that recent fast growth in number of social innovation initiatives and increasing popularity and centrality of the concept (EC, 2011a) – that is rightfully labelled as social innovation movement (BEPA, 2014) – is driven on one hand by growing and converging social, societal and governance challenges associated with multitude of ongoing crises – from the most general one related to (un)sustainability of the mainstream eternal growth model, to more concrete one dealing with the unemployment, inequality, social exclusion, lack of social cohesion, aging, welfare state, healthcare, pension and educational systems, biodiversity, environment, energy and climate, all that in circumstances of the growing budgetary constraints – and no effective solutions and convincing proposals coming from the old models and institutional establishments, and on the other hand great belief in the power of human innovativeness, and realization that new solutions require engagement and participation of all concerned social actors, investment in eroded social capital and renewed social contracts. In other words, in the circumstances of the growing crises and societal challenges combined with the harsh budgetary constraints, social innovations are attempts to address challenges in a way that will be less costly and more effective by relying on changed governance, with more emphasis on participation, empowerment and shared responsibility for the problem solving.

Social innovations have a prominent place within the EU policy, programmes and instruments, being firmly built into Europe 2020 strategy, its' Flagship initiatives, Multiannual Financial Framework for 2014-20 and its programmes and instruments, both within the more directly related policies and programmes – such as Innovative Europe Flagship Initiative, or research and innovation fund 'Horizon 2020', and the Employment and Social Innovation Programme – and as an important dimension within all EU policies and programmes. The objective is to move "beyond the expanding myriad of small initiatives and projects with limited results – as successful as they are – to achieve a real systemic change that puts social innovation at the heart of all processes and policies" (BEPA, 2014).

3.2. Social Innovations in addressing environmental challenges

Social innovation appears to be very natural approach in the domain of environmental challenges (SCUUWEB, 2014). Arguably the main reason is that social innovation commonly

includes societal or behavioural shifts based on the new awareness and reframing of the problem. This is the most efficient and effective solution to environmental problems caused by the stakeholders that are not aware of environmental consequences of their behaviour. Besides, the solution of majority of environmental problems requires collaboration, grass-root approach, the appreciation of local knowledge, adaptive and flexible approach, networking, cross sectoral cooperation. These are all central features of social innovation, and less so in traditional top-down, command and control approach.

There is a number of initiatives dealing with various environmental issues – climate change adaptation, energy use, waste management and recycling, transport, pollution, preservation and sustainable use of biodiversity and ecosystem services, farming and food production, etc. – already recognized and analyzed within the conceptual framework of social innovation (SCUUWEB, 2014). FfL has also already been recognized as promising social innovation (Boss, 2011), although not yet explicitly analysed within the social innovation conceptual framework. More recently, social innovation hubs have been established to support social innovation dealing with some environmental issues. E.g. Keep Britain Tidy Centre for Social Innovation was recently established within the Social Innovation to Prevent Littering project funded by UK DEFRA (Keep Britain Tidy, 2014).

3.3. Key success factors for Social Innovation

Although the Social Innovation is still the subject of active research (EC, 2013), with no universally established conceptual framework, various comparative analysis (e.g. BEPA, 2010; SCUUWEB, 2014; Evers et al 2014) of both theoretical frameworks and case studies generally agree on the following major elements and dimensions of the successful social innovation.

Crises as an opportunity: Social innovation is commonly triggered by some crisis. In the area of environmental challenges this is some environmental crisis, combined with the growing appreciation of threatened ecological values and the understanding of inadequacy of the existing or currently proposed models and solutions. The crises triggering social innovation provide convincing arguments required for successful mobilization and the engagement of critical mass of stakeholders.

Innovative, action-enabling reframing: The key feature that differentiates social innovation from other participative initiatives is its innovative reframing of addressed problem that allows and suggests fresh insights and new approaches, more effective than those used in an old framework. By presenting a problem not as a gloomy destiny but as an opportunity to create a new, brighter reality, successful reframing is action-enabling. Reframing could be triggered or facilitated by education, cross sectoral exchanges, awareness raising or value changing experience – either direct or communicated through the media. It is not a straightforward process. The adoption of new ideas by critical mass of stakeholders requires effort and takes time. Social innovation commonly uses recent technical innovations (including social media and opportunities for citizen science). Finally, social innovation should keep being innovative and adaptive to the changing circumstance.

Stakeholder engagement, networking and empowerment: In the currently dominant top-down models of governance, stakeholder engagement is often treated as unavoidable nuisance. Contrary to that, in the social innovation approach, stakeholder engagement is the main source of ideas and energy for the process. To be effective, stakeholder engagement has

to be close, personal and maximally customized to interests and sensibilities of various stakeholder groups. The establishment of effective cooperation coalitions among the local stakeholders is crucial to enhance public recognition and long term ownership over achieved results. Wide networking, including stakeholders from "the other" (e.g. business, policy) sectors is critical for both initiative's transformative potential and its resilience and sustainability. It also creates opportunity for community-based, action-oriented social learning. "Learning-by-together-doing" is much more effective then one-way-education activities.

Multi-functionality: Successful social innovation is intentionally designed to be multi-functional and appealing to the widest possible range of stakeholders with different interests. Typically, at the same time, it solves some environmental problems, provides an opportunity for the inclusion of some vulnerable social group, contributes to the wellbeing of community and strengthens the local economy.

Social entrepreneurs: Social innovation requires social entrepreneurs and social entrepreneurship, i.e. an individual or core group following entrepreneurial principles (risk-taking, imagination, perseverance, confidence) and providing steady and inspired leadership. Effective leaders have to care for and have sufficient knowledge about the issue, while also having capacity to serve as broker, conflict manager and an intermediary between various stakeholders. Social innovation can be initiated by actors from all sectors, including individuals, community groups, NGOs, academics, governments, businesses and all combinations of these. Similarly, it takes formal structure most suitable for concrete circumstances, more or less formal, from ad hoc gathering organized through social media, to associations, NGOs, cooperatives, social enterprises and companies.

Institutional support: Although social innovation comes from someone's inspiration, institutional (political, financial, in-kind) support increases probability for the sustainability of positive changes induced by social innovations and allows them to become more than just an experiment. The support should be finely tuned to the features of the social innovation: i.e. not killing the initiative's flexibility and innovativeness by too much rules and procedures; accepting occasional failures, as they are a natural part of the learning and innovating process.

Diffusion: The diffusion of social innovation is necessary for mainstreaming positive changes into the existing institutional set-ups and mind-sets. It is also the main mechanism by which social innovations spread from one environment to the other. The possibility of positive change demonstrated in one environment is the most effective trigger for reframing in some other environment which still follows old models.

Besides these main features, it is also well established that environment related social innovations are more probable in supportive environment characterized by: 1) nurturing of environmental awareness and appreciation for natural heritage; 2) building of capacity for social entrepreneurship within the community; 3) fostering of dialogue, networking, cooperation between key stakeholders; 4) accessible institutional support.

4. RECOMMENDATIONS

An analysis of the governance within the fisheries sector in Croatia suggests that social innovation is the only feasible approach enabling the modernization of fisheries sector while promoting the circular economy approach. Based on the customization of the established best

practice in social innovations for environment, following recommendations for the introduction of ALDFG management and FfL practices into the Croatian fisheries sector are formulated:

Crises as an opportunity: Although the situation with ML in Croatian fisheries sector itself is currently not perceived as a crisis of such urgency to give impetus to social innovation on its own, ML is sufficiently established as an urgent and significant global environmental threat to be effective as an argument and motivator for social mobilization and action. Two key messages suggested by FfL guidelines (OSPAR, 2007) are: "1) Marine litter is a problem that can be solved if everyone takes responsibility for their actions; 2) Marine litter damages fishermen's livelihood as well as the environment and it is in everyone's interest to solve the problem". Effective communication of the estimates of costs of negative ML impacts and the benefits of positive practices such as FfL, like those presented in this paper, should be used to convince a critical mass of stakeholders to join the initiative.

Innovative, action-enabling reframing: The main reframing should be, on one hand, the realization of the limited effectiveness of traditional top-down Command-and-Control governance system in fisheries sector and, and on the other hand, the realization of the real potential of currently underestimated social innovation approach. The main barrier to the latter is prejudice that such approach "does not work in our tradition", based on experience in which it has been followed declaratively, but deployed skills, know-how, experience, energy and time were not sufficient to achieve tangible results. What makes this prejudice relatively unchallenged is that it allows situation of "not-doing with nobody responsible", as easy excuses are available that "inspection is too weak due to budgetary constraints" and alternative approach "does not work in our tradition". The required reframing should be triggered by studying successful examples from elsewhere (OSPAR, 2007) (KIMO, 2012) and realization that all obstacles existing here, existed there too, that their success did not come just from the "great idea" but through determined leadership, persistent, objective-driven effort, the adaptive and flexible application of well-established methods and tools. Pilot activities implemented within the Defishgear project (Defishgear, 2015) also demonstrated that such approach is feasibility in our tradition.

Stakeholder engagement, networking and empowerment: Initiative should engage a wide spectrum of stakeholders, including, primarily fishermen through their cooperatives, associations, fishing ports of their affiliation, but also green NGOs dealing with the waste issue, firms from the recycling sector, diving centres that are the main partners in ALDFG removal activities, port authorities, ministries and other relevant authorities that can provide support to the initiative. Stakeholder engagement is critical, as this is the process through which the majority of desired behaviour change (e.g. adopting FfL practice, selective collection of old fishing nets, adopting practices that decrease the probability of losing fishing gear) is to be accomplished. To maximize the probability of successful behaviour change, well established methods should be used, such as e.g. EAST framework (TBIT, 2014) which, based on several years of testing of behavioural science principles in practice, did conclude that simplest advice for effective tactics for behaviour change is that it should "make it Easy, make it Attractive, make it Social, and make it Timely". Benefits should be convincingly communicated through simple messages, in customized way for each stakeholder group. Engagement should be made attractive by devising various awards, such as simple gifts for participants, good will and publicity, positive marketing, or technical assistance in e.g. application for EU funds. Defishgear project pilot activities have shown that even simple fisherman raincoat with initiative's logo is much appreciated by fishermen as a symbol of

others' appreciation for their effort. Even more costly awards can be considered, as FfL activities, by removing ML from marine environment, create real economic value to society.

Multi-functionality: Multi-functionality is already suggested by the above wide list of stakeholders, as well as in already explained multiple benefits: to environment, to the recycling sector, to the fisheries sector, to social cohesion within the sector and within the fishermen communities, to the environmental awareness of the general public.

Social entrepreneurs: Stakeholder analysis done within the Defishgear project (Defishgear, 2015) suggested the combination of stakeholders as the core group behind the initiative. It would preferably include: 1) the leading environmental NGO in coastal part of Croatia, with required social entrepreneur capacities and experiences, proven undying enthusiasm and extensive experience in dealing with waste issues, but also with experience in projects promoting sustainable fisheries and already established contacts and the relationship of trust with many actors within the fisheries sector; 2) the representatives of the most active fishermen co-operatives. Such core group would combine all skills, know-how, experience and enthusiasm required for the task. The establishment of the scheme requires full time manager.

Institutional support: Experience suggests (OSPAR, 2007) that institutional support from the national level is more effective than from the local level, although the latter is also welcomed. Institutional support is arguably guaranteed as both relevant ministries – fisheries and environmental protection – are already actively working on programs foreseeing the introduction of ALDFG management and FfL, while financing is available both from the European Maritime and Fisheries fund and the Croatian Environmental Protection and Energy Efficiency Fund. The process should be initiated by the establishment of the infrastructure for ALDFG management and FfL in 10-20 major fishing ports, involving 150-200 boats in FfL scheme, selectively collecting and forwarding for recycling 50% of assessed annual amount of end-of-the-life-cycle nets, removing ADLFG from 15-20 selected hot-spots. The Ministry of Environmental and Nature Protection should secure seamless connection between systems being established and the existing waste management systems.

Diffusion: Arguably the most important diffusion process will be analysis, presentation and communication of relevant successful examples from elsewhere, as part of the reframing facilitation. In the mainstreaming phases of the process, there will be diffusion of positive examples of local pioneers from the pilot phases. Successful change in the fisheries sector could also have a number of positive spill-over effects including in addressing of: ML issue in other sectors (primarily tourism), other environment-related issues within the fisheries sector, and other issues in the waste management sector.

BIBLIOGRAPHY

BEPA (Bureau of European Policy Advisers) (2010) **Empowering people, driving change – Social innovation in the European Union**, http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/index_en.htm [Accessed 26.02.2015]

BEPA (Bureau of European Policy Advisers) (2014) **Social Innovation – Decade of Changes**, http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/index_en.htm [Accessed 26.02.2015]

Boss, S. (2011) **Trawling for Trash** (an article on the Stanford Social Innovation Review web portal), http://www.ssireview.org/articles/entry/whats_next_trawling_for_trash [Accessed 19.03.2015]

Boulding, K.E., (1966): **The Economics of the Coming Spaceship Earth**, in H. Jarrett, ed.: ***Environmental Quality in a Growing Economy***, Baltimore, MD: Resources for the Future/Johns Hopkins University Press., http://www.eoearth.org/view/article/156525/ [Accessed 26.02.2015]

Davis, Hall (2006) **Circular Economy Legislation - The International Experience.** World Bank, Washington, May 2006.

Defishgear (2015) **Derelict Fishing Gear Project in the Adriatic Sea** (EU IPA Adriatic Strategic project; 2014-2016) http://www.defishgear.net [Accessed 28.02.2015]

EC (European Commission) (2011a) **Europe 2020 Flagship Initiative Innovation Union**, http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication-brochure_en.pdf [Accessed 27.02.2015]

EC (European Commission) (2011b) **A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy**, http://ec.europa.eu/resource-efficient-europe/index_en.htm [Accessed 27.02.2015]

EC (European Commission) (2013) **Social innovation research in the European Union: Approaches, findings and future directions**, http://ec.europa.eu/research/social-sciences/pdf/social_innovation.pdf [Accessed 27.02.2015]

EC (European Commission) (2014) **Towards a circular economy: A zero waste programme for Europe**, http://ec.europa.eu/environment/circular-economy/ [Accessed 27.02.2015]

EC (European Commission) (2015) EC Work Programme for 2015, http://ec.europa.eu/atwork/pdf/cwp_2015_en.pdf [Accessed 27.02.2015]

EREP (European Resource Efficiency Platform) (2014) EREP **Manifesto and policy recommendations,** http://ec.europa.eu/environment/resource_efficiency/documents/erep_manifesto_and_policy_recommendations_31-03-2014.pdf [Accessed 27.02.2015]

Evers, A., Ewert B., Brandsen T. (2014). **Social innovations for social cohesion. Transnational patterns and approaches from 20 European cities.** http://www.wilcoproject.eu/downloads/WILCO-project-eReader.pdf [Accessed 27.02.2015]

Feng Z. & Yan N. (2007): **Putting a circular economy into practice in China,** ***Sustainability Science***, 2: 95 – 101

Hall, K. (2000). **Impacts of Marine Debris and Oil. Economic & Social Costs to Coastal Communities.** Publication of Kommunenes Internasjonale Miljøorganisasjon (KIMO).

Keep Britain Tidy (2014) **Social Innovation to Prevent Littering**, http://network.keepbritaintidy.org/Documents/Files/Social%20Innovation%20-%20preventing%20litter.pdf [Accessed 27.02.2015]

Kershaw, P.J., Alcaro, L. et. al. (2013). **Review of existing policies that may be applied to mitigate the impact of marine litter.** (EC FP7 MARLISCO project – Marine litter in Europe seas: Social awareness and co-responsibility), http://www.marlisco.eu/review-of-existing-policies-that-may-be-applied-to-mitigate-the-impact-of-marine-litter.en.html [Accessed 27.02.2015]

KIMO (2012) **Fishing for Litter Scotland 2008 – 2011: Final report**, http://www.kimointernational.org/WebData/Files/FFL%20Scotland/FFL%20Scotland%20Report%20FINAL.pdf [Accessed 08.03.2015]

Macfadyen, G.; Huntington, T.; Cappell, R., (2009) **Abandoned, lost or otherwise discarded fishing gear**, UNEP Regional Seas Reports and Studies, No. 185; FAO Fisheries and Aquaculture Technical Paper, No. 523. Rome, UNEP/FAO.

McKinsey & Company (2012) **Towards the Circular Economy Vol.1: Economic and business rationale for an accelerated transition**, Ellen MacArthur Foundation, http://www.ellenmacarthurfoundation.org/business/reports/ce2012 [Accessed 27.02.2015]

McKinsey & Company (2013) **Towards the Circular Economy Vol.2: Opportunities for the consumer goods sector**, Ellen MacArthur Foundation, http://www.ellenmacarthurfoundation.org/business/reports/ce2013 [Accessed 27.02.2015]

McKinsey & Company (2014), **Towards the Circular Economy Vol.3: Accelerating the scale-up across global supply chains,** Ellen MacArthur Foundation, http://www.ellenmacarthurfoundation.org/business/reports/ce2014 [Accessed 27.02.2015]

Mouat, J.; Lozano, R.L.; Bateson, H. (2010), **Economic Impacts of Marine Litter**, KIMO, http://www.kimointernational.org/WebData/Files/Marine%20Litter/Economic%20Impacts%20of%20Marine%20Litter%20Low%20Res.pdf

OSPAR (2007), **Guidelines on How to develop a Fishing-for-litter Project**, http://www.ospar.org/documents/dbase/decrecs/agreements/07-10e_guidance%20to%20develop%20ffl.doc [Accessed 05.03.2015]

Pomeroy, R., Douvere F. (2008): **The engagement of stakeholders in the marine spatial planning process**, ***Marine Policy,*** 32: 816-822

Potočnik, Janez (2014): **Circular Economy and Green Employment Initiative**, address given by EC Environment Commissioner at the ***Press conference on Circular Economy and Green Employment Initiative***, Brussels, 2 July.

Republika Hrvatska (2013), **Nacionalni strateški plan razvoja ribarstva RH**, http://www.mps.hr/ribarstvo/UserDocsImages/NSP/NSP_OP_06112013/Nacionalni%20strate%C5%A1ki%20plan%20razvoja%20ribarstva%20Republike%20Hrvatske.pdf [Accessed 05.03.2015]

Republika Hrvatska (2014), **Operativni program za pomorstvo i ribarstvo Republike Hrvatske za programsko razdoblje 2014.-2020**., http://www.mps.hr/ribarstvo/UserDocsImages/EMFF/22072014/Programska%20polazi%C5%A1ta%20i%20ciljevi%20-%20sa%C5%BEetak.pdf [Accessed 05.03.2015]

SCUUWEB (2014) (Science Communication Unit, University of the West of England, Bristol) (2014), **Science for Environment Policy In-depth Report: Social Innovation and the Environment** (Report produced for the European Commission DG Environment, February 2014.), http://ec.europa.eu/science-environment-policy [Accessed 27.02.2015]

Stahel, Walter R. and Reday, Geneviève (1977) **The potential for substituting manpower for energy** (report to DG V for Social Affairs, Commission of the EC, Brussels).

TBIT (The Behavioural Insights Team) (2014), **EAST: Four simple ways to apply behavioural insights**, http://www.behaviouralinsights.co.uk/publications/east-four-simple-ways-apply-behavioural-insights [Accessed 10.03.2015]

UNEP (2009) **Marine Litter: A Global Challenge.** Nairobi: UNEP, http://www.unep.org/pdf/unep_marine_litter-a_global_challenge.pdf [Accessed 25.02.2015]

UNEP/MAP (2013), **Regional Plan for the Marine Litter Management in the Mediterranean**, http://www.cbd.int/doc/meetings/mar/mcbem-2014-03/other/mcbem-2014-03-120-en.pdf [Accessed 27.02.2015]

Vrgoč, N. (2012), **Hrvatsko morsko ribarstvo: stanje i perspective na pragu EU**, UNDP, http://www.izor.hr/c/document_library/get_file?p_l_id=68581&folderId=114050&name=DLFE-17701.pdf [Accessed 27.02.2015]

Vella, Karmenu (2014): **Statement of EC Environment, Maritime Affairs and Fisheries Commissioner**, address given at the ***Launch of the EU Strategy for the Adriatic and Ionian Region (EUSAIR)***, Brussels, 18 November

THE VIEW OF DAIRY SECTOR AND THE ECONOMIC SITUATION OF MILK PRODUCERS IN POLAND AND IN LITHUANIA AFTER ACCESSION TO THE EU

Irena Augustyńska-Grzymek,
Magdalena Czułowska,
Aldona Skarżyńska,
Marcin Żekało
Institute of Agricultural and Food Economics–National Research Institute
Swietokrzyska 20, 00-002 Warszawa
Phone: ++48 225054444; Fax: ++48 228271960
E-mail: marcin.zekalo@ierigz.waw.pl

Aldona Stalgiene
Lithuanian Institute of Agrarian Economics, Vilnius, Lithuania
V. Kudirkos Str. 18–2, 03-105 Vilnius
Phone: ++370 52614525; Fax: ++370 52614524
E-mail: aldona.stalgiene@laei.lt

Key words: *dairy farms, milk production, economic results, Central and Eastern Europe*
JEL classification: *O13, O57, Q19*

ABSTRACT

The dairy sector is the main branch of agricultural production which constitutes source of income of many farms in Poland and in Lithuania. Accession of both countries to the structures of the European Union has radically changed the functioning of the entire dairy sector which faced changes and the necessity to comply with the new free market circumstances. The first aim of this article is to present the overview of the dairy industry in Poland and in Lithuania after the accession to the EU. The second aim is to focus on the economic situation of milk producers. The summary clearly shows the immense progress in complying with the EU requirements, although the gap between these two markets and the biggest EU milk producers is still significant. The economic results of analysed dairy farms in Poland and in Lithuania confirmed the improved performance of productivity since 2004. Relatively small (about 50%) share of subsidies in farm net income makes milk production less dependent on such type of support.

1. INTRODUCTION

The Central and Eastern Europe varies in respect of policy and agriculture but in this geographical area the coutries share mutual historical heritage. After the II World War, these countries found themselves under strong influence of the Soviet Union which caused significant social and agricultural uniformity among them. After the collapse of the Soviet Union, the Central and Eastern European countries gained complete independence and entered the path of democratic policy and free market economy development. Despite the similarities between economies of individual countries, their starting positions varied greatly, at the beginning of the transformation period. The Central and Eastern European countries and the Baltic States seemed to be quicker than other countries to adjust to the market economy rules towards international trade. The pace of economic changes and progress of democratisation in these countries were faster than in the so called Eastern-block countries (Sorsa, 1997). A chance also occurred for economic cooperation, especially between the Baltic States and the Central European countries.

The dairy sector is one of the main branch of agricultural production which constitutes source of income of many farms in Poland and in Lithuania. The transformations of the political and economy system caused radical change of dairy market conditions. This also included the end centrally-planned economy of the dairy sector with significantly subsidised milk processing sector, which was characterised by excessive supply of the raw material. Dairy cooperatives stopped being subsidised by the state and faced the necessity of privatisation. Many countries which participated in the transformation and later on the steps to accession to the European Union structures, had to deal with numerous problems within the food economy in order to function in the reality of free market. To cope with market competition, consolidation measures were introduced, especially pertaining to small and medium-sized enterprises (SME). Also, an increase of the concentration of processing took place.

The old local and regional market networks were broken in the Central and Eastern European countries and were substituted by wider international cooperation. The strong relationship of the Baltic States, within the Baltic Free Trade Area (BFTA) was loosened and ceased to exist in May 2004 due to the accession of Lithuania, Latvia and Estonia to the EU. This allowed for easier international contacts and trade with other countries. A chance also appeared for Polish and Lituanian producers and processors of dairy to widen the international cooperation. The reports, from recent years, stating that international trade activity in the scope of dairy products, and even raw milk trade, between Poland and Lithuania is starting (PAP, 2012). The integration of Poland and Lithuania with the EU visibly changed the country's dairy sector, which leads to observation of the sector's development under new market conditions, the conditions of international trade, and farms' competitiveness conditions. Poland and Lithuania are the biggest milk producer within the Central and Eastern Europe region and it is very interesting to study the path of the dairy sector development of those two closely related countries.

The aim of this study is to present the overview of the dairy industry in Poland and in Lithuania after the accession to the EU. The paper uses domestic statistical data and FADN EU data available between 2004 and 2012 which were subject to tabular and graphic analyses. The second aim is to focus on the economic situation of specialised dairy farms in Poland and Lithuania. In that case the FADN EU data were taken into account. Summary attempts to describe synthetically the current state of the dairy sector as well as the economic condition of milk producers in Poland and in Lithuania.

2. DAIRY SECTOR IN POLAND AND LITHUANIA – THE OVERVIEW

The dairy sector in the modern understanding is a complex including three, tightly related parts which constitute elements of the milk marketing chain (Sznajder, 1999):

- **the production of milk** on agricultural farms, using knowledge and farmer's work, capital and the entire infrastructure of the farm, including: the breeding and husbandry of dairy cows, the plant production for feed (required forage area), the purchasing of means of production and the selling milk,

- **the processing of milk**, most often located outside an agricultural farm, usually at the dairies but also at cheese dairies and milk powdering plants. The processing plant is a complicated structure including: organisation of the company, its technical infrastructure, milk processing technology and waste disposal technology. The procurement of milk is the element joining processing and the production, and the sale of final dairy products is the element joining processing and trade,

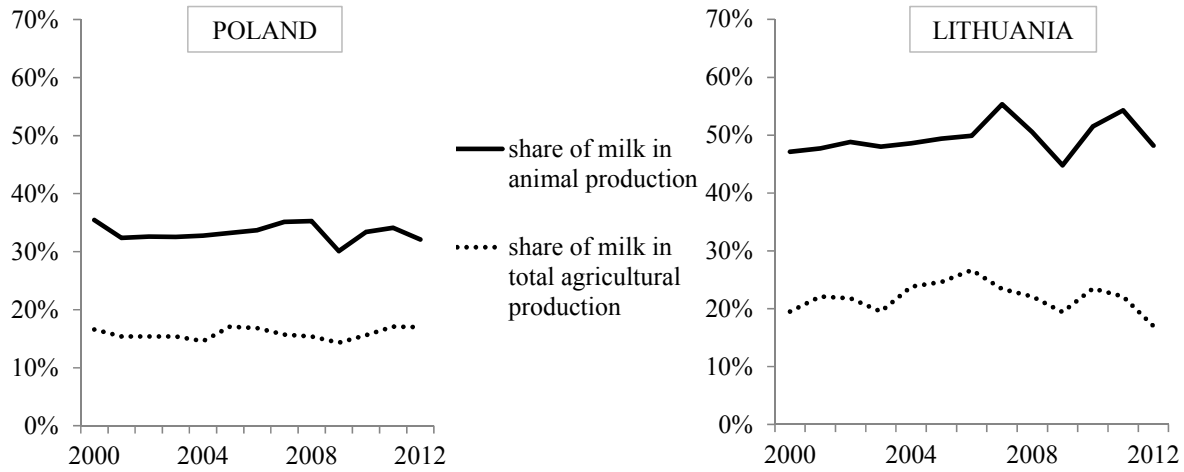
- **the distribution and the trade** which aims at supplying the final client with final dairy products of proper quality, in a way and place to the client's highest satisfaction.

Each stage of the milk marketing chain was the subject to transformation. The direction of the changes is largely influenced by the Common Agricultural Policy (CAP) and Poland and Lithuania participate in shaping it. Changes are also observed within the structure of the chain, for example: greater cooperation between producers and consolidation of processing but also internationalisation of the dairy sector. Without a doubt, changes occur also within the production at dairy farms, especially when it comes to aspects related to the quality of the raw product which, in turn, is connected with consumer expectations. All changes taking place in the dairy sector are visible more strongly in those countries which underwent the transformation of the political system. Especially with the switch of the entire agri-food sector from the centrally planned economy to the market economy system (Malak-Rawlikowska, 2007). The entire milk marketing chain operates within the current free market conditions, both in Poland and in Lithuania, however, changes within individual parts of the chain are characterised by varying dynamics.

2.1. Production of milk in Poland and Lithuania

The animal husbandry, both in Poland and Lithuania, is an important agricultural sector and the dairy cows husbandry and milk production are one of the most important branches of agricultural production. During the first three years after the EU accession (2004-2006) the value of milk production within the value of total agricultural production amounted to: in Poland 15.4%, 14.6% and 17.1%, and in Lithuania 23.8%, 24.6 % and 26,7%, respectively. In later years a small decrease of the share was recorded (Fig.1). The direction of the changes also shows that the significance of milk production increases. During 2004-2012 period, taking into account extreme values, the share of the milk production value within the total animal production amounted to 32.8-32.1% in Poland, and 48.6-48.2% in Lithuania. However, during the pre-accession period (2000-2003) it amounted to, respectively: 35.4-32.6% in Poland and 47.1-48.0% in Lithuania. It should also be noted that the share of milk within the structure of Lithuania's total animal production value was relatively high, and even higher than results of countries including Germany and Holland. In Poland the value equalled the average EU-27 value, similarly to France and Great Britain (Eurostat, 2012).

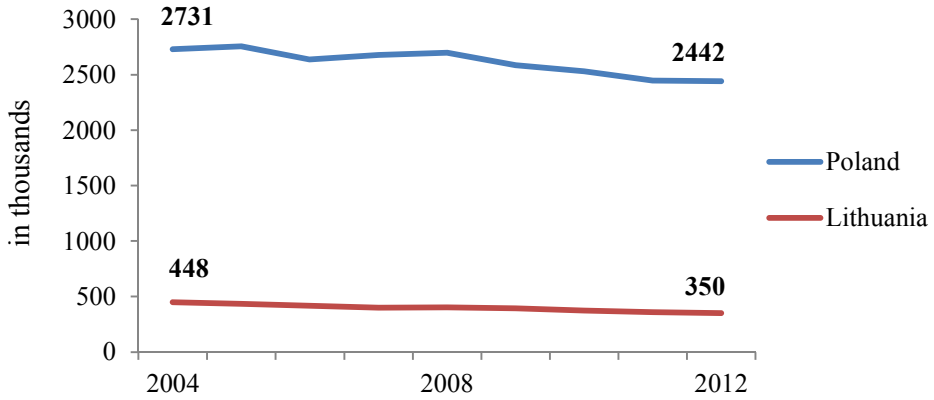
Figure 1. The share of milk production value in total agricultural production and animal production in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

The accession to the EU with the introduction of CAP was the main factor stimulating the process of restructuring the dairy sector in the last years. Important elements in this process were, e.g.: improvement of milk quality; pre-accession support investments, export development, increase in milk prices and the milk quota system. Also the increasing competition on a food market (market entry of foreign dairies, especially in Poland) has radically changed production conditions. The restrictive milk quality standards (chemical composition and purity as well as levels of different micro-organisms) mainly caused elimination of small producers from the market, who were unable to meet the quality requirements. The investments on improvement of milk quality required appropriate herd size and milk production scale to achieve the sufficient milk quota. It's worth noting, that milk quota system (limiting the milk production) was considered by producers as a barrier in the use of full production potential of dairy farms. Thus significant reduction in the number of dairy cows can be noted both in Poland and in Lithuania (Fig.2).

Figure 2. Numbers of dairy cows in 2004-2012 in Poland and Lithuania.

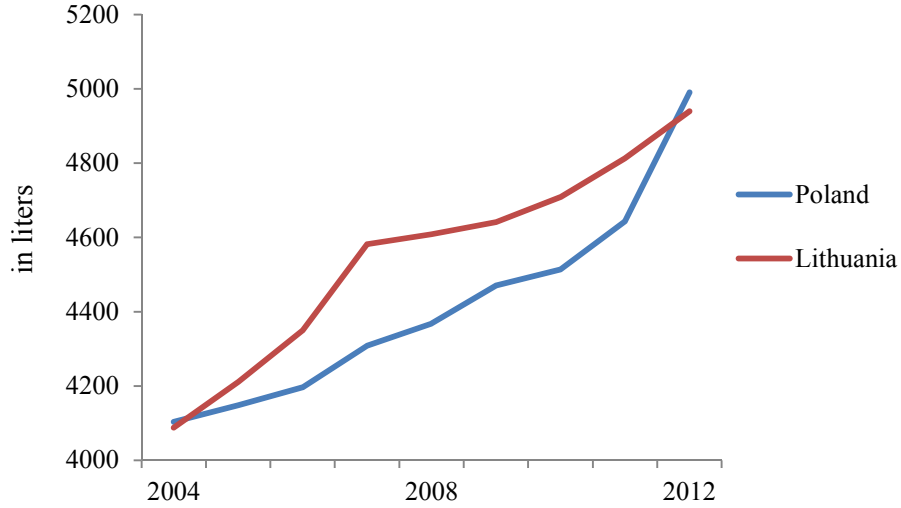


Source: Central Statistical Office of Poland and Lithuania, var. years.

The reduction of number of cows and decrease in population of dairy cows was compensated by the systematic increase of cows' milk yield (Fig.3). During 2004-2012 period milk yield in

Poland increased by 21.6%, and in Lithuania by 20.8%. Despite the decrease in population of cows, the amount of milk produced increased by 18.4% in Poland and in Lithuania – by 19.3% (the higher milk yield being the decisive factor). The increase of milk production was connected with improvement of production technology. The changes in production techniques used in dairy farms were observed, as a result of investments on new technologies (e.g. refrigerator for milk, milking parlors) and changes in nutritional practices (e.g. using the silage rather than hay).

Figure 3. The milk yield in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

Increase of milk yield directly influences the strengthening of this direction of agricultural production on the national scale. However, the fragmented production of milk is one of the greatest problems of the dairy sector in both countries. The greatest share within the structure of dairy farms, in both countries, was of the small farms (up to 10 cows). In 2010, in Poland the share amounted to 82.6% of dairy farms (in 2002 to 93.5%), and in Lithuania it amounted to 94.5% in 2009 (in 2004 to 97.7%) In 2010, in Poland 5.9 animals were kept per dairy farm (in 2002 r. – 3.3 animal) and in Lithuania – 3.6 animal in 2009 (2.6 animal in 2002). A slightly better situation can be observed in the typical dairy farms aiming at commercial farming. Studies provided by the European Commission show that between 2004 and 2009 in farms included in the FADN study, specialising in milk production, the average number of cows per 1 farm in Poland amounted to 14-16 animals, and in Lithuania – 12-18 animals; and the average milk yield amounted to, respectively, 4968-5340 kg/cow in Poland and 5046-5344 kg/cow in Lithuania.

It is worth noting that milk production is tightly connected with feed plants production, which is largely influenced by natural conditions of plant production. The use of existing grazing lands for the purposes of roughage production and grazing is important in milk production. The grazing system is the most popular system of sustaining dairy cows, both in Poland and in Lithuania. During the studied period (2004-2012) the share of grazing lands area in Poland is relatively stable in relation to the total of agricultural area and amounted to 19.7% to 21.3%. In Lithuania, in 2004, the share of grazing lands area was relatively high (amounting to 36.7% of agricultural area), however, in the following years the share decreased and amounted to only 19.4% in 2012. According to the studies by the European Commission, in farms specialising in milk production (included in the FADN studies), the use of feed area (area for production of feed in a farm) is very different between Poland and Lithuania. During

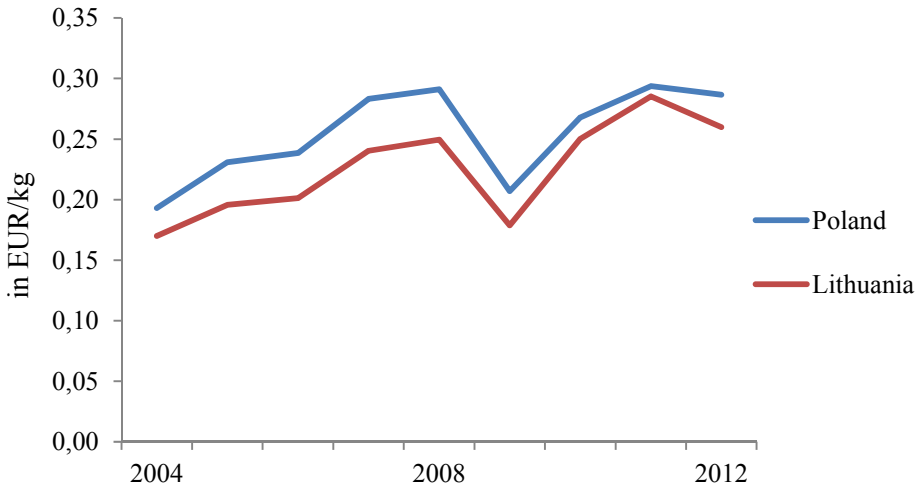
the 2004-2009 period, in Poland the feed area in those farms was on a stable level with 0.8-0.9 ha grazing area per 1 cow (except for 2004 – 0.6 ha/cow). In Lithuania, however, the feed area per 1 dairy cow was significantly larger, and during the said period showed decreasing trend, from 2.4 ha in 2004 to 1.7 ha in 2011.

The monitoring is an important mark of progress in technology of milk production and production of milk, as well as the results of assessment of dairy cows milk yield. It is often thought that with the help of assessment of milk yield modern and professional herd management is possible, including within the scope of: assessment of genetic advantages of animals allowing efficient husbandry and appropriate selection, that is heard improvement through improvement of animal characters and habit (Polish Federation of Cattle Breeders and Dairy Farmers, 2014). The milk yield program facilitates optimal feeding of animals, influences the increase of amount and quality of produced milk, thus increasing its profitability, and allows determination of the costs of production of milk and herd's economic assessment. In Poland, as in Lithuania, the number of dairy cows included in milk yield assessment increases. In 2004 the percentage of cows under control in Poland amounted to 17.4%, and in Lithuania as much as 42.2%. Following years saw a significant increase of interest in the assessment, and in 2012 the percentage of cows under control in Poland amounted to 27.9%. However, in Lithuania during the period remained at a relatively stable level and amounted to 43% in 2012 (during the 2005-2008 period amounted to as much as 47-49%). It should be noted that production results (milk yield) of cows under assessment are much higher than the national average in both countries in question.

The most popular husbandry races within the milk yield assessment include:
in Poland - Jersey, Montbeliarde, Polish Holstein-Friesian, Polish Red-White, Red Polish;
in Lithuania - Lithuanian Native Ash-grey, Lithuanian B & W, Holstein B&W , Native White-back, Ayrshire.

Raw material selling price obtained is a very important aspect of milk production. During the period 2004-20011 milk producers obtained favourable milk sales prices, despite some years of downturn (Fig.4).

Figure 4. The selling milk prices in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

Just after Poland and Lithuania's accession to the EU, in 2004, purchase prices were relatively lower which resulted from the decreasing tendency of shaping of purchase prices during the pre-accession period, that is years 2000-2003. In 2009 a significant decrease in milk purchase prices occurred, resulting from the global economic crisis, the results of which were felt by both Polish and Lithuanian producers.

It should be highlighted that milk production, as well as purchase of milk by the dairy industry are subject to seasonal fluctuations. The seasonal character of milk production is shaped by numerous factors, mainly within agriculture, and to a lesser degree within the external surroundings of farms (Matysik-Pejas, 2007). The inequality of production of milk is a phenomenon typical of smaller dairy farms where milk is not the main commercial product. This factor is of no significance to farms with large herds of dairy cows, specialising in production of milk of high quality.

2.2. Milk processing in Poland and in Lithuania

The process of technological and structural adjustment (after the accession to the UE) of milk processing was less impetuous than in case of the changes at the level of producers. Adjustment of milk processing to the EU market requirements was connected mainly with high quality requirements set for the production process but also with high quality requirements for the raw milk. The EU aid schemes, mainly investment grants for modernisation and further development of processing facilities were and still are an important support allowing transformation. A lot of the smaller facilities, which did not meet the requirements, was closed down or bought by large companies. In Poland a significant part (around 20%) of big and medium companies has foreign strategic investors, which not only guarantees external capital injection, technology and management systems know-how but also facilitates access to selling markets and distribution channels, and accelerates promotion of the required standards and procedures. Nevertheless, similar strategic actions may be observed in case of companies with a domestic capital.

After the accession to the EU, considering the number of subjects processing milk, in case of Poland a sudden increase in the number of processing facilities fully adjusted to the EU requirements was noted. There were 55 such facilities in 2004, and only a year later, the number increased to 225. In the following period (2006-2012), the number of processing facilities decreased from 226 to 172, mainly due to concentration and joining of companies into larger structures but also a significant percentage of subjects had to close down. In Lithuania, in 2003 there were 20 processing facilities in the dairy sector, and in the 2006-2012 period, the number dropped and currently there are 13-14 processing facilities. It can be stated that milk processing in Lithuania is very concentrated (in 2012 four main groups of producers in the country combined 80% of income of the total dairy sector).

2.3. Distribution of dairy products in Poland and in Lithuania - export and import

Poland and Lithuania are significant net exporters of dairy products (Bugała 2011). Cheeses, curds, powdered and liquid milk, and cream are the basic export products. Both countries' accession to the European Union influenced the systematic increase of export. The exception being 2009 characterised by lower results of both Polish and Lithuanian foreign trade due to the economic crisis (a small decrease was noticeable in Lithuania as soon as 2008). In 2009 the value of polish dairy products export dropped by about 24% in relation to the record year 2008, and the drop in Lithuania was significantly smaller and amounted to about 14%. The share of dairy import in the total value of food products imported to Poland, as well as to

Lithuania is insubstantial and in 2009 amounted to around 3% and 4%, respectively. The value of import of dairy products has been rising continuously since 2003, with the exception of 2009, as in the case of export.

Table 1. Polish foreign trade in dairy products (mln EUR).

Specification	2003	2004	2005	2006	2007	2008	2009	2010
export	327	561	880	916	1165	1222	925	1177
import	50	62	99	140	259	284	273	364
saldo	276	499	782	776	906	938	652	813

Source: Central Statistical Office of Poland and Lithuania, var. years.

The European Union is the main recipient of Polish and Lithuanian dairy. In 2003 the dairy products imported to the European Union from both these countries amounted to 41% of total value of dairy export. Since Poland's accession to the EU, the percentage has been rising and amounted to 69% in 2004 and 82% in 2009. In case of Lithuania, export to the member states remains at a fairly stable level of 60-65%.

Table 2. Lithuanian foreign trade in dairy products (mln EUR).

Specification	2003	2004	2005	2006	2007	2008	2009	2010
export	152	220	246	285	385	372	320	405
import	11	13	35	59	82	112	73	123
saldo	142	207	211	226	303	260	247	282

Source: Central Statistical Office of Poland and Lithuania, var. years.

In 2010 Poland noted a slight increase in significance of export to countries outside the EU. The increase amounting to almost 23% resulted from the increase of export of dairy products to Russia and Arabic countries. Germany is the most important recipient of Polish dairy products. In 2004 the value of export amounted to only 8%, and currently it amounts to ¼ of the total value of Polish dairy export. However, export of dairy products from Lithuania to countries outside the EU amounts to 35-40%, of which most products reach the Russian market (33% of total export of dairy products in 2010).

The direction of import of dairy products to Poland and to Lithuania is similar to that of export – from member states. In 2003 import share amounted to 82% and 77% of total value of imported dairy products, respectively. In 2010 the share increased to 99.6% within the structure of Polish dairy import, and 100% within Lithuanian. Germany is Poland's main trade partner, and it is from this country that nearly half of all the imported dairy products comes. France and Lithuania are two partners of lesser importance. Potentates from the region of Oceania (New Zealand, Australia), as well as Switzerland are the suppliers from outside the EU. In case of Lithuania, Latvia and Estonia are the main suppliers of dairy products and, what is worth highlighting, so is Poland (as much as 23% of total dairy products import).

2.4. Distribution of dairy products in Poland and in Lithuania – the consumption

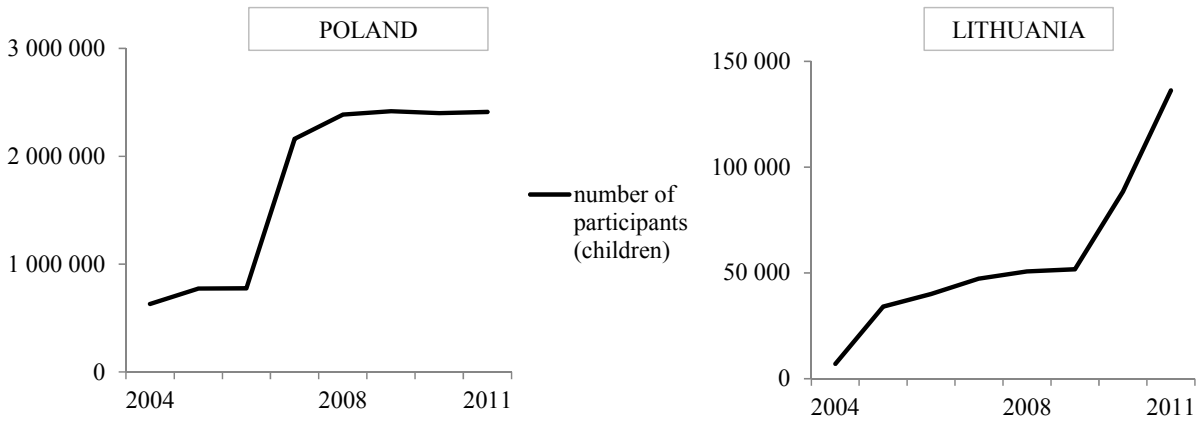
In the 2003-2005 period, in Poland, a decrease in milk and dairy products consumption in general, as well as per capita could be observed. In 2005 total milk and dairy products consumption dropped in comparison with 2003 by 8.5%, and milk and dairy products in milk equivalent consumption (no butter) per capita dropped by 4.4%, and butter consumption per capita decreased by 10.6% (Pietrzak, Szajner 2006). A gradual increase in dairy consumption

can be noted since 2006. In 2009 milk consumption in Poland reached the level of 170-182 litres per citizen, and consumption of butter amounted to around 4.2 kg. Consumption of cheeses increased by nearly 5% in comparison with 2008. According to IAFE-NRI estimates, in 2011 the balance consumption of milk in Poland calculated per citizen amounted to 193 litres (excluding milk used for the production of butter). This means that it was higher by 1% than the previous year and by about 12% than in 2005 . Consumption of butter and cheeses in 2011 amounted to 4.0 kg per capita. Newest data show that dairy products consumption (in milk equivalent) amounted to the average of 280 kg in 2012, calculated per number of Polish citizens.

A systematic increase in general consumption of cheeses and butter may be observed in Lithuania since 2006, however, consumption of milk decreased (Eastagri, 2009). According to FAO data, in 2009, in comparison with 2006, consumption of butter and cheeses increased respectively by 34 and 85%, and consumption of milk decreased in total by around 72%. However, when analysing the consumption of milk and dairy products per citizen, calculated per kg of milk until 2009, it remained at a relatively stable level of 280-290 kg. The consumption per citizen of Lithuania in 2009 in case of milk was at 137 litres, and of butter at 3.49 kg. Consumption of cheeses dropped by nearly 10.5% in comparison with 2008 (Eurostat 2010).

Since 2004, in Poland and in Lithuania the "EU School Milk Programme" social campaign has been run. The aim of the programme is to teach children and youth good eating habits, through promotion of consumption of milk and dairy products. This form of support and promotion of consumption of milk and dairy products met with noticeable interest in both countries. Poland is a leader in implementation of the programme as far as consumption of milk and obtaining of support thanks to EU funds are concerned. The number of children (at educational establishments) consuming milk and dairy products within the programme, in Poland and in Lithuania, are shown in Figure 7.

Figure 7. EU School Milk Programme in 2004-2012 in Poland and Lithuania.



Source: EU School Milk Programme.

The scale of the "EU School Milk Programme" in Poland and in Lithuania is incomparable. Realisation of the programme in these two countries also differs greatly. It is worth noticing that the significant increase in the number of children included in the programme in Poland occurred slightly earlier (in 2006), and stabilised in later years. In Lithuania, the increased interest begun in 2009 and the number of children included in the programme in following years increased further, rapidly.

3. THE ECONOMIC RESULTS OF MILK PRODUCTION IN POLAND AND LITHUANIA

Farms specializing in milk production are an important part of the Polish and Lithuanian agriculture, thus, it is justified to study their productivity and effectiveness. One way to assess the operation of farms is the management effectiveness, that is, the ratio of the effects to the means used (Józwiak, 1998). In order to evaluate the effectiveness of dairy farms, the assessment of farm productivity can be used. Productivity is a quantitative relation between the output and the size of the factor involved in its production (Kołoszyc, Świtłyk, 2004). Effectiveness can be measured using indicators, the most frequently economic and financial ones of a cost and resource nature, in which the aim should be full use of the potential (Kulawik, 2010). In this study, measuring the effectiveness will be based on total output profitability (Kulawik, 2008).

3.1. Materials and methods

The study uses available empirical data collected in the EU FADN from 2004 (the year of the accession to the EU) and 2012 (recently available data on EU FADN database). Study objects were chosen using the purposive sampling method. Groups selected for the analysis were farms specializing in dairy (type of farming – TF14 Specialist milk). The type of farming is defined on the basis of the contribution of individual types of agricultural activities to the total Standard Output value of a farm, and it reflects the pursued system of production. The selected farms specializing in milk production were characterized by the fact that revenues from the sale of milk and dairy products accounted for over 50% of total revenues. For the purposes of this analysis, total revenues are considered to be total output[1] increased by the value of subsidies related to operating activities.

The indicators were used to assess the productivity of farms, as follows:

- Total output per dairy cow,
- Total output per 1 AWU (Annual Work Unit)[2],
- Total output per 100 Euro assets.

The following indicators were used to analyse the economic efficiency:

- Total output profitability [%] = (Total Output + Total Subsidies excl. on investments) / Total Input,
- Total costs/total output.

To illustrate the economic situation of Polish and Lithuanian dairy farms, economic results of farms with the type of farming TF14 specialist milk are also presented in selected EU countries: Hungary (Central Europe) and Latvia (Baltic State).

3.2. Results of the study

It has to be accented that the economic results of surveyed group of farms only reflect the results of the selected sample, but there are indications that it may be an illustration of the

[1] Total output of crops and crop products, livestock and livestock products and of other output, sales and use of (crop and livestock) products and livestock, change in stocks of products (crop and livestock), change in valuation of livestock, various non-exceptional products, less purchases of livestock.
[2] Total labour input of holding expressed in annual work units = full-time person equivalents.

economic performance of milk production in general. The main informations concerning the designated groups of farms in selected countries were presented in table 4.

Table 4. Selected data on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Economic size	1000 Euro SO	19.6	29.3	11	18.9	73.6	93.2	18.1	25.1
Labour input	AWU	1.77	1.82	1.49	1.67	2.79	2.87	2.3	1.98
Total Utilised Agricultural Area	ha	15.54	21.04	24.96	32.82	62.1	72.52	52.16	47.27
share of forage crops	%	50	60	69	72	58	60	75	81
Dairy cows	LU[1]	12.2	14.8	8.3	11.1	30.3	33.5	14.1	14.4
Stocking density	LU/ha	2.2	1.8	0.6	0.7	1.2	1.2	0.6	0.6
Milk yield	kg/cow	4688	5304	4476	5340	5968	6722	4627	5651
Total output	Euro	17806	33551	12099	27804	87655	131117	23689	36308
share of milk&milk product	%	64	80	51	66	52	62	52	69

[1] Livestock Unit.
Source: Own calculation based on EU FADN data.

At the beginning, it is worth emphasising that the selected Polish and Lithuanian farms were, in terms of area, several times smaller than the Hungarian and Latvian ones (it is the result of a greater concentration of milk production in Hungary and Latvia). Typically, the structure of crops on dairy farms is dominated by fodder plants, providing cheaper feed from own production. The share of fodder plants in the analysed set of farms was the highest in the studied farms from Lithuania (69-72%) and Latvia (75-81%), whereas it was significantly lower in case of Polish and Hungarian farms (about 60%). Feeding system is an important issue affecting the production and economic results in farms focused on dairy cows.

The degree of specialization has been increasing along with the increase in the scale of keeping dairy cows, both the number of cows and their milk yield. Since 2004, the production situation of selected farms has improved in all the countries concerned. In terms of the average milk yield of cows, in 2012, Hungarian farms reached results by 27% better (about 6700 kg per cow) than Polish and Lithuanian farms (about 5300 kg per cow) and by about 19% better than selected Latvian farms (about 5650 kg per cow). Selected group of Hungarian farms (these were the largest farms amongst others) were also characterized by the best labour productivity. In 2012, the number of people employed full-time per 10 milk cows was 0.86 AWU. In case of Poland, it was 1.22 AWU, Lithuania – 1.50 AWU and Latvia – 1.40 AWU.

The first of the measures used was the value of production (total output) per 1 milk cow. The values of this rate corresponded with the milk yield of cows in the analysed groups of farms increasing progressively in all countries since 2004. Selected group of Lithuanian and Latvian farms reached the value of production of approximately 2500 euro/LU, and Polish farms – about 2300 euro/LU. The results obtained were lower than in the group of Hungarian farms by 36% and 41%, respectively.

Table 5. Selected factors of productivity on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Total output per dairy cow	Euro/LU	1460	2273	1459	2503	2891	3920	1686	2521
Total output per 1 AWU	Euro/AWU	10060	18435	8120	16649	31418	45685	10300	18337
Total output per 100 Euro of assets	Euro/100 Euro	25	17	30	31	28	45	50	44

Source: Own calculation based on EU FADN data.

Labour productivity informs about the value of production achieved per 1 full-time employed person. High labour productivity means that at a given workload the production unit achieved a higher value of production. Data presented in Table 5 shows that the labour productivity was higher in the groups with a larger number of cows in the herd. In Polish farms, with a herd of about 15 milk cows, production/AWU was nearly 18.5 thousand euro. There was a similar situation in relation to the studied farms in Latvia (18.4 thousand euro), and slightly worse in case of a group of Lithuanian farms (about 16.6 thousand euro). In the Hungarian farms, the value of production per 1 AWU was higher by more than half compared to the other groups and amounted to almost 46 thousand euro.

Hungarian and Latvian farms made the best use of capital. It is illustrated by the capital productivity index, that is, the value of production per 100 euro of assets involved. In 2012, in case of these groups of farms, this index amounted to 44-45 euro and was by 13 euro higher than on Lithuanian farms and by 27 euro than in the group of Polish farms. Farms in Poland were characterized by the weakest use of capital in the considered years (2004 and 2012).

Output profitability index in the selected group of Polish dairy farms was at the highest level (154%) compared to the other groups. It is worth indicating that in 2012, in case of Polish and Lithuanian farms, total costs were significantly lower than the value of output (costs accounted for 77% of the value of output), and in case of Lithuanian farms only slightly lower (accounted for 90%), and in Hungarian and Latvian farms costs even exceeded revenues (Table 6).

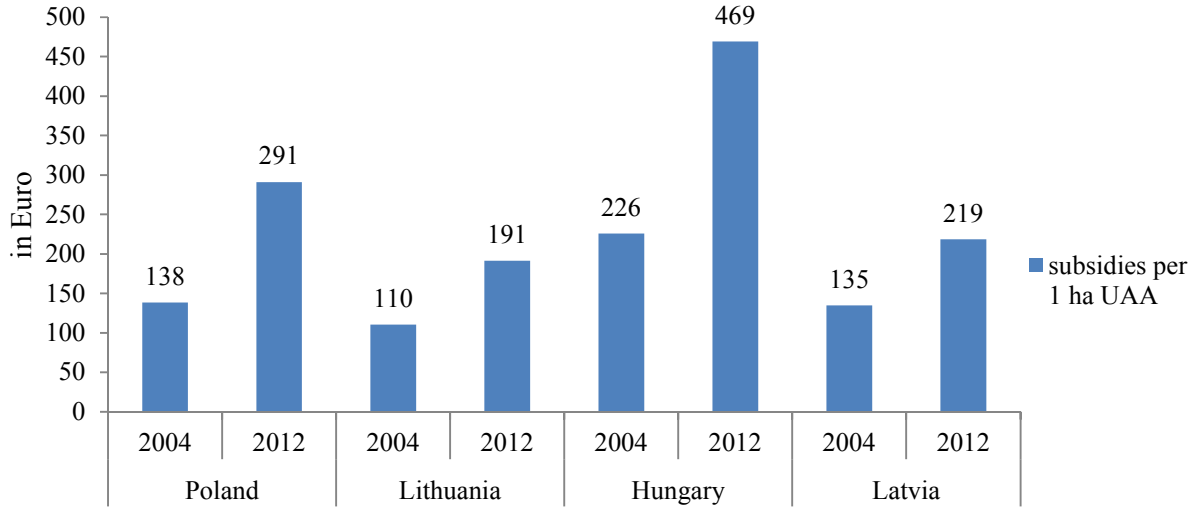
Table 6. Selected indexes of effectiveness on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Output profitability	%	160	154	166	137	108	119	137	122
Total costs/total output	-	0.70	0.77	0.74	0.90	1.07	1.06	0.94	1.05

Source: Own calculation based on EU FADN data.

The level of support with subsidies to 1 ha of UAA increased significantly from 2004 to 2012 in all the considered farms, but apparently larger support concerns rather the studied dairy farms in Poland and in Hungary than in case of dairy farms in Lithuania and in Latvia.

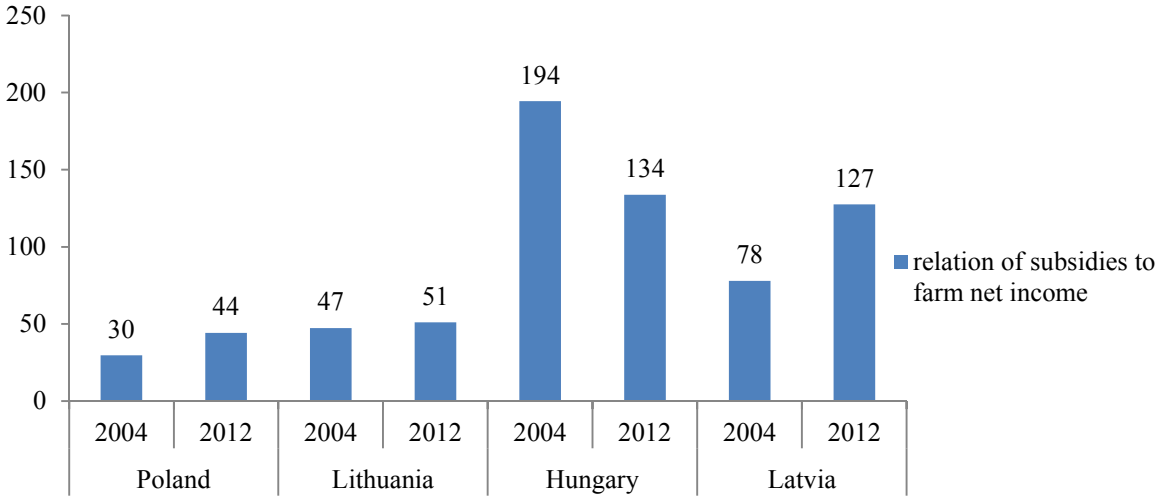
Figure 8. The subsidies per 1 ha UAA on the group of farms (TF14 Specialist milk) in the selected countries.



Source: Own calculation based on EU FADN data.

However, it is worth noting that the relation of subsidies to income from the family farm in Poland and Lithuania is relatively small (less than 50%). In case of Hungarian and Latvian farms, the level of this support amounted to as much as 130% in 2012.

Figure 9. The relation of subsidies to farm net income level on the group of farms (TF14 Specialist milk) in the selected countries.



Source: Own calculation based on EU FADN data.

4. SUMMARY AND CONCLUSIONS

The progress made in recent years (after accession to the EU) in Polish and Lithuanian dairy sector is a highly beneficial phenomenon, however the gap separating the two countries from the biggest EU producer is still wide, for example in the scope of production scale or cows' milk yield. The milk quota system, as one of the most important instruments of intervention on the milk market, had a strong influence on the structural and technological changes in milk production. It caused the elimination of small producers who could not meet the quality

requirements of production from the market which, in consequence, resulted in greater concentration of milk production. Also, as a result, the number of dairy cows was reduced, both in Poland and in Lithuania. The high fragmentation of milk production remains the greatest problem and challenge. The greatest share within the structure of dairy cow farms, both in Poland and in Lithuania, belonged to farms with small herds up to 10 animals. After the accession to the EU, a significant improvement of the situation could be observed, as the result of continuous concentration of production, however, the dynamics of the process is still weak.

A very important informations come from the comparison of the economic performance in selected dairy farms in Poland and in Lithuania with similar specialist dairy farms in Hungary and Latvia. Amongst the surveyed groups the milk production is more concentrated in Hungary and Latvia and the dairy farms appeared to be more specialised (in the matter of farm area and scale of milk production). However, the results of analysed dairy farms in Poland and in Lithuania confirmed the improved performance of productivity since 2004. In the other hand, the level of financial support of surveyed dairy farms was significantly higher in Hungary and Latvia than in Poland and Lithuania. But the selected indexes of the production effectiveness showed the better situation of selected dairy farms in Poland and Lithuania. Amongst the surveyed countries, in case of Poland the highest level of total output profitability index was calculated. The relation of subsidies to farm net income in case of Poland and Lithuania was relatively small (about 50%) which makes milk production less dependent on such type of support. While in case of surveyed dairy farms in Hungary and Latvia the large dependence on the subsidies is shown, in 2012 the relation of subsidies to farm net income was about 130%.

The processors' situation is influenced mainly by the conditions on sales markets of products. Processing facilities realise production strategies for the sale market. In Poland significant part of products is exported to the EU market (mainly Germany); in case of Lithuania, the Russian market is of importance. The long-term restrictions or constraints on import of Lithuanian dairy products observed have negative effect on the processors, who are thus forced to change the structure of production – instead of producing fresh products, products with longer expiry dates are produced, which allows comfortable search for other sales markets. Such products will be sold on Western EU markets, however the profitability of sales on those markets will be lower than in case of the Russian market.

Foreign trade in Polish dairy industry has been playing a major role for a long time, despite numerous difficult periods throughout history. The accession of Poland and Lithuania to the European Union and accepting of the rules of the EU Common Commercial Policy created the effect of establishment of marketing of agri-food products, as well as improvement of positive trading balance. It resulted from removing of all constraints in mutual trade in agri-food products between the "old", as well as the "new" EU member states. In case of Poland, the high dynamic of growth of course of trade was observed in the scope of animal products, especially in the scope of dairy products. Lower prices of the Polish and Lithuanian products were the factors stimulating export of dairy products to the EU countries and providing competitive advantage. A pronounced drop of value of exported products was recorded only in 2009 both in Poland and in Lithuania. This situation resulted from the economic crisis which lead to decreased import demand and lowered prices of dairy products across the world. It is also worth to pay attention to import in trade in milk products, which between 2003 and 2010 showed continuous increase. Even though Germany is still the main supplier

of dairy products to Poland, Lithuania is also of significance among the closest partners. In case of Lithuania, Latvia and Poland are the basic transactors supplying dairy products.

Domestic consumption of milk and milk products in Poland and in Lithuania is significantly lower than in the countries of Northern Europe, such as Denmark or Holland, and in the Scandinavian countries, where similar models of food consumption exist (Seremak-Bulge, 2012). It should also be noted that, so far, production of milk grew faster than consumption. In consequence, it resulted in excess in supply over demand and in self-efficiency in covering home demand for dairy products.

Finally, it should be highlighted that Poland's and Lithuania's accession to the European Union accelerated many positive changes in economies of both countries, and opened new perspectives for development. More and more frequent opinions of observers of economic markets and their thoughts on the closeness between Poland and Lithuania, whose mutual history oftentimes intertwined, are not without significance. Amongst economic reporters you can more often hear: "The Polish–Lithuanian Commonwealth (federation including the Crown of the Polish Kingdom and the Grand Duchy of Lithuania) once existed, now the Baltic Functional Airspace Block – common airspace of the Republic of Poland and of the Republic of Lithuania exists. Why, then, shouldn't there be a Milk Republic, in the sector of dairy, in the future?"

BIBLIOGRAPHY

ARR (2010), **Szklanka mleka**, Warszawa.

Bugała, A. (2011), **Polski handel zagraniczny artykułami mleczarskimi w latach 2003-2010**, FAPA.

European Commission Report, (2013), **EU dairy farms. Report 2012 based on FADN data.** http://ec.europa.eu/agriculture/rica/pdf/dairy_report_2012.pdf [Accessed 20.01.2013]

Eurostat, (2012), http://epp.eurostat.ec.europa.eu [Accessed 20.01.2012].

EastAgri, (2009), **Milk stats: Production, Trade, Consumption.** http://www.eastagri.org /files/Consumption%20of%20Milk%20&%20Dairy%20in%202009.xls [Accessed 20.01.2014].

EU School Milk Programme, www.ec.europa.eu/agriculture/drinkitup/index_en.htm. [Accessed 9.05.2014].

FAPA, (2006), **Polskie rolnictwo - dwa lata po akcesji do UE**, FAPA**.**

GUS, (2012), **Charakterystyka gospodarstw rolnych. Powszechny Spis Rolny 2010.**

Górski, J. (2011), **Litwa-Estonia-Łotwa: Bałtyckie tygrysy liżą rany.** Forum Mleczarskie Biznes.

ICAR, (2014), **Yearly Milk Enquiry**, http://www.survey-icar.org/cow_survey/ [Accessed 20.01.2014].

IDF, (2013), **The world dairy situation 2013.** Bulletin of the international dairy federation 470/2013

Józwiak, W. (1998), **Efektywność gospodarowania w rolnictwie.** Encyklopedia agrobiznesu. Fundacja Innowacyjna, Warszawa, p.146–149.

Kazlauskiene, N., Meyers,W.H. (1997), **The Baltic Free Trade Agreement in Agriculture: Issues and Potential Impacts.** Center for Agricultural and Rural Development, Iowa State University.

Kazlauskiene, N., Meyers,W.H. (2000), **The Baltic Free Trade Agreement In Agriculture: Early Results Of The Experiment.** Economic Policy in Transitional Economies, 9(3).

Kołoszycz, E., Świtłyk, M. (2004), K**oszty, dochodowość i efektywność produkcji mleka**, Związek prywatnych producentów mleka, Warszawa.

Kulawik, J. (2010), **Efektywność przedsiębiorstw wielkotowarowych w rolnictwie**, Zagadnienia Ekonomiki Rolnej nr 3, IERiGŻ-PIB, Warszawa.

Kulawik, J. (2008), **Analiza efektywności ekonomicznej i finansowej przedsiębiorstw rolnych powstałych na bazie majątku RWSP**, IERiGŻ-PIB, Warszawa.

Lekesys, V. (2002), **The emerging farm structure of milk production and trends in production in Lithuania**, Global trends in the dairy Industry: Outlook for the Baltics, OECD.

Matysik-Pejas, R. (2007), **Sezonowość skupu mleka oraz jego cen przed i po wprowadzeniu systemu kwotowania w Polsce**, Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Światowego, t. 2(17): 258-266.

Maksymowicz, E. (2013), **Polska rzeka mleka**, www.wilnoteka.lt/pl/tresc/polska-rzeka-mleka [Accessed 9.09.2014].

Malak-Rawlikowska, A., Milczarek-Andrzejewska, D., Fałkowski, J. (2007), **Restrukturyzacja sektora mleczarskiego w Polsce. Przyczyny i skutki**, Roczniki Nauk Rolniczych SERiA G, T.94, z.1.

Miklaszewski, S., Malendowski, E. (2009), **Gospodarka światowa w warunkach globalizacji i regionalizacji rynków**, Warszawa.

Polish Federation of Cattle Breeders and Dairy Farmers, (2013), **Czym jest ocena wartości użytkowej bydła**, www.pfhb.pl/?strona=ocean_charakt.htm [Accessed 20.01.2013].

Polish Press Agency, (2012), **Polaków kusi litewski rynek mleczarski**, www. biznes.wp.pl [Accessed 18.01.2012].

Ryan, M. (2002), **Implication for the dairy sector in the Baltic countries**, Global trends in the dairy Industry: Outlook for the Baltics, OECD.

Seremak-Bulge, J., Bodył, M. (2012), **Spożycie mleka w Polsce na tle innych krajów**, Zagadnienia Ekonomiki Rolnej, 338(1) p.146-158.

Sorsa, P. (1997), **Regionalism and the Global Economy: The Case of Central and Eastern Europe**, The Global and Regional Outlook in the Baltics.

Szajner, P. (2009), **Rozprawa doktorska.** IERiGŻ-PIB, Warszawa.

Sznajder, M. (1999), **Ekonomia mleczarstwa**, Wydawnictwo Akademii Rolniczej im. Augusta Cieszkowskiego w Poznaniu.

www.vilnius.trade.gov.pl/pl/Wiadomosci_gospodarcze_z_Litwy/article/detail,2787,Rolnictwo.html [Accessed 9.09.2014].

Žemės ūkio informacijos ir kaimo verslo centras, (2013),http://www.vic.lt/uploads/file/06_ukiu110101_pagal_gyvas_karvs11.pdf,http://www.vic.lt/uploads/file/07_ukiu110101_pagal_gyvus_karvs21.pdf,http://www.vic.lt/uploads/file/08_ukiu110101_pgl_gy_kar22.pdf [Accessed 9.07.2013].

AN EMPIRICAL INVESTIGATION OF THE ROLE OF FDI ON WAGE INEQUALITY IN TRANSITION ECONOMIES

Merita Zulfiu Alili
South East European University/Faculty of Public Administration and Political Sciences
Ilindenska, no.335, Tetova
Phone: ++ 38971275263; Fax: ++ 389 44 356 001
E-mail: m.zulfiu@seeu.edu.mk

Key words: *Gini, Wage Inequality, FDI, Transition Economies, FE model*

Jel Codes: *C33 Panel Data Models; D63 Inequality; F23 Multinational Firms*

ABSTRACT

The last two decades have been characterised by a rise in income and wage inequality in a wide range of countries, including transition countries. The rise in globalisation (mainly measured by trade and FDI) is one major factor explaining this increasing wage inequality (Te Velde, 2003; OECD-ILO, 2008; Mahutga and Bandelj, 2008; Franco and Gerussi, 2010; Figini and Görg, 2011). International trade and foreign direct investment have increased significantly in transition economies during the transition period, which has motivated scholars to examine the impact of these factors on labour market and more specifically wage inequality. This paper aims to examine whether FDI plays a major role in explaining the pattern of wage inequality in selected transition countries through an increase in the relative demand for skilled workers. The analysis presented in the previous research suggested that the net effect of FDI on wage inequality will depend on how large are the relative skill wage differences in foreign-owned firms and domestic owned firms, the relative skill-intensity of employment in foreign-owned firms compared to domestic ones and the relative size of the foreign-owned sector (Zulfiu-Alili, 2014).

This investigation has been conducted using two data sets. First, the Gini coefficient is used to measure wage inequality for the period from 1993 to 2008 for 19 transition countries. Second, we compute Gini coefficients on the average wages per employee across four digit level of ISIC manufacturing industries for 20 countries from 1992-2007. A cross-country empirical investigation indicates a positive relationship between FDI and wage inequality in nineteen transition countries.

1. INTRODUCTION

International trade and foreign direct investment have increased significantly in transition economies during the transition period, which has motivated scholars to examine the impact of these factors on labour market and more specifically wage inequality. This paper aims to examine whether FDI plays a major role in explaining the pattern of wage inequality in selected transition countries through an increase in the relative demand for skilled workers. The analysis presented in the previous research suggested that the net effect of FDI on wage inequality will depend on how large are the relative skill wage differences in foreign-owned

firms and domestic owned firms, the relative skill-intensity of employment in foreign-owned firms compared to domestic ones and the relative size of the foreign-owned sector (Zulfiu-Alili, 2014). Feenstra and Hanson (2001) argue that both trade in intermediate inputs and skilled-biased technological change have decreased the demand for low skilled labour and increased the relative demand and wages of the higher skilled. In addition, "as international trade and capital mobility increase, an international product cycle becomes established with specialization in new goods and services in those economies with decentralized wages and 'employment at will'" (Adnett, 2001, p.355).

In assessing the causes of wage inequality most studies utilise the Gini coefficient as the measure of inequality. The size of these coefficients has increased considerably after 1990s in transition countries (Milanovic, 1999; Milanovic, 2011) and we attributed these increases to a range of factors, such as globalisation, skilled-biased technological change, differential access to schooling, unemployment and institutional differences. Therefore in addition to FDI we add these control variables to investigate the relationship of these factors with wage inequality. The previous reviews of theoretical and empirical studies on wage inequality indicate that the determinants of increasing wage inequality are ultimately an empirical question, one which we aim to examine in this paper. Though, as Jensen and Rosas (2007) argue one should approach this analysis very carefully since potential issues of reverse causality, selection bias, and omitted variables can lead to spurious results. Accordingly, in section 4 several model specification and tests have been used to obtain consistent estimates and to check for the robustness of the results. Due to missing data in some years over the period under investigation (1990 to 2008), the study is using unbalanced panel data for nineteen transition countries and fixed effects model to account for the presence of unobserved heterogeneity across countries and potential endogeneity of FDI with wage inequality. The cross-country empirical investigation of the role of FDI on wage inequality has been conducted using two data sets. First, the Gini coefficient is used to measure wage inequality for the period from 1993 to 2008 for 19 transition countries. Second, we compute Gini coefficients on the average wages per employee across four digit level of ISIC manufacturing industries for 20 countries from 1992-2007.

The remainder of this paper is organised as follows. In Section 2 we build the empirical model for a cross-country empirical investigation of the role of FDI. We discuss the data and descriptive statistics of the variables of interest in Section 3. Section 4 explains and justifies the chosen approach to estimate the model. Section 5 examines and interprets the results of the wage inequality model using different wage inequality measures as robustness checks. The last section is devoted to concluding remarks.

2. MODEL SPECIFICATION

This paper aims to investigate the effect of FDI and other control variables suggested by theory on wage inequality. Following the theoretical discussion and the previous empirical literature on wage inequality the following basic equation is specified:

$$Inequality_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 FDI_{it}^2 + \beta_3 X_{it} + \lambda_t + \epsilon_{it} \quad (1)$$

where *i* indexes countries, and *t* the time period. Inequality is a measure of wage inequality, the *Gini* coefficients for each country-year are the chosen measure. The Gini coefficient is a common measure of dispersion in studies investigating inequality in income, however, studies using Gini coefficient to assess inequality in wages are limited. To check for the robustness of

the results we compute an alternative Gini coefficient (GINI2) which will be explained in the next section. Investigating whether FDI improves or worsens inequality in wages we include the FDI variable which measures inward foreign direct capital as a percentage of GDP in the country. The stock of FDI is chosen rather than the inflow in order to reflect the long-term effects, since FDI stocks contribute to the stock of general-purpose technology available in the economy (Figini and Görg, 2011).

Considering the previous theoretical discussion, FDI may increase labour market inequality by increasing the relative demand for skilled labour and raising the skilled wage premium. There is supporting empirical evidence, Bruno et al., 2004; Mahutga and Bandelj, 2008; Commander and Kollo, 2008; Franco and Gerussi, 2010; Figini and Görg, 2011, for this causation, therefore we expect to find a positive relationship between FDI and wage inequality. However, as FDI increases in a country it may reduce wage inequality, in long run, as a result of the increased supply of skilled labour force. To control for this possible non-linear effect of inward FDI the squared term of FDI is added in the wage inequality equation. X is a vector of control variables deduced from theory to affect wage inequality, namely domestic investment, trade, GDP per capita, education, unemployment and institutional differences; λ is a full set of time dummies and e is the error term.

In addition to FDI, domestic investment is also introduced as a proxy for technological change. The higher the rate of domestic investment in a country, other things equal, the more likely to be the skill-biased technological progress, thereby increasing the proportion of skilled workers and hence the wage differential between skilled and unskilled workers. Accordingly the expected sign of the domestic investment variable is positive. In addition, a trade variable (the sum of imports and exports as a share of GDP) is included in the model to control for the effect of increased trade volumes on wage inequality. With respect to trade openness H-O theory suggests that great openness to trade should reduce wage inequality in developing countries by increasing the relative demand for unskilled labour and narrow the wage gap between skilled and unskilled workers. However, empirical studies such as Peter, 2003; Onaran and Stockhammer, 2008; indicate that trade liberalisation can increase wage differential between skilled and unskilled workers as a result of an increase in the returns of the skilled labour. Increases in GDP per capita should be associated with reductions in wage inequality as suggested by the Kuznets hypothesis. For this reason GDP per capita is introduced into the model, representing the level of economic development of a country. In order to test for the supply side of the labour market we include the level of education in the model. Two alternative measures of this control variable are used: the tertiary school enrolment (% gross) and the proportion of the labour force who have completed tertiary education (% of total). Using enrolment rates may not be appropriate for investigating wage inequality since this proxy captures educational attainment amongst the future potential labour force, whereas the wage inequality is likely to be affected by the level of education of the current labour force. Therefore a second proxy, the proportion of the labour force with tertiary education, is also included in the model. Other things being equal, an upward shift in the supply of more educated/skilled workers should depress the skill premium and lower wage inequality between skilled and unskilled workers. We additionally control for unemployment and institutional differences that were indicated as potentially important determinants of wage inequality in the literature (Aghion and Blanchard,1994; Krugman, 1994; Boeri and Terrell, 2002; Biewen and Juhasz, 2010). Most of transition countries are characterised by high unemployment rates and low unemployment benefits or no safety nets in terms of benefits. This may affect the distribution of wages by lowering the wages of less skilled workers contributing to increases in wage inequality (Boeri and Terrell, 2002). To

capture institutional differences in the labour market the Index of Economic Freedom (IEF) is included in the wage inequality model. The expected relationship between the IEF and wage inequality is expected to be positive since higher values of this index for a country imply less interference in the market, for example a weaker influence of unions and minimum wage legislation, leading to higher wage inequality. Data and descriptive statistics of the variables used are discussed in the following section.

3. DATA AND DESCRIPTIVE STATISTICS

Wage inequality is measured by the GINI coefficient which ranges from 0 to 1, where 0 represents complete equality (all individuals receive equal wages) and 1 represents the highest level of inequality. The chosen Gini coefficient is the distribution of earnings, which refers to monthly wages with bonuses, for full-time employees as reported by employers. Data on the Gini coefficient (labelled as GINI1) were obtained from the *TRANSMONEE* (2010) database. Using the GINI1 variable as a dependent variable we can estimate equation 1 for the period 1993 to 2008, however with some gaps due to missing values of GINI1 for different years and countries. The number of countries in the database using GINI1 is 18 transition economies with 195 GINI1 observations. Table 1 presents summary statistics of the variables included in the regressions, whereas Appendix 1 and 2 (a) and (b) presents further details on variable definition according to the data source and summary statistics of the countries included in sample. In addition, the alternative measures of wage inequality is used, namely the GINI2 coefficients for each country-year. This alternative measure is labeled GINI2 and is calculated following Figini and Görg (2011) using data on the average wages per employee across four digit level of ISIC manufacturing industries in country *i* at time *t*, weighted by the number of employees in each sector. Data for this variable are obtained from the *UNIDO Industrial Statistics Database* (2010). Dataset includes information on 19 transition economies for the period of 15 years (1993-2007), generating an unbalanced panel with 201 observations of GINI2.

Table 1. Summary statistics of the variables of interest, GINI1:1993-2008; GINI2:1993-2007

Variable label	Variable name	Expected sign[1]	Mean	Std. Dev.	Min	Max	Missing Obs.
Gini	**GINI1**		0.36	0.07	0.23	0.52	106
Gini-UNIDO	**GINI2**		0.42	0.07	0.21	0.59	0
FDI stock (% of GDP)	FDI	+,-	21.92	16.51	0.36	85.86	7
FDI inward stock in manufacturing	FDIM	+,-	5051.68	7054.49	13.6	32475.8	81
Domestic Investment (% of GDP)	DOM	+	17.47	5.16	1.84	29.79	2
Trade (% of GDP)	TRADE	?	97.64	27.67	44.25	172.79	0
GDP per capita	GDP	+,-	7705.12	5401.928	1003.97	29574.1	2
Tertiary school enrolment (%)	EDU	-	41.92	18.33	11.64	86.71	26
Labour force with tertiary education (%)	LFEDU	-	21.82	13.98	2.4	66.1	107
Unemployment rate	UN	+	11.54	6.73	3.9	37.3	12
Index of Economic Freedom	IEF	+	55.37	9.11	30	76.1	45

[1] Where (+, -) indicates an expected non-linear effect of the variable to wage inequality, whereas (?) indicates that the expected effect is ambiguous, for example according to H-O theory trade should have a decreasing effect on wage inequality, however there is empirical evidence that trade increases wage inequality.

The inward FDI stock as a percentage of GDP (FDI) is used as a proxy to identify the effect of inward FDI on wage inequality. To account for depreciation this variable is measured as the value of the share of their capital and reserves (including retained profits) attributable to the parent enterprise, plus the net indebtedness of affiliates to the parent enterprises. Data on FDI are obtained from *UNCTADSTAT* (2011). The number of observations of FDI in the estimated models differs depending on the number of countries and years included in the database. Domestic investment (DOM) is defined as the gross fixed capital formation (formerly gross domestic fixed investment) as a percentage of GDP, after deducting FDI inflow. Both the gross fixed capital formation (% of GDP) and FDI inflow (% of GDP) are taken from the World Development Indicators (*WDI*, 2010) available from the *World Bank*. TRADE is the sum of exports and imports of goods and services measured as a share of GDP. Data on TRADE are obtained from *World Development Indicators* (*WDI*, 2010). The proxy for the level of economic development, the Gross Domestic Product (GDP) is based on purchasing-power-parity (PPP) per capita GDP in current international dollars[2] to take into account the price differentials across countries. Data are obtained from *International Monetary Fund (IMF), World Economic Outlook Database* (2010). In addition, two proxies for education are used, EDU and LFEDU. EDU is defined as the tertiary school enrolment as a percentage of gross enrolment ratio, which is the ratio of total enrolment regardless of age, to the population of the age group that officially corresponds to the level of tertiary education. Data for this proxy are obtained from *World Development Indicators* (*WDI*, 2010). As explained in the previous section enrolment rates may not be the best proxy for the level of education of the labour force and studies using this measure may be misspecified. Instead a better proxy could be education according to the qualification of the workforce or employment according to education. *World Development Indicators* (*WDI*) and *Global Development Finance* (*GDF*) provide information on labour force with tertiary education as a percentage of total labour force (LFEDU) which is considered a better proxy for the supply side of skilled workers, but as it can be seen from Table 1 there are many missing values for this variable for the countries in the sample, therefore the use of both proxies is necessary. Data on unemployment rate (UN) as a percentage of total labour force come from *IMF*, *World Economic Outlook Database* (2010). The proxy for institutions, the last explanatory variable, is the Index of Economic Freedom (IEF). It is a measure of ten components of economic freedom, assigning a grade in each using a scale from 0 to 100, where 100 represents the maximum freedom. The ten component scores are then averaged to give an overall economic freedom score for each country. The ten components of economic freedom are: Business Freedom; Trade Freedom; Fiscal Freedom; Government Spending; Monetary Freedom; Investment Freedom; Financial Freedom; Property Rights; Freedom from Corruption; Labour Freedom. Data for this measure come from *The Heritage Foundation* (2011).

4. EMPIRICAL METHODOLOGY

This section is discussing the empirical methodology used to choose the appropriate estimation technique. Following the conventional procedure for panel data we have compared the Ordinary Least Squares (OLS), Fixed Effects (FE) and Random Effects (RE) models. As discussed below the appropriate estimator seems to be the FE model. To check if the model is misspecified diagnostic tests have been applied to the chosen model. The common problems associated with panel estimations have been investigated such as slope homogeneity, cross-sectional dependence in the error, groupwise heteroscedasticity, serial correlation in the errors and normality of the errors. All these tests are explained below and summarised in Table 2.

[2] An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. The Implied PPP conversion rate is the national currency per current international dollar.

Robust standard errors are used to account for the heteroscedasticity problem. As a robustness check the estimates of the basic equation are replicated by using the GINI2 coefficients as a dependent variable.

According to the results explained in Table 2 and Table 3, FE is the preferred model that is also more appropriate for small samples because the fixed model is estimated by OLS, it may have better small sample properties than a random effects model (Pugh, 2008) and can be estimated for unbalanced panels as it is the case here. The fixed effects model has constant slopes but intercepts differ according to the cross-sectional group, i.e. by country, allowing for individual country heterogeneity and accounting for potential omitted variables and misspecification. In fixed effects (LSDV) model the effects of explanatory variables are estimated only from within-group variation (Greene, 2002). The basic static wage inequality model is estimated with period dummy variables, in order to minimise the cross-country correlation in the error terms arising from economic cycle effects as a result of the transition process. These dummy variables are named according to the year they represent, starting from 1993 to 2008. It is an estimation issue whether FDI should be considered as an endogenous variable. Inward FDI flows at the national level are hypothesised to be determined by international differences in the return to capital, which are largely exogenous to local labour markets (Feenstra and Hanson, 1995). However, we cannot completely exclude the possibility that wage inequality is a determinant of FDI. The problem of inverse causality could occur since FDI may locate to areas with lower wages to save costs or to areas characterised with higher level of inequality, as well as imports and exports may be stimulated by high rates of inequality (Franco and Gerussi, 2010). In applied econometrics, Wooldridge (2002) indicates that endogeneity usually arises in one of three ways: omitted variables which appear when additional potentially relevant variables cannot be included due to data unavailability; measurement error is the case of measuring the (partial) effect of a variable with only an imperfect measure of it; and simultaneity occurs when at least one of the explanatory variables is determined along with the dependent variable. One of the most used methods to deal with the endogeneity problem is the GMM estimator proposed by Arellano-Bond (1991) and Arellano-Bover (1995)/Blundell-Bond (1998) introduced also by Roodman (2006). As Roodman argues, this is an appropriate approach for situations with "small T, large N panels, meaning few time periods and many individuals; with independent variables that are not strictly exogenous, meaning correlated with past and possibly current realizations of the error; with fixed effects; and with heteroskedasticity and autocorrelation within individuals" (p.1), which is not case of the present study since T and N are close to each other (T=16, N=19). Another way of dealing with the endogeneity problem is to use instrumental variables (IV) methods (Baltagi, 2005, p. 113). However, finding a good instrumental variable for an endogenous explanatory variable is in this case very difficult given the limitations of the available data. Under the assumption that the correlation of FDI with the error term is fixed over time, controlling for country fixed effects alleviates the problem of potential endogeneity (Figini and Görg, 2011). For this reason, a Fixed Effects model has been employed.

Table 2. Comparison of OLS, FE and RE using GINI1

Tests	T-statistic (TS)	Prob.	<>	CV (5%)	Decision
F test that all u_i=0:	F(18,119)=21.35	0.00	>	1.69	If TS>CV → Reject H_0 (Supports Fixed Effects)
H_0: σ^2_u=0	chi2(1) = 119.97	0.00	>	3.84	If TS>CV → Reject H_0 (Supports Random Effects)
Ho: difference in coefficients not systematic	chi2(21) =150.84	0.00	>	32.67	If TS>CV → Reject H_0 (Supports Fixed Effects)

Table 3. Comparison of OLS, FE and RE using GINI2

Tests	T-statistic (TS)	Prob.	<>	CV (5%)	Decision
F test that all u_i=0:	F(18,134)= 27.68	0.00	>	1.68	If TS>CV → Reject H_0 (Supports Fixed Effects)
H_0: σ^2_u=0	chi2(1) = 293.66	0.00	>	3.84	If TS>CV → Reject H_0 (Supports Random Effects)
Ho: difference in coefficients not systematic	chi2(19)=26.44	0.11	<	30.14	If TS<CV → There is insufficient evidence to reject H_0 (RE can be estimated)

In order to achieve the best possible statistical specification diagnostic testing should be used. This can be difficult in panel data. Diagnostics for panel analysis are not well developed, especially for unbalanced and small panels, which we have in this case. However diagnostic testing can still provide some useful indicators, therefore diagnostics have been applied to the chosen FE model both in levels and log-linear form. The second approach is preferred since on checking for normality the test and the plot of residuals indicate the presence of non-normality in levels and serial correlation is also improved with logs when using GINI 1 as dependent variable. For comparison with the above results the estimates of the basic equation are replicated by using GINI2. Since GINI2 is calculated in manufacturing industries the FDI inward stock in manufacturing is included in the second step of the estimations. Table 4 and Table 5 summarises the diagnostic test results of the log-linear specification using GINI1 and GINI2 as dependent variable.

Table 4. Model diagnostics using GINI1

Tests	T-statistic (TS)	Prob.	<>	CV (5%)	Decision
Slope homogeneity H_o:βi =β	chi2(70) = 1547.85	0.00	>	90.53	If TS>CV → Reject H_0 (No slope homogeneity)
Cross-sectional dependence in the errors H_o:Zero cross-sectional dependence	Without Time DVs Pesarans's test= -0.150 Friedman's test= 3.920 With Time DVs Pesarans's test= -1.022 Friedman's test= 2.560	0.88 0.92 0.31 0.98			Both tests suggest that there is insufficient evidence to reject H_0.
Groupwise heteroskedasticity H_o:Homoscedasticity	chi2 (18) = 136.59	0.00	>	28.87	If TS>CV → Reject H_0 (Heteroskedasticity)
Serial correlation H_o:No 1st order autocorrelation	F(1, 13) = 4.19	0.06	<	4.67	If TS<CV → There is insufficient evidence to reject H_0
Normality of the errors H_o:Normally distributed	adj chi2(2) =4.66	0.09	<	5.99	If TS<CV → There is insufficient evidence to reject H_0

Comparing Table 4 with Table 5, the results suggest no slope homogeneity, heteroscedasticity, serial correlation and the residuals are normally distributed. The problem of heteroscedasticity and serial correlation is addressed using Driscoll-Kraay standard errors. Given that the unobservable common factors are uncorrelated with the explanatory variables, the coefficient estimates from FE estimator are still consistent but inefficient and the standard

error estimates of commonly applied covariance matrix estimation techniques are biased (Hoechle, 2007). "Fortunately, Driscoll and Kraay (1998) propose a nonparametric covariance matrix estimator that produces heteroskedasticity- and autocorrelation-consistent standard errors that are robust to general forms of spatial and temporal dependence" (Hoechle, 2007, p.282). The Driscoll-Kraay standard errors syntax in Stata is xtscc estimated by FE regression. The xtscc programme can be used both with balanced and unbalanced panels and can handle missing values (Hoechle, 2007), making it appropriate for use in this study.

Table 5. Model diagnostics using GINI2 and FDIM

Tests	T-statistic (TS)	Prob.	<>	CV (5%)	Decision
Slope homogeneity H_o:βi =β	Chi2(56)= 5857.36	0.00	>	74.47	If TS>CV → Reject H_0 (No slope homogeneity)
Cross-sectional dependence in the errors H_o:Zero cross dependence	The panel is unbalanced and there are insufficient observations, so the tests could not be performed.				
Groupwise heteroskedasticity H_o:Homoscedasticity	chi2 (14)= 590.44	0.00	>	23.68	If TS>CV → Reject H_0 (Heteroskedasticity)
Serial correlation H_o:No 1st –order autocorrelation	F(1,13)= 31.99	0.00	>	4.67	If TS>CV → Reject H_0 (Serial correlation)
Normality of the errors H_o:Normally distributed	adj chi2(2) = 1.61	0.44	<	5.99	If TS<CV → There is insufficient evidence to reject H_0

5. ESTIMATION RESULTS

This section presents estimation results based on the two alternative measures of wage inequality. Table 6 presents the results of estimating equation (1) in log form with the GINI1 coefficients as the dependent variable. Columns (1) and (2) provide results for regressions of FE using Driscoll-Kraay standard errors, respectively including the simple FDI term and the quadratic specification. Columns (3) and (4) replicate the estimations adding LFEDU and IEF in the model, with and without SQFDI. Results of the GINI2 coefficients as a dependent variable and using FDI in manufacturing (FDIM) instead of FDI (% of GDP) are presented in Table 7. Overall, the results indicate a positive relationship between FDI stock and wage inequality in transition countries.

Discussing the results when GINI1 is used as a dependent variable, Table 6 indicates that the FDI coefficient (FDI stock as percentage of GDP) is positive and significant in the specifications in which the squared term of FDI is not included, and it is very similar in terms of magnitude. This suggests that if the share of FDI in GDP increases by 1% wage inequality will increase for 0.05% (column 1); or by 0.06% including all variables in the model (column 3). There is no clear evidence of a concave relationship between FDI and wage inequality in transition countries, which may not be surprising considering that transition economies have not yet attracted high levels of FDI. The SQFDI is significant only in column (2) at 10% level of significance. The coefficient of DOM does not have the expected sign and is significant at 5% in the regressions using all variables in columns (3) and (4). A higher rate of domestic investment, other things equal, should be associated with more capital-intensive and skill-

intensive production that should, other things being equal, increase inequality. However, the negative sign in this case may indicate that domestic investment in the representative transition economies are associated with less-capital and less-skill intensive production leading to reductions in wage inequality. The coefficient on trade is positive and significant at 1% and 5% when including all variables indicating that 1% increase in the share of trade in GDP raises wage inequality by 0.14%. The coefficient of GDP per capita is negative and significant indicating that the higher is the level of development of the country the lower is the wage inequality. The impact of education seems to differ across different specifications. The EDU coefficients look very similar in terms of magnitude and statistical significance in column (1) and (2) suggesting that wage inequality increases as the education of the potential labour force increases that is contrary to the prediction of orthodox theory. However, as argued above, enrolment rates may not be the best proxy for the workforce's level of education since wage inequality is more likely to be affected by the level of education of the current, rather than future, workers. The results of the alternative measure of education (LFEDU) significant at 1% and 5% level of significance suggest that for 1% increase in LFEDU decreases wage inequality by around 0.05%, in line with our theoretical framework. Unemployment also does not have the expected sign but is not significant in all specifications. Since unemployment rate is higher among less skilled workers (ILO, 2007; Novkovska, 2008; ILO, 2010; ILO, 2012) these results might indicate that the unskilled workers are more likely to leave the labour market contributing to decreasing wage inequality by leaving more space to educated and skilled labour that are more likely receiving similar wages. The last variable included in the model, IEF, has the expected positive sign and is significant at 1% suggesting that, as anticipated, greater economic freedom is associated, other things being equal, with greater wage inequality. Wage inequality increases by 0.39% for a 1% increase in the IEF.

Table 6. Fixed effects regressions (dependent variable is GINI1)

	Drisc/Kraay Std.Err.	Drisc/Kraay Std.Err.	Drisc/Kraay Std.Err.	Drisc/Kraay Std.Err.
	(1)	(2)	(3)	(4)
VARIABLES	GINI1	GINI1	GINI1	GINI1
FDI	0.051***	0.026	0.065***	0.049**
	(0.015)	(0.018)	(0.008)	(0.019)
SQFDI		0.008*		0.005
		(0.004)		(0.005)
DOM	-0.029	-0.022	-0.062**	-0.055**
	(0.021)	(0.020)	(0.024)	(0.022)
TRADE	0.051	0.058	0.144***	0.138***
	(0.039)	(0.038)	(0.025)	(0.026)
GDP	-0.231**	-0.204**	-0.244***	-0.259***
	(0.086)	(0.088)	(0.056)	(0.061)
EDU	0.139***	0.119***	0.065*	0.063*
	(0.042)	(0.045)	(0.035)	(0.035)
LFEDU			-0.049**	-0.048***
			(0.017)	(0.015)
UN	-0.033	-0.030	-0.008	-0.012
	(0.027)	(0.029)	(0.023)	(0.025)
IEF			0.396***	0.391***
			(0.084)	(0.084)
Constant	0.126	-0.078	-1.205***	-1.023**
	(0.888)	(0.835)	(0.318)	(0.464)
Observations	157	157	70	70
Number of groups	18	18	13	13

All variables are in log form
*** p<0.01, ** p<0.05, * p<0.1
Regressions include a full set of time dummies

Table 7. Fixed effects regressions (dependent variable is GINI2)

	Drisc/Kraay Std.Err.	Drisc/Kraay Std.Err.
	(1)	(2)
VARIABLES	GINI2	GINI2
FDIM	-0.029	0.277***
	(0.037)	(0.104)
SQFDIM		-0.023***
		(0.006)
DOM	0.083***	0.068***
	(0.012)	(0.017)
TRADE	-0.135	-0.123
	(0.108)	(0.091)
GDP	-0.436**	-0.558***
	(0.172)	(0.141)
EDU	-0.300***	-0.216***
	(0.077)	(0.065)
UN	0.092**	0.091***
	(0.037)	(0.025)
Constant	4.096**	4.259***
	(1.874)	(1.337)
Observations	114	114
Number of groups	14	14
All variables are in log form		
*** p<0.01, ** p<0.05, * p<0.1		
Regressions include a full set of time dummies		

Results using GINI2 as the dependent variable and FDIM to measure the impact of foreign direct investment in manufacturing sector are presented in Table 7. A positive and significant relationship between FDI and wage inequality is supported in column (2). There is evidence of a quadratic relationship between FDI and wage inequality. Calculating the net effect[3] of these two terms for the transition economies included in the sample indicates that 1% increase in the mean of FDIM decreases wage inequality by 0.11%. If the mean of FDIM increases by 5%, the GINI2 coefficient will decrease by 0.13%. Estimating the turning point we find that wage inequality increases until the level of the mean of FDIM reaches 465.57 MN Euro and decreases afterwards. Whereas the net effect for the case of Macedonia indicates that a 1% increase in FDIM, at the level of its mean, decreases GINI2 by 0.001% for the period from 1997 to 2007. The mean of FDIM for all transition countries included in the sample is 5051.68 MN Euro in the period from 1993 to 2007 and the mean of FDIM for the case of Macedonia is 478.57 MN Euro for the period from 1997 to 2007. The impact of DOM variable in this case has the expected positive sign and is significant at 1% and 5% level of significance, suggesting that in the manufacturing sector a 1% increase in DOM is associated with a 0.08% (column 1) increase in GINI2. This suggests that domestic investment in this sector is concentrated in more capital-intensive and skill-intensive production and hence increases wage inequality in manufacturing. The TRADE variable is not significant in all specifications, whereas a higher GDP is again associated with reductions in wage inequality. The coefficient on EDU, as expected, is negative and significant, suggesting that 1% increase in the tertiary school enrolment decreases wage inequality by 0.3%. In contrast to the previous results using GINI1, there is now evidence that increases in the unemployment rate increase wage inequality, which may indicate that higher unemployment affects the distribution of wages by lowering the wages of less skilled workers in the manufacturing sector.

[3] The net effect is calculated based on this formula:

$$ny = \alpha + \beta_1 \ln x + \beta_2 (\ln x)^2 ; \frac{d \ln y}{dx} = \beta_1 \frac{1}{x} + 2\beta_2 (\ln x) \frac{1}{x} ; \frac{\frac{dy}{y}}{dx} = [\beta_1 + 2\beta_2 \ln x] \left(\frac{1}{x}\right) ; \frac{dy}{dx} * \frac{x}{y} = \beta_1 + 2\beta_2 \ln x$$

where the mean value of the relevant independent variable is used in the calculations.

Specifications including all variables, in which case the number of observations falls to 85, do not result in any significant coefficients, with the exception of EDU and UN at 10% level of significance and therefore they are not reported.

6. CONCLUSION

A large strand of the literature has investigated the complex nature of wage inequality in developed and developing countries, however there is limited evidence for transition economies. The previous empirical evidence suggests that wage inequality has increased during the transition period and this increase can partly be explained by globalisation factors such as trade and FDI. Using two alternative measures of wage inequality, namely GINI1and GINI2 coefficients this paper examines the effect of FDI on wage inequality in the selected transition countries. Several model specification and tests have been used to obtain consistent estimates and to check for the robustness of the results. The results indicate that a rising share of FDI in GDP increases wage inequality in transition economies in the period from 1993 to 2008. Results using GINI1 indicate that wage inequality increases with inward FDI stock in GDP and there is no robust evidence that this effect is non-linear. Results using the Gini in the manufacturing sector (GINI2) and FDI inward stock in manufacturing do suggest the presence of a non-linear effect: wage inequality increases with FDI inward stock in manufacturing but this effect diminishes with further increases in FDI. The net effect indicates that wage inequality decreases with further increases at the mean level of inward FDI stock in manufacturing. This may suggest that FDI in manufacturing industries in the representative transition economies are associated with less-capital and less-skill intensive production leading to reductions in wage inequality. Among the control variables we find some support for the Kuznets hypothesis, i.e. increases in GDP per capita are associated with reductions in wage inequality. In addition, there is no evidence for the H-O theory that greater trade openness reduces wage inequality. In line with our theoretical discussion, increases in the supply of more educated workers (LFEDU) lowers wage inequality in transition economies.
In sum, the empirical evidence supports the hypothesis that an increased FDI inward stock as a share of GDP increases wage inequality in transition economies, however this relationship may be a complex one. Differences in average wages, wage differentials, employment shares of skilled workers and relative size of the foreign-owned sector are all likely to be important for the behaviour of wage inequality.

BIBLIOGRAPHY

Adnett, N. (2001). Modernizing the European Social Model: Developing and Guidelines. *Journal of Common Market Studies,* vol. 39, no. 2, pp. 353-364.

Aghion, P. and Blanchard, O. (1994). On the Speed of Transition in Central Europe. *NBER Macroeconomics Annual,* vol.9, pp.283-330.

Arellano, M. and Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, no.58, pp. 277 – 297.

Arellano, M. and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error Component Models. *Journal of Econometrics,* no.68, pp. 29-51.

Baltagi, B. (2005). *Econometric Analysis of Panel Data.* John Wiley and Sons, England.

Biewen, M. and Juhasz, A. (2010). Understanding Rising Income Inequality in Germany. *IZA Discussion Paper,* no. 5062.

Boeri, T. and Terrell, K. (2002). Institutional Determinants of Labor Reallocation in Transition. *The Journal of Economic Perspectives*, vol. 16, no. 1, pp. 51-76.

Bruno, G., Crinò, R. and Falzoni, M. (2004). Foreign Direct Investment, Wage Inequality, and Skilled Labour Demand in EU Accession Countries. *Universita' Deglistudi di Bergamo, Dipartimento di Scienze Economiche "Hyman P. Minsky",* Bergamo, Italy.

Commander, S. and Kollo, J. (2008). The Changing Demand for Skills. Evidence from the Transition. *Economics of Transition,* vol. 16, no. 2, pp.199–221.

Feenstra, R. and Hanson, G. (1995). Foreign Investment, Outsourcing and Relative Wages. *NBER Working Paper,* no. 5121.

Feenstra, R. and Hanson, G. (2001). Global Production Sharing and Rising Inequality: A Survey of Trade and Wages. *NBER Working Paper,* no. 8372.

Figini, P. and Görg, H. (2011). Does Foreign Direct Investment Affect Wage Inequality? An Empirical Investigation. *The World Economy,* vol.34, issue 9, pp.1455-1475.

Franco, C. and Gerussi, E. (2010). Trade, FDI and Income Inequality. Empirical Evidence from Transition Countries. *MIUR Working Paper Series,* no.15.

Greene, W. (2002). *Econometric Analysis.* Prentice Hall, New Jersey.

Hoechle, D. (2007). Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence. *The Stata Journal,* no.3, pp.281-312.

ILO (2007). *Employment Policy Review "The Former Yugoslav Republic of Macedonia".* International Labour Organisation (ILO) and Council of Europe, Geneva.

ILO (2010). *Global Employment Trends.* International Labour Organisation (ILO), Geneva.

ILO (2012). *The Gender Pay Gap in the Former Yugoslav Republic of Macedonia.* International Labour Organisation (ILO), Geneva.

Jensen, N. and Rosas, G. (2007). Foreign Direct Investment and Income Inequality in Mexico, 1990-2000. *International Organization*, vol.61, no.3, pp. 467-487.

Krugman, P. (1994). Past and Prospective Causes of High Unemployment. *Economic Review,* vol.79, no.4.

Mahutga, M. and Bandelj, N. (2008). Foreign Investment and Income Inequality, The Natural Experiment of Central and Eastern Europe. *International Journal of Comparative Sociology*, vol. 49 (6), pp.429-454.

Milanovic, B. (1999). Explaining the Increase in Inequality During Transition. *Economics of Transition,* vol. 7, no. 2, pp.299-341.

Milanovic, B. (2011). More or Less. Income inequality has risen over the past quarter-century instead of falling as expected. *Finance and Development. IMF,* vol.48. no.3.

Novkovska, B. (2008). Measuring Non-standard and Informal Employment in the Republic of Macedonia. *State Statistical Office of the Republic of Macedonia, Working Paper.*

OECD-ILO (2008). *The Impact of Foreign Direct Investment on Wages and Working Conditions.* OECD Conference Centre, Paris, 23-24 June 2008.

Onaran, Ö. and Stockhammer, E. (2008). The effect of FDI and foreign trade on wages in the Central and Eastern European Countries in the post-transition era: A sectoral analysis for the manufacturing industry. *Structural Change and Economic Dynamics,* no. 19, pp. 66–80.

Peter, K. (2003). Skill-Biased Transition: The Role of Markets, Institutions, and Technological Change. *IZA Discussion Paper,* no. 893.

Pugh, G. (2008). *Estimating Models with Panel Data*. Lecture presentation, Staffordshire University.

Roodman, D. (2006). How to do xtabond2: An Introduction to "Difference" and "System" GMM in Stata, The Center for Global Development. *Working Paper*, no. 103.

Te Velde, D.W. (2003). Foreign Direct Investment and Income Inequality in Latin America. *Overseas Development Institute,* London.

Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data.* MIT Press, USA.

Zulfiu Alili, M. (2014). Simulation Analysis of the Effects of Increased Foreign Ownership on Wage Inequality. *Academicus International Scientific Journal*, issue 9, pp. 140-158.

Appendix 1-Variable name, variable label, variable definition[4] and data sources

Variable label	Variable name	Variable definition	Data source
Gini (dependent variable)	**GINI1**	Distribution of earnings: Gini coefficient Earnings refer to monthly wages, with bonuses, for full-time employees as reported by employers.	TRANSMONEE, 2010.
Gini-UNIDO (dependent variable)	**GINI2**	GINI2 is own calculation using data on the average wages per employee (in current US Dollars) across four digit level of ISIC manufacturing industries in country *i* at time *t*, weighted by the number of employees in each sector. Wages and salaries include all payments in cash or in kind paid to and quot; employees and quot; during the reference year in relation to work done for the establishment. Payments include: (a) direct wages and salaries; (b) remuneration for time not worked; (c) bonuses and gratuities; (d) housing allowances and family allowances paid directly by the employer; and (e) payments in kind. Excluded are employers contributions in respect of their employees paid to social security, pension and insurance schemes, as well as the benefits received by employees under these schemes and severance and termination pay. Number of employees- the number of persons engaged is defined as the total number of persons who worked in or for the *establishment* during the reference year. However, home workers are excluded. The concept covers working proprietors, active business partners and unpaid family workers as well as employees. The figures reported refer normally to the average number of persons engaged during the reference year, obtained as the sum of the and quot; average number of employees and quot; during the year and the total number of other persons engaged measured for a single period of the year. The number of employees is including all persons engaged other than working proprietors, active business partners and unpaid family workers. An "establishment" is ideally a unit that engages, under a single ownership or control, in one, or predominantly one, kind of activity at a single location; for example, workshop or factory.	UNIDO Industrial Statistics Database, 2010. The database is built around the International Standard Industries Classification (ISIC) code system, which classifies industries broadly along product lines, such as food, textiles, iron and steel.
FDI stock (% of GDP)	FDI	FDI stock (% of GDP) is the value of the share of their capital and reserves (including retained profits) attributable to the parent enterprise, plus the net indebtedness of affiliates to the parent enterprises.	UnctadStat, 2011.
FDI inward stock in manufacturing	FDIM	FDI inward stock in manufacturing, NACE 1 DIGIT Unit: EUR MN	The Vienna Institute for International Economic Studies , Database on Foreign Direct Investment(wiiw), 2011.

[4] Variable definition is given according to the data source.

Domestic Investment (% of GDP)	DOM	Domestic Investment is the gross fixed capital formation (% of GDP), (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. We deducted the FDI inflow (% of GDP) from gross fixed capital formation. FDI inflow (% of GDP) is the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.	World Development Indicators (WDI),Edition: December 2010.
Trade (% of GDP)	TRADE	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Development Indicators (WDI),Edition: December 2010.
GDP per capita	GDP	Gross domestic product based on purchasing-power-parity (PPP) per capita GDP, Current international dollar. These data form the basis for the country weights used to generate the World Economic Outlook country group composites for the domestic economy.	International Monetary Fund, World Economic Outlook Database, October 2010.
Tertiary school enrolment	EDU	School enrolment, tertiary (% gross). Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.	World Development Indicators (WDI),Edition: December 2010.
Labour force with tertiary education	LFEDU	Labour force with tertiary education (% of total).Labour force with tertiary education is the proportion of labour force that has a tertiary education, as a percentage of the total labour force.	Source: World dataBank: World Development Indicators (WDI)& Global Development Finance (GDF), April 2011.
Unemployment rate	UN	Unemployment rate, percent of total labour force. Unemployment rate can be defined by either the national definition, the ILO harmonized definition, or the OECD harmonized definition. The OECD harmonized unemployment rate gives the number of unemployed persons as a percentage of the labour force (the total number of people employed plus unemployed). [OECD Main Economic Indicators, OECD, monthly] As defined by the International Labour Organization, unemployed workers are those who are currently not working but are willing and able to work for pay, currently available to work, and have actively searched for work. [ILO, http://www.ilo.org/public/english/bureau/stat/res/index.htm]	International Monetary Fund, World Economic Outlook Database, October 2010.
Index of Economic Freedom	IEF	Index of Economic Freedom. It is a measure of ten components of economic freedom, assigning a grade in each using a scale from 0 to 100, where 100 represents the maximum freedom. The ten component scores are then averaged to give an overall economic freedom score for each country. The ten components of economic freedom are: Business Freedom; Trade Freedom; Fiscal Freedom; Government Spending; Monetary Freedom; Investment Freedom; Financial Freedom; Property Rights; Freedom from Corruption; Labour Freedom.	The Heritage Foundation, March 2011.

Appendix 2(a)-Gini coefficient (GINI 1) of earnings inequality for the countries included in the database, 1993-2008[5]

No.	Country	Year	GINI1 Mean	Std. Dev.	Min	Max
1	Armenia	1993-1995;2000	0.39	0.07	0.32	0.49
2	Belarus	1995-2008	0.34	0.01	0.31	0.37
3	Bulgaria	1993;1996;2002;2006	0.31	0.05	0.25	0.37
4	Czech Republic	1993-2005	0.26	0.01	0.25	0.28
5	Estonia	1997-2001	0.38	0.02	0.34	0.40
6	Hungary	1993-1994;1997;2001	0.34	0.03	0.32	0.39
7	Kazakhstan	2003-2006;2008	0.39	0.03	0.36	0.42
8	Kyrgyzstan	1993-2008	0.46	0.03	0.40	0.51
9	Latvia	1993-2004	0.33	0.02	0.28	0.35
10	Lithuania	1994-1999;2001-2004	0.37	0.02	0.35	0.39
11	Macedonia	1993-2008	0.28	0.02	0.24	0.32
12	Moldova	1993-1996;1998-2006	0.39	0.03	0.33	0.44
13	Poland	1993-1999;2004;2006	0.30	0.03	0.26	0.35
14	Romania	1993-2008	0.35	0.05	0.23	0.41
15	Russia	1994-1996;2001-2002;2004-2008	0.46	0.03	0.42	0.52
16	Serbia	2002-2008	0.32	0.01	0.31	0.35
17	Slovenia	1993-2008	0.30	0.02	0.28	0.36
18	Ukraine	1993;1996-2004;2006-2008	0.41	0.02	0.36	0.46

Appendix 2(b)- Calculated Gini (GINI2) coefficient of earnings inequality for the countries included in the database, 1993-2007

No.	Country	Year	GINI2 Mean	Std. Dev.	Min	Max
1	Albania	1998-2006	0.33	0.05	0.25	0.38
2	Azerbaijan	1997-2007	0.52	0.06	0.37	0.58
3	Bulgaria	1996-2006	0.45	0.05	0.39	0.54
4	Czech Republic	1995-2006	0.39	0.02	0.37	0.43
5	Estonia	2000-2007	0.36	0.02	0.33	0.40
6	Georgia	1998-2007	0.49	0.02	0.45	0.51
7	Hungary	1994-2006	0.38	0.02	0.36	0.42
8	Kazakhstan	1998-2007	0.48	0.03	0.43	0.52
9	Kyrgyzstan	1993-2003	0.47	0.03	0.43	0.55
10	Latvia	1993-2007	0.38	0.02	0.32	0.40
11	Lithuania	1993-1994;1996-2007	0.41	0.02	0.39	0.45
12	Macedonia	1997-2001;2003-2007	0.46	0.11	0.33	0.58
13	Moldova	1996-2006	0.29	0.04	0.21	0.36
14	Poland	1993-1995;2002-2006	0.36	0.02	0.33	0.39
15	Romania	2003-2007	0.49	0.03	0.45	0.53
16	Russia	1999-2007	0.44	0.04	0.38	0.48
17	Slovakia	1993-2006	0.40	0.03	0.36	0.45
18	Slovenia	1995-2007	0.41	0.01	0.38	0.44
19	Ukraine	2000-2007	0.58	0.01	0.57	0.59

[5] Azerbaijan is excluded from the database when we run regressions using GINI1 since there is no data for unemployment for this country during the period of study.