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Economies in Transition: How Does Export Promotion Facilitate Growth at Intensive and Extensive Margins

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ABSTRACT

The primary goal of this paper is the empirical assessment of the effects proceeded from exports on the economic growth of transition economies from both extensive and intensive margins. Preferred estimation methods are Granger causality test and panel regression/cointegration estimators. The study found that fostering export-oriented growth policy triggers technological progress/productivity increase through spillover effects attached to international trade (intensive growth). On the other hand, increasing trade volume/exports stimulate capital accumulation and simultaneously enhances the demand for imported capital and intermediate goods that further complements capital accumulation (extensive growth).
Keywords: intensive growth, extensive growth, export, total factor productivity, capital accumulation
JEL Codes: F11, F14

INTRODUCTION

Since the 90s of the last century, several countries have embarked on the transition process from centrally planned to market economy. Some chose to make a gradual transition while others applied so-called shock therapy referring to the rapid changes in national economic policies.

The transition process of these countries was oriented on market liberalization corresponding to the promotion of the private sector, aggressive privatization, creation of liberal investment climate, and encouragement of market competition. All these were added up to encourage firms to innovate, expand, and explore the foreign export markets. Hence, the export expansion was perceived as the driving force of economic growth.

Theoretically, fostering exports is considered a key determinant for sustainable economic growth (*Michaely*, 1977; *Feder*, 1983; *Darrat*, 1987; *Dritsakis*, 2006, etc.), especially in transition economies (*Funke and Ruhwedel*, 2005; *Kaminski et al.*, 1996). Exports appear to resolve the problem of a small domestic market that does not allow to maintain adequate demand growth (*Taban and Aktar*, 2008). Basically, export markets are boundless and cannot impose any restriction on a demand growth (*Agosin,* 1999); it is a catalyst for income growth as a component of aggregate demand (*Herzer et al.,* 2002). Unfortunately, several empirical studies regarding export-led growth (ELG) policy landed conflicting results, meaning that homogenizing export-oriented

growth is not a priori model for sustainable economic growth. Accordingly, the goal of this study is the empirical assessment of the exports/ELG policy and its effects on transition economies.

The rationale of the study is the following: During the transition process, an outward-oriented growth model can quickly escalate economic growth if implemented properly. Trade policies like export-led growth (ELG) have a bigger space to facilitate technology/knowledge spillovers that in turn increases productivity (intensive growth). Besides, increasing trade turnover by prioritizing exports can trigger capital accumulation by increasing the demand for imported capital and intermediate goods (extensive growth). Following these steps by slowly facilitating gains from ELG policy to the R&D and education will trigger the country's overall potential and create an adequate base to develop into a competitive, innovative economy.

LITERATURE REVIEW

The transition process implies the stage of economic development moving from centrally planned economy to market economy. The path through which transition was going to happen derived from two viewpoints: One claimed rapid "big bang" reform style, while another suggested a gradual set of reforms (*Svejnar,* 2002). Eventually, whatever is the path, a keystone in the transition process should remain the export performance (*MacBean*, 2000). Accordingly, export-oriented growth (ELG) was perceived to be the most efficient policy during the transition process.

The nexus of ELG theory is that exporting on large scales increases factor productivity and correspondingly economic growth. Several studies were dedicated to the empirical assessment of the export-led growth theory. Early works were carried out by *Michaely* (1977), *Heller and Porter* (1978), *Balassa* (1978), *Tyler* (1981), *Feder* (1983), etc... Later work corresponds to *Jung and Marshal* (1985), *Darrat* (1987), *Dritsakis et al.* (2006), *Silaghi* (2009), etc...

Michaely (1977) argued that the rapid expansion of export production can boost economic growth in developing countries. Hence, his results confirmed the positive relationship between exports and growth. On the other hand, *Heller and Porter* (1978) re-examined the potential growth-enhancing character of export with some changes in Michael's model. As Heller mentioned in his work, "*Michaely* (1977) complained that his predecessors in this task had erred because they correlated the growth rate of a national product with a growth rate of exports, and since exports are themselves part of the national product,… a positive correlation of two variables is almost inevitable, whatever their true relationship" (*Heller and Porter*, 1978); but Heller and Porter noticed that Michaelly made the same mistake, thus provided the corrected model of their predecessors regarding the issue. As so, Heller and Porter showed a higher correlation coefficient (0.45) than those of Michaely's (0.38). Eventually, they agree with Michaely that the minimum threshold of economic development is necessary before the relationship between export and economic growth to take-off (*Heller and Porter,* 1978).

Balassa (1978) investigated the relationship between export and economic growth for the countries with the already existing base level of industrial development. He founds that ELG theory performs better for those countries than import substitution policy. According to Balassa, ELG generates incentives to promote sales both within and outside the domestic market, hence, improving resource allocation, increasing market capacity, facilitating technology diffusion and simultaneously increasing production efficiency (*Balassa,* 1978).

Tyler (1981) assessed the relationship between export end economic growth by employing a sample of 55 developing countries, excluding less developed ones due to the certain threshold of the level of industrial development necessary to experience ELG policy benefits. The results confirmed the positive association between the growth and exports, suggesting that "countries which neglect their export sectors through discriminatory economic policies run the considerable risk of having to settle for a lower rate of economic growth" (*Tyler,* 1981).

Feder (1983) analyzed the sources of growth besides capital accumulation and labor force in semi-industrialized countries for the period between 1964 and 1973. According to the results, firstly, marginal factor productivities were found higher in export sectors rather than non-export sectors, and secondly, concentrating resource allocation to export-intensive sectors can trigger economic growth (*Feder,* 1983).

Unlike his predecessors, *Jung and Marshall* (1985) provided causality results concerning export and economic growth for the sample of 37 countries. The results cast doubt on the validity of the ELG policy as far as just 4 countries show support for the policy.

Darrat (1987), *Jung and Marshal* (1985) and some other later studies are emphasizing the importance of causal relationships and criticizing the previous works for simply applying OLS regression and ignoring the possible causality between the variables. Therefore, they are shifting the methodological preference for incorporating causal relationships. As so, *Darrat* (1987) empirically assessed the effects of ELG policy on economic growth for a special case of "growth miracle", "Gang of four", or as often referred to, "Asian tigers" corresponding to Hong Kong, Taiwan, South Korea and Singapore for the period between 1955 and 1982. The results confirmed the positive association of export to economic growth, but the causality test failed to land support on the ELG policy (*Darrat*, 1987).

Dritsakis et al. (2006) analyze the relationship between exports and economic growth in 3 export giants, namely the European Union (EU), the USA and Japan through the multivariate Johansen cointegration test and causality in terms of error correction model (ECM). The results of the Johansen test confirm the long-term cointegration and bilateral causal relationships between the variables of the EU and the USA. On the other hand, no causal and cointegrating relationship was found for Japan.

The efficiency of ELG policy regarding transition economies is well recorded in the following empirical literature: *Kaminski et al.* (1996), *Funke and Ruhwedel* (2005), *Awokuse* (2007), *Saglam et al.* (2018).

Kaminski et al. (1996) evaluated the export performance in transition countries, hence, concluded that prioritizing trade liberalization by removing major trade bar-

riers contributes more to export performance and correspondingly economic growth than relaxing import controls; but one should bear in mind that neither way is successful if implemented alone, instead, liberal foreign trade regime along with stabilization, currency devaluation measures should be executed simultaneously. As so, export success appeared not as "the objective of transition, rather a significant component and an indicator of progress" (*Kaminski et al.,* 1996).

Funke and Ruhwedel (2005) conducted a study regarding the importance of export variety for economic growth in transition economies. From this perspective, export variety represents one of the main determinants of export performance and correspondingly success of export-oriented growth. Accordingly, the results showed that "productivity gains from export variety are empirically relevant to Eastern European transition economies, i.e. GDP per capita is linked to the widening of the product spectrum; however, the importance of variety in determining per capita income depends upon the characteristics of the sector" (*Funke and Ruhwedel*, 2005).

Awokuse (2007) tested the role of both export and import in the economic growth of CEEC countries through the multivariate cointegration VAR methods. The results support both ELG and ILG policies.

Saglam et al. (2018) compared the performance of domestic demand and ELG strategies to European transition economies. The paper employed panel data from 1990 to 2015 with 16 cross-sectional units and applied Westerlund ECM panel cointegration along with heterogenous panel causality tests. The results indicate the significance of both strategies and show bidirectional causality regarding economic growth.

Apparently, ELG policy is a crucial part of the development process in transition economies and the success of it goes through market liberalization which is another cornerstone in the transition process. Market liberalization is a source of new market access, enlarged trade partners, improved spillover effects, and boosted foreign investments that should be directed in sectors with high production efficiency to further complement economic growth (*Bernatonyte and Normantiene*, 2009). Accordingly, international trade and its conventional benefits are presumed as the cardinal source of economic growth regarding transition economies (*Kokko,* 2002*; Malovic and Zdravkovic,* 2017). International trade is the one that can bring together both intensive and extensive growth factors. The ability of international trade to facilitate positive externalities concerning technology transfers and knowledge spillovers stimulates intensive growth as follows: Countries can compensate for the lack of intermediate goods through the imports, thus, manage to increase productivity via technology diffusion, leading to intensive growth (*Belitz,* 2013; *Madsen,* 2008). Similarly, one way to leverage intensive growth is the export-driven foreign investment inflow: Considering export as the main source of growth, promotion of the ELG policy enhances the inflow of foreign investment through the market openness, where the market openness is the main determinant of FDI inflow and the important measure for ELG policy. Accordingly, increased foreign investment with proper management increases the production efficiency of both major export and non-export sectors, leading to intensive economic growth.

From the perspective of extensive growth, vast empirical literature suggests that increased exports/trade flow can be a significant source of capital accumulation. For instance, as far as exports are the main component of the total trade flow, fostering exports can trigger capital accumulation/investment due to the necessity of boosting export production (*Feddersen et al.,* 2017; *Bhagwati* 2007). Accordingly, chasing the export expansion stimulates the demand for the importing capital/intermediate goods that in turn boost capital accumulation (*Emery*, 1967; *Akpokodje*, 2000).

MATERIALS AND METHODS

According to the revised literature, the study hypothesized the following statements:

- H1: Fostering export expansion escalates economic growth through productivity increase.
- H2: Increasing trade flow triggers larger capital accumulation.
- H3: Promoting exports enhances capital accumulation by stimulating the demand for imported capital and intermediate goods.

To address the above-mentioned hypotheses, the study employed two regression models, along with three Granger causality tests. The preferred estimation method is panel data analysis. The paper uses a balanced panel dataset with 231 observations for both regression models. Data were collected from the World Bank database. Datasets include 11 cross-section units over 21 years (1997 to 2017). The cross-section units of the panel datasets represent transition economies corresponding to Albania, Armenia, Azerbaijan, Georgia, Belarus, Ukraine, Moldova, Northern Macedonia, Russia, Kazakhstan and Kyrgyzstan. The variables included in the study are gross fixed capital formation (GFCF), total value of trade (TR), gross savings (GS), inflation (INF), total value of exports (EX), imports of capital and intermediate goods (IMCI), gross domestic product (GDP), trade openness (TO), total factor productivity (TFP), and labor force (LF). As mentioned earlier, there are two regression models, along with three Granger causality tests in the study. Hence, the variables presented above are employed in the following way:

- Regression model (1): Dependent variable GDP and explanatory variables GFCF, LF, EX.
- Regression model (2): Dependent variable GFCF and explanatory variables TR, GS, and INF.
- Granger causality test (1): Testing if EX Granger causes GDP.
- Granger causality test (2): Testing if EX and TO Granger causes TFP.
- Granger causality test (3): Testing if EX Granger causes IMCI.

The first regression model captures the effects of export expansion on economic growth, simultaneously providing the evidence for the validity of the ELG policy assessed through the causality relationship between exports and economic growth. In this regression model, exports are assumed to be one of the main sources of technological progress/productivity increase. Accordingly, to strengthen the assumption

regarding exports and technological progress/productivity increase, I utilized exports, trade openness, and total factor productivity in the Granger causality test to check if the lagged values of exports/trade openness add explanatory power to forecasting total factor productivity; where trade openness represents a measure/indicator for the outward-oriented growth (ELG hypothesis) and the total factor productivity is a proxy for technological progress/productivity increase.

The second regression model assesses the effects of international trade on capital accumulation (extensive growth), and lastly, conducting Granger causality test between exports and imports of capital/intermediate goods provides complementary evidence regarding the ability of exports to increase demand for imported capital/intermediate goods that by itself is the main ingredient in capital accumulation.

Accordingly, the first regression model, along with the first and second Granger causality test addresses the first research hypothesis, while the second regression model, along with the third Granger causality test addresses the second and third hypotheses.

EMPIRICAL RESULTS AND THEIR EVALUATION

Panel regression results for the first regression model, along with first and second Granger causality tests

The first regression model employed a balanced panel dataset (231 obs.) with 11 cross-sectional units over 21 years (1997-2017) collected from World Bank Group. The dependent variable is gross domestic product (GDP) and explanatory variables are capital proxied by gross fixed capital formation as a percentage of GDP (GFCF), the total labor force (LF), total export value (EX), and inflation proxied by consumer price index (INF). All the variables are Log transformed.

Before proceeding to the panel unit root testing, I applied the Pesaran CD test for cross-sectional dependence on all the variables. Pesaran CD test helps us to decide between the 1st (in case cross-sectional dependence is absent) and 2nd generation unit root test (if cross-sectional dependence is present). The result of the test shows the presence of cross-sectional dependence in all variables except for LF (*Table 1*). Hence, I proceeded to test the unit root through 2nd generation tests.

Table 1

Pesaran CD test for cross-sectional dependence

Variables	GDP	GFCF	LF	EX	INF
Pesaran CD	0.000	0.000	0.355	0.000	0.000

Table 2a reports the results of Pesaran CADF/CIPS and Breitung 2nd generation panel unit root tests. According to the results, all the variables are non-stationary at levels in Pesaran CADF except for EX when a trend is specified. Similarly, the Breitung test confirms

the non-stationarity of the variables except for GFCF when a trend is excluded. As for Pesaran CIPS, it shows non-stationarity of variables except for GDP and INF when excluding trend, and GFCF with the trend. The differences between results can be the cause of the size of the time dimension that in our case is not large enough. However, the overall results of the three tests suggest the non-stationarity of the variables at levels and stationery at 1st differences (*Table 2a* and *Table 2b*).

Table 2a

Pesaran CADF, Breitung, and Pesaran CIPS second-generation unit root tests at levels

Variables	Pesaran CADF		Breitung		Pesaran CIPS	
	No trend	Trend	No trend	Trend	No trend	Trend
GDP	0.986	0.98	0.781	0.743	-2.489**	-2.331
GFCF	0.79	0.283	0.024	0.163	-2.036	-2.869**
LF	1.000	1.000	0.753	0.806	-0.916	-1.122
EX	0.715	0.001	0.852	0.68	-1.939	-2.311
INF	0.001	0.678	0.939	0.317	-2.315**	-2.435

Note: Critical values for Pesaran CIPS without trend: -2.14 (10%), -2.25 (5%), -2.45 (1%); with trend: -2.66 (10%), 2.76 (5%), -2.96 (1%); lag length is set at 2 according to the average lag length for each cross-section unit in panels for every variable suggested by Akaike criterion. H1 = nonstationary

Table 2b

Pesaran CADF, Breitung, and Pesaran CIPS second-generation unit root tests at 1st differences

Variables	Pesaran CADF	Breitung	Pesaran CIPS
GDP	0.112	0.000	-3.415***
GFCF	0.001	0.000	-3.614***
LF	0.999	0.000	-2.97***
EX	0.000	0.000	-3.536***
INF	0.016	0.000	-3.888***

Note: Critical values for Pesaran CIPS: -2.14 (10%), -2.26 (5%), -2.47 (1%); lag length is set at 2 according to the average lag length for each cross-section unit in panels for every variable suggested by Akaike criterion. H1 = nonstationary.

As far as all the variables tend to be integrated of the same order, I proceeded to the Kao cointegration test. The results of the test indicate the presence of a cointeg-

ration relationship as the null hypothesis of no cointegration could not be rejected (*Table 3*).

Table 3

Kao cointegration test

ADF	t-statistic	Prob
	-5.918	0.000

Note: H1 = no cointegration.

Eventually, coefficients for panel cointegration relationships were estimated through the FMOLS estimator. The result of the estimated model shows that all the variables have correct signs and are statistically significant (*Table 4*).

Table 4

FMOLS regression model results

Variables	Coefficient	Prob
GFCF	0.137	0.000
LF	0.522	0.009
EX	0.751	0.000
INF	-0.069	0.000
R2 = 0.989		

To check the consistency of the results, I performed a couple of post-estimation tests. Apparently, the FMOLS estimator is robust to the main regression assumptions. Therefore, post-estimation tests correspond only to the normality of residuals and multicollinearity tests. The results of the post-estimation tests are presented in *Table 5* and *Table 6.*

The results of the tests showed that multicollinearity is absent from the model (VIF values are way less than 10) and residuals are normally distributed (*Table 5* and *Table 6*).

Table 5

Jarque-Bera normality test results

Test	Statistic	Prob.
Jarque-Bera normality	2.761	0.251

Note: Jarque-Bera H1 = normally distributed.

Table 6

Variance inflation factor (VIF)

Variable	VIF	1/VIF
GFCF	1.015	0.985
LF	3.304	0.302
EX	2.150	0.465
INF	2.430	0.411
Mean VIF	2.224	

As a next step, I employed a Granger causality test between exports and GDP to validate the importance of ELG policy for transition economies. Besides, to strengthen the assumption regarding the ability of exports to stimulate productivity increase, I also utilized exports (EX), trade openness (TO), and total factor productivity (TFP) in the Granger causality test (*Table 7*).

Table 7

Granger Causality test results

Hypotheses tested	Z-bar Stat.	Probability
EX does not Granger-cause GDP	2.417	0.018
EX does not Granger-cause TFP	5.224	0.000
TO does not Granger-cause TFP	8.865	0.000

Note: H1 = no causality; Lags according to AIC criteria. Variables EX, TO, and TFP are in real growth rates.

The results presented in *Table 6* show that the variables EX Granger-causes GDP, and TO along with EX Granger-causes TFP as we reject the null of no causality.

Overall, the selected variables for the first regression model appeared to be significant contributors to the economic growth: As the main determinants of the aggregate output, GFCF and LF have positive signs and are statistically significant at 1% with the coefficients of 0.137 and 0.522 respectively; inflation has a negative impact on GDP with the coefficient of –0.069; lastly, EX indicates positive impact on GDP with a coefficient of 0.751. Furthermore, Granger causality tests confirm the causal relationship from EX to GDP, as well as from TO and EX to TFP. Accordingly, the results of the first regression model, along with the first and the second Granger causality tests, confirmed the validity of the ELG policy for the transition economies and suggested that the increase in exports enhanced total factor productivity by this stimulating economic growth at intensive margins.

PANEL REGRESSION RESULTS FOR THE SECOND REGRESSION MODEL AND THIRD GRANGER CAUSALITY TEST

The second model uses a strongly balanced panel dataset (231 obs.) with 11 cross-sectional units over 21 years (1997-2017) collected from the World Bank Group database. The dependent variable is capital accumulation proxied by gross fixed capital formation (GFCF) and explanatory variables are total trade turnover (TR), gross savings as a percentage of GDP (GS), and inflation proxied by consumer price index (INF). The variables are in real growth rates.

The results of Pesaran CD test show that all the variables are cross-sectionaly dependent (*Table 8*), hence, I proceeded to stationarity check of the variables by using 2nd generation unit root test, along with 1st generation unit root test with subtracted cross-sectional mean which mitigates the impact of cross-sectional dependence as stated by Levin, Lin, and the Chu. Accordingly, *Table 9* and *Table 10* report the results regarding the stationarity of the variables. The results of the tests show that mostly all the variables are stationary at 1 lag (with and without trend).

After confirming that the variables under consideration are stationary, I proceeded to the estimation of the regression model via POLS, RE, and FE estimators. The results of the regression models show that all the variables have expected signs and are statistically significant (*Table 11*).

Table 8

Pesaran CD test for cross-sectional dependence

Variables	GFCF	TR	GS	INF
Pesaran CD	0.000	0.000	0.000	0.000

Note: H1 = no cross-sectional dependence.

Table 9

Pesaran CADF, Breitung, and Pesaran CIPS second-generation unit root test

Variables	Breitung		Pesaran CIPS		Pesaran CADF	
	No trend	Trend	No trend	Trend	No trend	Trend
GFCF	0.000	0.000	-3.495***	-3.886***	0.000	0.000
TR	0.002	0.000	-3.604***	-4.222***	0.001	0.000
GS	0.002	0.442	-2.32**	-2.788**	0.312	0.257
INF	0.018	0.012	-4.014***	-4.047***	0.000	0.009

Note: Critical values for Pesaran CIPS without trend: -2.14 (10%), -2.25 (5%), -2.45 (1%); with trend: -2.66 (10%), -2.76 (5%), -2.96 (1%); lag length is set at 1 according to the average lag length for each cross-section unit in panels for every variable suggested by Akaike criterion. H1 = nonstationary.

Table 10

Fisher-type (Phillips-Perron) panel unit root test

Variables	GFCF		TR		GS		INF	
	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend
Inv. Chi 2	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
Inv. normal	0.000	0.000	0.000	0.000	0.011	0.019	0.000	0.000
Inv. logit	0.000	0.000	0.000	0.000	0.006	0.005	0.000	0.000

Note: lag length is set at 1 according to the average lag length for each cross-section unit in panels for every variable suggested by the Akaike criterion. H1 = nonstationary.

Table 11

POLS, RE, and FE regression model results (dependent variable is GFCF)

Variables	POLS	RE	FE
TR	0.924*** (0.053)	0.924*** (0.054)	0.93*** (0.056)
GS	0.209** (0.11)	0.209* (0.111)	0.292** (0.14)
INF	-0.081* (0.045)	-0.081* (0.045)	-0.093* (0.049)
R2	0.67	0.67	0.678

Accordingly, Hausman and Lagrange Multiplier tests were employed to identify the best model. The results reported in *Table 12* show that the preferred model is POLS.

Table 12

Hausman test and Lagrange Multiplier tests for Random effects (RE)

Hausman Test		LM test for RE (Cross-section)		LM test for RE (Time)		LM test for RE (Both)	
Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
2.941	0.4	1.684	0.194	0.26	0.609	1.945	0.163

To confirm the consistency of the POLS model, I conducted several post-estimation tests including cross-sectional dependence in residuals, heteroskedasticity, multicollinearity, and autocorrelation tests (*Table 13* and *Table 14*).

Table 13

Results of post-estimation tests: Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD tests for checking residual cross-sectional dependence; Panel cross-section Heteroskedasticity LR test for detection of heteroskedasticity, and Wooldridge test for autocorrelation

Breusch-Pagan LM Test		Pesaran scaled LM Test		Pesaran CD Test		Hetero. LR Test		Wooldridge Autocorrelation	
Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	LR Stat.	Prob.	F Stat.	Prob
79.286	0.017	2.315	0.02	1.313	0.188	35.699	0.000	5.522	0.04

Note: Breusch-Pagan LM, Pesaran Scaled LM, and Pesaran CD H1 = no cross-sectional dependence; Hetero. LR H1 = no heteroskedasticity; Wooldridge H1 = no autocorrelation.

Table 14

Variance inflation factor (VIF)

Variable	VIF	1/VIF
TR	1.37	0.728
GS	1.37	0.73
INF	1.64	0.61
Mean VIF	1.46	

According to the post-estimation test results, the POLS model suffers from heteroskedasticity, autocorrelation, and cross-sectional dependence in residuals.[1] To deal with these violations of regression assumptions, I have employed heteroskedastic, contemporaneous correlation, and autocorrelation robust standard errors through GLS, Prais-Winston PCSE, and Driscoll-Kraay SCC estimators and re-run the model (*Table 15*).

The results of the robust estimators (GLS, PCSE, and SCC) landed the same results as the POLS model. It appears that a 1% increase in total trade flow increases GFCF by 0.886 to 0.933%. In the same way, a 1% increase in GS increases GFCF by 0.209 to 0.332%. As for INF, the value of GFCF decreases by 0.081 to 0.106% on every 1% increase in the inflation rate.

[1] The results of the tests for cross-sectional dependence indicate that 2 out of 3 tests confirms the cross-sectional dependence. Accordingly, I assumed cross-sectional dependence, but still, due to Pesaran CD test that showed no cross-sectional dependence, I ran the corresponding GLS, PCSE, and SCC regressions with and without cross-sectional correlation.

Table 15

GLS, PCSE and SCC regression model results (dependent variable is GFCF)

Variables	GLS (no CS corr.)	GLS	PCSE (no CS corr.)	PCSE	SCC
TR	0.933***	0.926***	0.886***	0.886***	0.924***
GS	0.332***	0.322***	0.257*	0.257*	0.209**
INF	-0.088**	-0.07**	-0.106**	-0.106**	-0.081**
R2			0.635	0.635	0.67

As mentioned earlier, this study also provides complementary evidence regarding the ability of exports/ELG policy to stimulate capital accumulation through the causality analysis between exports and imports of capital/intermediate goods. The rationale behind this claim is as follows: Competitive pressure along with the desire of exporting firms to succeed in the international market triggers investments in R&D, simultaneously, it enhances the demand for the imports of capital/intermediate goods, which are direct contributors to capital accumulation. Accordingly, I conducted a Granger-causality test between EX and IMCI to farther support the argument regarding the growth-enhancing character of exports/ELG policy to complement capital accumulation through stimulation of the demand of IMCI (*Table 16*).

Table 16

Granger causality test results

Hypothesis tested	Z-bar Stat.	Probability
EX does not Granger-cause IMCI	3.049	2.E-06

Note: H1 = no causality.

The results reported in *Table 16* show the causal relationship from exports to imports of capital/intermediate goods as we reject the null hypothesis of no causality.

As we can see from the results of the second regression model and the third Granger causality test, engagement in larger trade activities by prioritizing exports brings together new forces to facilitate the farther expansion of capital accumulation (growth at extensive margins).

FINAL NOTES AND CONSISTENCY WITH LITERATURE

Apparently, adopting the ELG growth model indicates the signs of both, growths at extensive margins (capital accumulation) and the intensive margins (productivity increase) regarding selected transition economies. The results of this study give support to the implementation of ELG policy in transition economies

and confirmed the validity of the claim presented in *MacBean* (2000): Whatever is the path, the export performance should remain a keystone in the transition process (*MacBean*, 2000). These results are also in line with *Kaminski* (1996) where the author showed the prominence of exports as a significant component and indicator of progress while prioritizing trade liberalization within the transition process. Similar results were presented in *Awokuse* (2007) and *Saglam et al.* (2018) that found strong evidence supporting ELG theory regarding CEEC/European transition economies. Among others, the results of the current study are consistent with *Moschos* (1987) showing that the growth of output is mainly generated by export expansion and capital formation in developing countries. Furthermore, the results are relevant to the findings in *Balassa* (1986), where the author states that the outward-oriented countries are more resistant to external shocks and rely less on foreign borrowings, while inward-oriented countries are more vulnerable and borrow extensively abroad (*Balassa*, 1986).

The relationship between capital accumulation and trade/exports is another important issue addressed in this study. It appeared that fostering trade enhances capital accumulation which in turn boosts the aggregate production of a country. Hence, the implementation of ELG policy has twofold benefits reflected in both extensive (capital accumulation) and intensive (spillover effects enhancing technological progress) growth aspects. The results are consistent with *Feddersen et al.* (2017), where the authors found that a "shock to exports is associated with an improvement in capital… and exports Granger-causes capital" (*Fedderson et al.*, 2017). Similarly, the results of this study are in line with *Levine and Renelt* (1992) that found a positive association between trade/exports and investments/capital. Besides, the current study presents the evidence that the demand for imports of capital/intermediate goods that are direct contributors to capital accumulation, is significantly affected by export expansion. Similar results were found in *Emery* (1967) and *Akpokodje* (2000).

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Resources of Sustainable Economic Growth and Development: The Case of the Republic of Serbia

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ABSTRACT

The Sustainable Development Strategy implies a targeted long-term process that affects economic, social, environmental and institutional aspects of life. The goal is to meet the social and economic interests of citizens, reduce poverty, reduce unemployment and gender inequalities and reduce negative impacts on natural resources and the environment, resulting in long-term economic growth with economic efficiency, technology and innovation. Accordingly, in 2015, the United Nations adopted Resolution A / RES / 70/1 - Transforming our world: the 2030 Agenda for Sustainable Development, based on three dimensions of sustainable development: economic growth, social inclusion and environmental protection. At the end of the 20th century, parallel with the theory of development, which turned into the concept of sustainable development, there was globalization that integrated the entire world regions in order to gain as strong economic and financial positions as possible on the world stage. Today, Serbia is not in a position to choose whether to engage in modern globalization processes, but it must continue the initiated transitional reforms and accession to the European Union, regardless of the economic, political or environmental consequences. By implementing national policies, Serbia should aim at national and economic sovereignty, which will further influence sustainable development. Only by changing the current economic policy, by creating a national strategy based on the exploitation of domestic economic and industrial potentials, by reducing unemployment, social responsibility and individual freedom, economic growth and sustainable development can be achieved. This work, besides the introduction, consists of materials based on the presentation of the sustainable development strategy of the Republic of Serbia, and also presents the results and discussion that draft the current situation with possible solutions to achieve sustainable development in the future. Finally, final ratifications are provided.
Keywords: sustainable development, economic growth, national strategy, Republic of Serbia

INTRODUCTION

A country's sustainable development strategy is defined as a long-term and targeted process that affects economic, social, environmental and institutional aspects of life on all levels. Namely, this strategy should be oriented towards the creation of a model that will not be the best way to satisfy the social and economic interests of citizens of one state, while on the other hand it reduces the negative impacts on natural

resources and the environment itself. This will, in addition to economic efficiency, technology and innovation, lead to economic growth in the long run, which will directly affect the reduction of poverty levels and the increase in the quality of life, but also the preservation of the environment through the reduction of possible pollution. One of the most important goals of sustainable development is the reduction of the unemployment rate through job creation and employment of young people and the reduction of gender inequality, which must be supported by political will and public support.

The global goal of the national strategy for sustainable development is the balance of three pillars, namely the sustainable development of economic and technological growth, revitalizing the development of society through social balance and sustainable development of environmental protection, which must be supported by the institutions.

At the summit in September 2015, the United Nations adopted Resolution A / RES / 70/1 - Transforming our world: the 2030 Agenda for Sustainable Development. Specifically, the Agenda 2030 is a universal strategy in which State Parties are expected to mobilize all resources in order to achieve targets by 2030. Agenda 2030, with all 17 goals (the world without poverty, the world without hunger, good health, quality education, gender equality, clean water and sanitation, accessible and renewable energy, dignified work and economic growth, industry, innovation and infrastructure, reduction of inequality, sustainable cities and communities, responsible consumption and production, climate action, life under water, life on earth, peace, justice for strong institutions, partnership to goals) includes three dimensions of sustainable development: economic growth, social inclusion and environmental protection.

MATERIALS AND METHODS

In this paper, materials and methods are based on the analysis of the sustainable development of the Republic of Serbia, which includes the strengths and weaknesses of sustainable development, but also the opportunities and threats of sustainable development.

In order to enable the realization of a sustainable development vision, the Republic of Serbia was based on national priorities of key importance. It primarily refers to EU membership, and in addition to the development of a competitive market economy and balanced economic growth, development and education of the population with increased employment and social inclusion, the development of infrastructure and the balanced development of all regions in the country, as well as the protection and improvement of the environment with the rational use of natural resources. Certainly, there are strengths and opportunities to be used, on the one hand, but also weaknesses and threats to be avoided, on the other hand (*Table 1* and *Table 2*).

As it has already been mentioned above, the Republic of Serbia has defined accession to the European Union as the largest national priority, where the main goal is to meet a number of previously formulated conditions by the EU based on the

development of stable democratic institutions with the rule of law, the development of a market economy and legal harmonization with the EU.

Table 1

Strengths and weaknesses of Serbia's sustainable development

STRENGTHS	WEAKNESESS
Geographical position of the earth;	Insufficient trust of citizens in institutions;
Quality workforce;	Differences in regional development;
Legal basis of democratic and open societies;	Insufficient number of greenfield investments;
Reforms of a large number of sectors;	Slow privatization process;
Private Sector Growth;	Lack of traffic and communal infrastructure;
Trust on the regional level and raising reputation;	Insufficient investment in the development of the economy;
Awareness raising for the need of sustainable development planning on the local level;	Very low allocation rate for education and science from GDP;
Reducing current imbalances in the financing of social and pension-disability insurance funds;	Low rate of allocation from GDP in the field of social protection;
High degree of biodiversity;	Continuation of brain drain;
Various natural resources;	Ethnocentrism in the part of the ruling elite;
Risks of cultural infrastructure and cultural values;	Low level of citizen participation;
Existence of expert and financially significant diaspora;	Lack of consensus about further regionalization and decentralization;
Preserved environment in non-industrialized areas.	Unplanned exploitation of natural resources;
	Unfavourable socio-economic situation of young people;
	Excessive pollution of water, air and soil; Poor waste management practices;
	Lack of incentives to reduce pollution.

Source: *Republic Institute of Statistics of the Republic of Serbia* (2019)

The development of a competitive market economy and balanced economic growth can be achieved by supporting innovation through linking science, technology and entrepreneurship to IT technologies. This can be achieved by attracting FDI, macroeconomic stability, increasing exports, development, small and medium-sized enterprises, fostering innovation and entrepreneurship and the development of IT.

Development and education of the population with increased employment and social inclusion are achieved by increasing the number of jobs, increasing the number of experts, improving the quality of the workforce and investing in human resources. However, this can be achieved by preventing professionals and youth from leaving the country, better flexibility of the labor market, investing in education, achieving gender equality through the incentives for employment of young women and investing

competitiveness, evenly stimulating regional and local development, and by developing rural areas.

Table 2

Opportunities and threats to the sustainable development of the Republic of Serbia

OPPORTUNITIES	THREATS
EU integration;	Growing Intolerance and Social Division;
Inclusion in EU funds;	Possibilities of new ground insulation;
Cooperation with the Diaspora;	Adverse demographic trends;
Introduction of EU norms and standards for environmental quality assurance;	The increase in unemployment, poverty, indebtedness and slow economic development;
Completion of privatization;	Principle "not in my yard";
Further development and strengthening of democratic institutions in the areas of social development;	Lagging behind for the region due to unresolved political issues;
Reducing corruption and increasing transparency;	Unresolved issues of combating corruption and organized crime;
Political will to implement legal reforms;	Insufficient public awareness and insufficiently developed public awareness;
Increasing Public-Private Partnerships;	Lack of investments for infrastructure construction;
Introducing cleaner production;	Industrial production with outdated technologies;
Improvement of energy efficiency, rational use of raw materials and the reduction of traffic intensity.	Possible absence of political will to carry out legal reforms;
	Growing level of traffic with low quality fuel.

Source: *Republic Institute of Statistics of the Republic of Serbia* (2019)

Protection and improvement of the environment with the rational use of natural resources is based on establishing a system of protection and controlled use of natural resources, then investing in reducing the pollution of the environment, more efficient use of fossil fuels and others.

The National Strategy for Sustainable Development of the Republic of Serbia is based on the globally accepted principles defined in the Declaration on Sustainable Development from Johannesburg, furthermore on the objectives of sustainable development of the UN and the EU Sustainable Development Strategy (*Institute for Urban Planning*, 2017). Its main points are the following:

1. Intergenerational solidarity and solidarity. It refers to meeting the needs of the present generations without compromising the rights of future generations, which is achieved through a democratically harmonized distribution of available natural and created capital, providing basic human needs;
2. Open and democratic society - participation of citizens in decision-making. It refers to the guarantee of civil rights and participation in decision-making, providing access to information and ensuring access to justice.

3. Knowledge as a carrier of development. It involves promoting a prosperous, innovative, competitive and environmentally efficient knowledge-based economy that provides a high standard of living and full and high-quality employment.
4. Promote education and develop public awareness of sustainable development. It is based on involvement in social processes and the tendency that differences and polarization among members of society should be minimized and to combat social exclusion and poverty.
5. Integrate environmental issues into other sectoral policies. Promote the integration of economic, social and environmental approaches and analyzes, using instruments such as strategic environmental assessment.
6. The precautionary principle. Require the preservation of the natural balance in circumstances where there is no reliable information on a particular problem. In case of possible and significant environmental impacts, undertake preventive activities, especially in situations of endangering the welfare of people and animals.
7. Principle polluter / user pays. Include the costs of environmental damage in the economic costs of the polluter / user, applying the polluter / payer principle.
8. Sustainable production and consumption. Respect balanced relationships in the exploitation of natural resources and provide a high level of protection and improvement of the quality of the environment. Reduce environmental pollution and promote sustainable consumption and production, so that economic growth does not cause a proportional increase in environmental degradation.

This strategy reflects a positive image for the future of Serbia, and even only some of these items are fulfilled, because of the application of appropriate economic, technological and social strategies, it can lead to the improvement of today's very bad position in relation to other countries in transition. In particular, it should be taken into account that Serbia is in relation to the countries in its environment, and according to the analysis of the transition indicators, the EBRD had the slowest progress in the transition process (*Toskovic*, 2016). We can assert that the Republic of Serbia needs sustainable development that is based on an increase in the stability of basic macroeconomic aggregates such as GDP, employment, foreign trade, FDI inflows and increased competitiveness with the reduction of public and external debt, which will result in macroeconomic stability on the one hand, and on the other, it will contribute to a better quality of life of citizens. Also, in addition to everything mentioned above, our country requires educated people who possess knowledge and who will contribute to the implementation of all the items mentioned by their efforts and work.

RESULTS AND DISCUSSIONS

The results and discussions point to the objectives of sustainable development in the Republic of Serbia, which relate to social responsibility, freedom of the individual, regional development, the launching of industrial growth and economy, but also possible recommendations for the future.

At the end of the 20th century, the previously known theory of development turned into a concept of sustainable development, which has scientific and technological development in its base. At the same time, there has been globalization that has integrated the entire world regions in order to gain as strong economic and financial positions as possible on the world stage. Namely, globalization is a phenomenon of a newer date that can be understood as a process that enables the transformation of local or regional phenomena into global (*Toskovic and Filipovic*, 2017). Today, the term globalization implies „international integration" of goods, technologies, labor and capital, so globalization can be discussed in a wider sense (*Dujusin*, 1998). According to another interpretation, globalization implies the process of abolishing restrictions on the flow of goods, services and people (*Turek*, 1999). In one word, those who do not participate in these processes remain excluded from the main world commodity and financial flows, which are controlled by several world centers.

The development of the global economy is enabled by the technological development that began in the seventies in the most economically and technologically most developed countries in the world. The question of the development of national economies is a constant topic of today. Each country should formulate and adopt national strategies for economic development (*Toskovic and Filipovic*, 2018). By implementing national policies, Serbia should aim at national and economic sovereignty. Nevertheless, Serbia is not in a position to choose whether to engage in modern globalization processes, it simply needs to continue the initiated transitional reforms and accession to the European Union, whatever the economic, political or environmental consequences are. Sometimes the economic structure had the dominance of the primary sector, eg. agriculture and the organic industry, as well as the secondary sector or the processing industry.

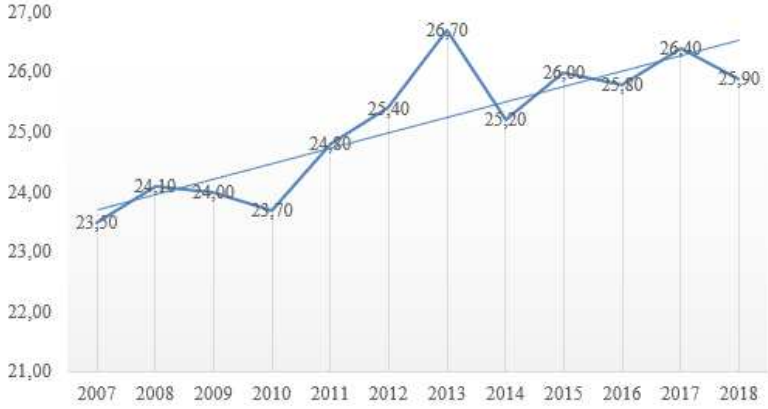
Today, the primate has a tertiary sector, a service sector imposed on by globalization processes. Our country is facing a high external trade deficit as well as additional external borrowing, which leads to a burden on economic activity and the danger of a crisis of foreign liquidity. Also, one of the problems is the technological backwardness of domestic enterprises, which has led to low productivity and insufficient competitiveness of the economy on foreign markets. Insufficient competitiveness is the result of a high monopolization of the domestic market, which prevents further transitional reforms. However, this could be changed by changing the prevailing economic policy, creating a national strategy based on the exploitation of domestic economic and industrial potentials, increasing FDI but also by integrating the domestic economy into the world's economic flows. Accordingly, the possible goals of the sustainable development of the Republic of Serbia can be summarized as the most important ones:

1. Social responsibility. Social responsibility should be based on the principle of social justice and responsibility for each individual. In order to achieve a socially responsible economy, it is necessary to improve the economic environment for all residents and provide them with a chance to work, reduce poverty and the right to work, and reduce gender inequality.

2. Freedom of the individual. Citizens of our country should live freely, in society and economy with overall lower risks, and with greater chances for cultural, economic and technological development and life, without anxiety for existence and life.
3. Regional development. Balanced regional development and policy of regional development stimulation are necessary, since regional differences are large (economic, political, demographic), especially in the South and East parts of the country. These incentives relate to infrastructure, education, education and employment, and FDI.
4. Launch of industrial production. Serbia could improve its economic position by creating a national strategy based on the exploitation of domestic economic and industrial potentials. The observed period shows that industrial production is in constant decline, which is the result of the current economic policy (*Figure 1*).

Figure 1

Industry (%) of the Republic of Serbia in the period 2007-2018

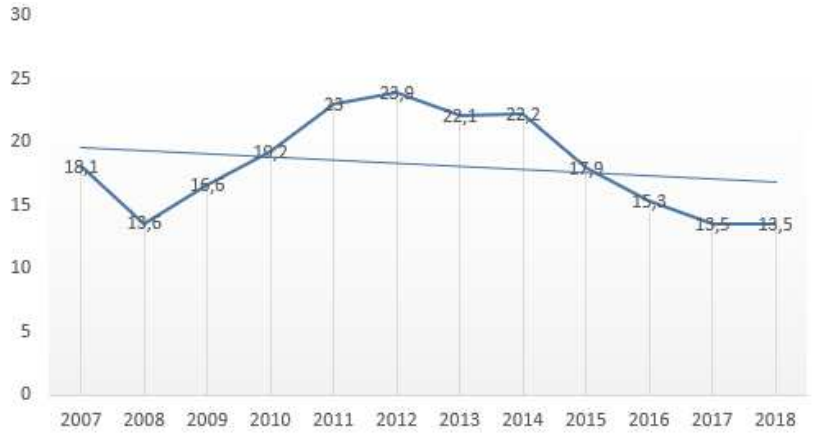


Source: *World Bank* (2019, a)

5. Reduction of unemployment is necessary in order to achieve economic growth. For several years, Serbia has been struggling with high new unemployment, resulting in large migrations of the population into EU countries. The reason for abandoning the state is the inability of the population to live from their work, because in the current economic system they are unable to get to work and have a decent living from their work. Observing a ten-year period, the highest unemployment rate was in 2012 when it was 24%, which is the result of the second wave of the economic crisis (*Figure 2*).
6. Economic growth. It should be based on economic and technological development that will lead to the growth of production, employment and GDP, while improving the quality of life. In the last ten years, the consequences of the global economic crisis, economic growth did not exceed 3%. The *Figure 3* shows the economic growth in the Republic of Serbia between 2007 and 2018.

Figure 2

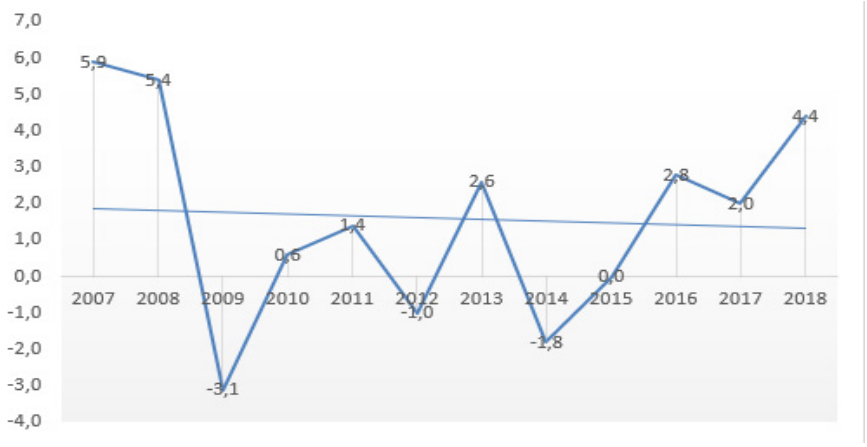
Unemployment (%) in the Republic of Serbia in the period 2007-2018.



Source: *World Bank* (2019, b)

Figure 3

Economic growth (%) in the Republic of Serbia in the period 2007-2018.



Source: *World Bank* (2019, b)

CONCLUSION

The sustainable development strategy of a country implies a targeted process in the long run, which affects both economic and social, environmental and institutional aspects of life on all levels. The goal of the strategy is to create a model that will best

satisfy the social and economic interests of citizens, but also reduce the negative impacts on natural resources and the environment, which will result in long-term economic growth with economic efficiency, technology and innovation. Furthermore, the strategy will directly affect the reduction of the level of poverty and the preservation of the environment through reduction of possible pollution. One of the most important goals of sustainable development is the reduction of the unemployment rate and the reduction of gender inequality, which must be supported by political will and public support. Accordingly, in 2015, the United Nations adopted Resolution A / RES / 70/1 - Transforming our world: the 2030 Agenda for Sustainable Development, based on three dimensions of sustainable development: economic growth, social inclusion and environmental protection.

At the end of the 20th century, parallel with the theory of development, which grew into the concept of sustainable development (the base is scientific and technological development), there was globalization that integrated the entire world regions in order to gain as strong economic and financial positions as possible on the world stage. In other words, globalization implies the process of abolishing restrictions on the flow of goods, services and people, while those who do not participate in these processes remain isolated from the main world commodity and financial flows, which are controlled by several world centers. Thus, in the seventies, the development of a global economy enabled technological development in the most economically and technologically developed countries of the world, while the issue of the development of national economies is a permanent theme of today. By implementing national policies, Serbia should aim at national and economic sovereignty, which will further influence sustainable development. However, Serbia is not in a position to choose whether to engage in modern globalization processes, but it must continue the initiated transitional reforms and accession to the European Union, regardless of the economic, political or environmental consequences.

Today, our country faces a high external trade deficit, high external indebtedness, unemployment, while the technological backwardness of domestic enterprises has led to low productivity and insufficient competitiveness of the economy in foreign markets, which is the result of high monopolization of the domestic market, which prevents further transitional reforms. Such a picture could be changed by changing the prevailing economic policy, creating a national sustainable development strategy based on the exploitation of domestic economic and industrial potentials, reducing unemployment, social responsibility, and freedom of individuals, which will ultimately result in economic growth.

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Spatial Illustration of Indicators on the Example of Biomass Potential for Energy Purposes in the Tabi District

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ABSTRACT

This paper is intended to show the importance of spatial accounting, the practicality of mapping and illustration. To this end, biomass potential that can be grown on arable lands and the resulting indicators were studied on the example of the Tabi járás (Tabi district) of Hungary. The processed data was projected onto maps for mapping the absolute potential, but also specific indicators such as values per hectare or per capita. The results are plotted in equal intervals and along with natural fractures classification of the data. The results thus obtained emphasize the heterogeneity caused by spatial unevenness. Taking such information into account can improve the efficiency of state interventions, investments, developments and the decentralization of other decisions.
Keywords: spatial analysis, sustainable energy, environmental indicators, arable land use, thematic map

INTRODUCTION

In accordance with the title, the indicators presented in this article are neither intended to discuss the theoretical sustainability of bioenergy systems, nor specific practices in a particular area. Our task is to provide a spatial illustration of the indicators and to highlight the regional differences. We would like to demonstrate the practicality of the spatial illustration of data. To do this, we use a geographic information system (GIS) toolbar to map the created indexes. Spatial illustration allows us to notice the spatial heterogeneity of data, which may raise a lot of new relationships, questions and problems. The information thus obtained then can be used, for example, in the formation of government policies, plant location decisions or even infrastructure development. In addition, the examples presented can be used in any situation where data is stationary, thereby enabling spatial analysis.

Our chosen region is the Tabi járás (Tabi district) in Somogy county, in the Southern Transdanubian region of Hungary. The reason for this selection can be explained by the knowledge gained from previous project works and the available database. The area is located in Somogy county, consists of 24 settlements, its seat and only town is Tab. The district has an area of 427.24 km², a population of 12 786 people, thus the population density is about one-third of the national average, ~30 people/km². Our indicators are based on biomass, which comes from the agricultural nature of the area

and the idea of the local resource-based economic development. Of course, we would have been able to choose data of an economic or social feature, but in the spirit of our solidarity with global natural problems, we have advocated a (limited) renewable resource. We did this despite the fact that our current study will not have a direct practical bearing, but we hope that this work's approach on energy may inspire others.

Although climate change has brought renewable energy into the spotlight all over the world, one of the most controversial of these alternatives is undoubtedly the energetic use of biomass produced on arable land. When discussing the use of arable biomass, the "food versus fuel" debate (*Zhanga et al.*, 2010), the dilemma of carbon (and pollutant) neutrality (*Brack*, 2017), the energy balance of the resource, or the optimal soil utilization and influencing soil supply (*Hutkainé Göndör et al.*, 2013) are often debated areas - just to mention the most exciting ones. Biomass is undoubtedly different from the lifeless and inexhaustible nature of sunshine, wind or tides due to its living matter, but with carefully selected quantitative and utilization criteria it can be a complete component of a sustainable energy system. This is especially true in agricultural or forestry areas where soil or slope conditions are unfavourable, for example.

THEORETICAL BACKGROUND

There are several questions regarding the planting of biomass for energy purposes. Different plants have different advantages and disadvantages as well as environmental needs. What kind of plant we choose to grow is influenced by several environmental, economic, technical or legal factors. Although it is not our intention to consider practical aspects, there are a few ideas that illustrate the complexity of this issue. For the sake of simplicity, we consider three different biomass feedstocks: (i) straw of cereals (primarily wheat) and maize stalk; (ii) energy grass, (iii) energy forest (fuelwood). The yield and energy density of the plants are shown in *Table 1*.

Table 1

Yield and energy density data for plants

	Yield, t/ha	**Energy density, MJ/t**
Straw and maize stalk[1]	9.75 (*Agrárium7*, 2015)[2]	14400 (*Ivanovic and Glavas*, 2013)
Energy grass	16 (*Gyulai*, 2007)	15500 (*Gyulai*, 2007)
Energy forest	20 (*Szajkó et al.*, 2009)	17000 (*Gyulai*, 2007)

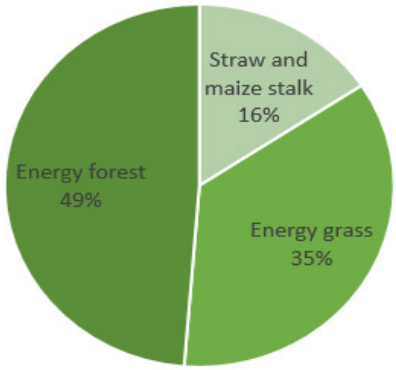
[1]As a simplification, we assume that straw and corn stalks are present in the area in a half-half proportion, so yields and energy densities are averaged.

[2] We did not find data of the current average yields of straw and maize stalks in Hungary in peer-reviewed scientific journals. For the calculation, we worked with the data from the article titled "Szalmafélék és származadványok" (Straw and stem residues) in Agrárium7.

Based on the yield (t/ha) and energy density (MJ/t) of plants per unit area (*Table 1*), the total amount of heat which can be „harvested" from a given area can be estimated. Since the ratios of energy contents are constant between the plants, assuming the same needs of the plants, their masses are formed in the same proportion in any area. For the sake of clarity, the ratio of energy content to the whole is illustrated in *Figure 1* based on *Table 1*. It is evident that the energy forest has the highest potential (yield and energy density too), followed by energy grass, followed by straw and maize stalk. However, it is important to bear in mind that this latter raw material is a by-product, so it is natural that its yield is below those of the other two main crops. In other words, if we focus only on volume, the oldest type of biomass used, fuelwood from (energy) forest will „triumph". Leaving aside the environmental, economic, technical, legal circumstances, we can say that if the goal is to derive a specified amount of energy from the smallest possible area, then it is worth to concentrate on wood from the three energy sources.

Figure 1

Distribution of heat potential of crops grown per unit area



Although energy forest is the absolute „winner" of yields and energy potentials, its plantation makes it impossible to grow food and/or feed crops, which can lead to food shortages, thus rising prices as well. The energy forest is followed by energy grass, which can be cultivated under extreme natural conditions (frost, drought, poor soil quality etc.). Through its deep penetrating root system, it prevents erosion and deflation and consequently, after harvesting, replenishes large quantities of organic matter. The cost of planting is well below that of the forest, and in contrast to the latter one, it can be utilized annually (*Gyulai*, 2007).

If we want to align ourselves with EU and national priorities (*Dinya*, 2018), leaving behind direct energy production, we must give preference to the residues of crop production. This latter solution also poses a number of dilemmas. After harvesting, crop residues left on the soil play an important role in the replenishment of soil, as they improve their structure and their chemical composi-

tion during decomposition. Thus, biofertilizers although carried can be replaced by fertilizers, this is often produced from fossil fuels (natural gas) under fairly energy-intensive conditions. In addition, we have not taken into account the material and environmental aspects (e.g. greenhouse gas and noise emissions) of the transport of biofertilizer and the transport of fertilizers.

While not all of the arguments for and against different cultures have been listed, it is clear from these few that optimizing installations is far from easy. We have not even considered the decision-making role of spatial heterogeneity. It is a challenge in itself to select and determine the plant to be grown but finding the optimal place to produce a selected plant is not an easier task. The (increasing) popularity of spatial analysis is precisely due to the fact that mapping data can provide additional information that justifies redesigning our ideas created on the „homogeneous plain". With the information we extract, we are more confident in choosing a good geographic location for our activity.

Spatial recognition and illustration are very common in most scientific fields, including energy management. This is mainly due to the uneven geographical distribution of energy sources. There are enormous regional disparities in the case of non-renewable and renewable energy sources if we compare Central Europe with the Middle East or Scandinavia. This question is also important for Hungary, as there are significant differences in the potential of coal, solar energy (*Solargis*, 2020) or geothermal energy (*Mádlné Szőnyi et al.*, 2008) in our different regions.

According to *Turner* (1990), many ecological issues require the study of large regions and an understanding of spatial heterogeneity. Spatial and temporal analyses are becoming increasingly important in ecological studies. In his study, he examined the relationship between landscape patterns and ecological processes with a neutral modelling approach. *Ayotte et al.* (2001) attempted to improve the reliability of wind forecasts with the help of temporal and spatial analysis. By investigating wind speed and direction data from several meteorological towers, he attempted to reduce modelling errors in the context of wind energy calculations. *Ramachandra and Shruthib* (2007) undertook a spatial mapping of energy supply and demand to contribute to the design of a regionally integrated energy system. By understanding the regional characteristics of supply and demand, decision-making processes can be supported, and the dissemination of local and renewable energy technologies can be facilitated. The research by *Arnettea and Zobe* (2011) uses a geographic information system (GIS) to map renewable energy sources with a regionally heterogeneous picture. The model analyzes the potential of wind, solar and biomass in the southern Appalachian region (USA), where electricity generation is highly dependent on coal. Replacing this fossil resource with alternative energy sources would improve the state of the environment. *Zhaoa et al.* (2014) undertook a survey of regional factors influencing the intensity of energy-related carbon dioxide emissions in the analytical region of 30 Chinese provinces. According to their study, the greenhouse gas emissions of energy use strongly depend on the natural and social characteristics of the areas. *Mola-Yudego et al.* (2014) investigated the spread of plants suitable for producing wood pellets

using space statistical methods. Their purpose was to identify areas with significant pellet production capacity. The study provides methodological tools for identifying the most important pellet production areas in Europe, which have additional economic and political relevance.

Several spatial analyzes have already been made by Hungarian authors in many different fields. *Bíró et al.* (2002) dealt with the probability of spatial and temporal occurrence of inland waters. The aim of his research is to create category maps whose successive overlaps produce an inland water hazard map. *Tőth* (2007) examined the criminal-geographical status of Hajdú-Bihar county, one of the most problematic areas in Hungary, between 1990 and 2003. *Bálint* (2011) emphasizes the spatial differences in life expectancy at birth between 2005 and 2009 and presents the most important micro-regional characteristics according to the current classification. *Szigeti* (2013) examines macro-level changes in the ecological footprint in time and space. As she puts it, „we want to present a moment where the temporal path that each country traverses and the spatial situation to which they have reached are both visible."

METHODOLOGY

For the analysis, on one hand, we used the public maps of the Open Street Map (*Geofabrik*, 2019) (border map layer and coordinates of the settlements), on the other hand, the European Union CORINE Land Cover database with a scale of 1:50 000 (CLC50-HU) that is extended by the Department of Geodesy, Remote Sensing and Land Offices, under the Government Office of the Capital City Budapest (*Lechner Tudásközpont*, 2020). For calculation of the potentials, we used Microsoft Excel, while for GIS operations we used QGIS 2.18.20.

Table 2 shows our initial data. Population data and territory data of settlements are from the National Spatial Development and Spatial Planning Information System (TEIR), as are "gold crown"[3] (aranykorona, GC) values, which were published by the Central Statistical Bureau of Hungary in the Agricultural Census Survey 2000. The arable areas were calculated in QGIS based on the CORINE spatial database. Fields were selected on the CORINE map and shown in dark in *Figure 2*. It can be seen that most of the area can be used for crop production.

In order to represent spatially the characteristics of the area, we plotted the values of the gold crowns of the settlements and charted the population, the size of the total area and the arable area (*Figure 3*). The gold crown categories are designed to have the same number of settlements in each.

The best fields are typically located in the middle and middle east of the district. The diagrams show a similar proportion of the area of the settlements and the area of their arable land in the whole district. We calculated the correlation coefficient between them, which proved our assumption that the relationship is close: r = 0.92.

[3] It is officially a land quality indicator, which is an indicator of the net income of a unit of land, i.e. its fertility, location and cultivability. Its origins date back to 1850.

Table 2

Basic data about the Tabi district

Settlement	Population, head	Settlement area, ha	Arable land area, ha	Gold crown
Andocs	1062	4328.25	2659.10	13.64
Bábonymegyer	796	2191.72	1253.14	12.95
Bedegkér	389	2599.44	1879.27	24.96
Bonnya	228	1458.16	783.98	11.89
Fiad	115	1490.68	517.67	15.76
Kánya	410	1448.81	1150.68	21.67
Kapoly	653	2230.68	1288.11	14.63
Kára	35	537.52	340.01	17.29
Kisbárapáti	348	2871.84	1243.17	13.95
Lulla	187	1038.10	505.32	15.02
Miklósi	200	1047.10	675.36	16.39
Nágocs	685	2227.20	1581.93	16.88
Sérsekszőlős	139	667.41	448.70	16.03
Somogyacsa	166	2446.01	1232.01	12.36
Somogydöröcske	133	1081.80	499.52	15.92
Somogyegres	163	1080.73	934.68	18.2
Somogymeggyes	477	1562.66	1206.24	13.36
Szorosad	94	647.40	326.36	11.33
Tab	4307	2585.45	1331.77	13.55
Tengőd	404	3013.80	1556.23	22.49
Torvaj	244	1141.67	684.18	13.7
Törökkoppány	441	2578.69	1388.49	13.96
Zala	243	921.87	646.21	15.97
Zics	320	1499.90	1249.92	16.97

Source: TEIR, KSH

To estimate the biomass potential, we started from the areas of the municipalities suitable for growing arable crops. The area of arable land was aggregated by settlement, and the lands were weighted with gold crown values, thus taking into account their different quality. Subsequently, the average yields per unit area (different from plant to plant) were plotted on the arable land and the results were also expressed in the estimated heat content (*Table 3*).

Figure 2

Arable lands in the Tabi district

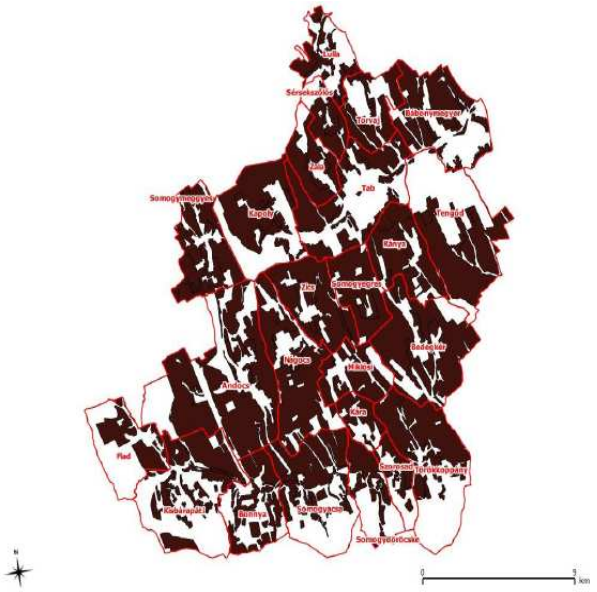


Figure 3

Gold crown categories by settlement and population, total area and arable land values in the chart

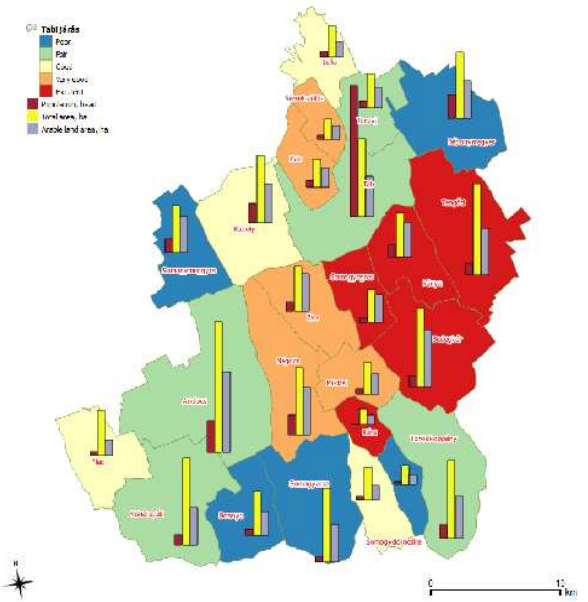


Table 3

Theoretical biomass potential that can be produced in the settlements of the district

Settlement	Energy content of straw and maize stalk, MJ	Energy content of energy grass, MJ	Energy content of energy forest, MJ
Andocs	330705714	749406222	1027411756
Bábonymegyer	154903281	351023516	481241918
Bedegkér	257001643	582386763	798433466
Bonnya	95999988	217543832	298245576
Fiad	65583075	148616618	203748590
Kánya	153218882	347206530	476008953
Kapoly	161594982	366187459	502031194
Kára	43643792	98900407	135589267
Kisbárapáti	155032032	351315277	481641912
Lulla	63608599	144142293	197614434
Miklósi	86025208	194940164	267256677
Nágocs	202349817	458541252	628645265
Sérsekszőlős	56977265	129115147	177012702
Somogyacsa	151495856	343302012	470655985
Somogydöröcske	63370520	143602786	196874788
Somogyegres	120908722	273989063	375630167
Somogymeggyes	149648080	339114802	464915455
Szorosad	39763287	90106863	123533603
Tab	165498094	375032231	514157091
Tengőd	208616811	472742774	648115094
Torvaj	85134376	192921466	264489106
Törökkoppány	173169308	392415830	537989445
Zala	82014991	185852685	254798036
Zics	160004921	362584252	497091313

Although absolute quantities are undoubtedly important, economic science often uses specific indexes derived from them, as they can carry more information. Therefore, the absolute amounts calculated per crop were used to construct indexes. All the energy produced was divided by the area of the settlement and the number of its inhabitants, thus obtaining values per hectare and per capita. While the former one may be the productivity of the settlement, the latter one may represent a kind of energy abundance.

The heat potential data for each area has been categorized into five categories: poor, fair, good, very good, excellent, to make the maps easier to understand. There

were two kinds of logic in the classification. On one hand, we divided the minimum and maximum ranges into five equal intervals, and on the other hand, we divided the categories into five groups based on the natural breaks classification method[4] (*Jenks*, 1967). Using the resulting categories, we created a thematic map and, as shown in the legend, marked the thermal potentials using five different colours. For the purpose of illustration, we also prepared a heat map and a symbolic map that can be seen at the end of the study.

SPATIAL ILLUSTRATION OF THE INDEXES

By taking into account the advantages and disadvantages of different raw materials, we can select the raw materials that meet our needs and the environment. Once this is done, there may be an optimization of deployments, which is strongly supported by the regional approach. In order to illustrate spatial unevenness, the heat energy produced from biomass per settlement is shown on a map. *Figure 4* shows the settlements according to the heat energy from the plants. Since the produced energy is always proportional to the yield, and since the yield is always proportional to the size of the arable land per settlement, no matter what kind of plant the energy comes from (assuming the same needs), the ratios between the settlements will remain constant. The colour of the map is therefore the same for all three raw materials.

There are significant differences in the amount of energy that can be produced per settlement, which is particularly visible on the map (*Figure 4*). The largest settlement with absolute potential is Andocs. It is the largest area in terms of both settlement and arable land, so even if it does not have high quality arable land (GC: 13.64), it is only by its size that it can produce most of the raw materials.

Examining natural breaks, the district retains its Andocs priority, but the proportion of good and very good settlements increases. This map clearly shows that the potential of small settlements is small, due to the clear relationship between the area and the potential. In fact, a map of the arable land would have done the same.

Because of the above-mentioned facts, it is more appropriate to examine the specific values. If we plot the area on the basis of the thermal energy potential per hectare per settlement, the result is significantly different from the previous one (*Figure* 5). Based on the potential per hectare, we have four areas with excellent potential: Kánya, Bedegkér, Zics, Somogyegres. These four villages are considered to be the most productive parts of the district. As the relationship between the area of the settlements and the area of their arable land is very strong (r = 0.92), it is not enough to be large, but the quality of the land is also important. The four settlements are part of the areas with the best gold crown values (GC: 16.97 - 24.96). Taking into account natural

[4] It is done by seeking to minimize each class's average deviation from the mean of the class while maximizing each class's deviation from the means of the other groups. Therefore, this method tries to reduce the variance within classes and maximize the variance between classes.

breaks, the „picture" improves, several settlements get better (e.g. Somogymeggyes, Kisbárapáti or Miklósi) and only Fiad stays in the poor category.

Figure 4

Spatial distribution of heat energy potential from field-grown biomass (equal interval on the left, natural breaks on the right)

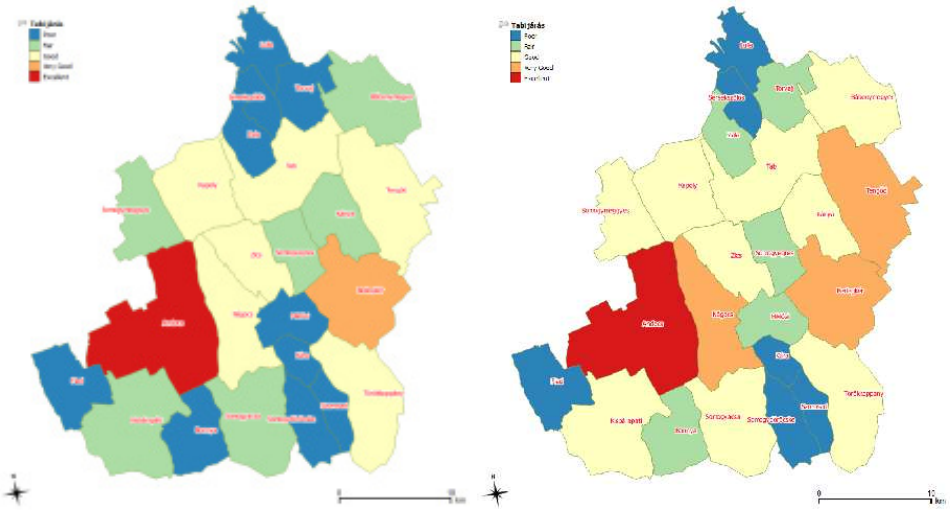
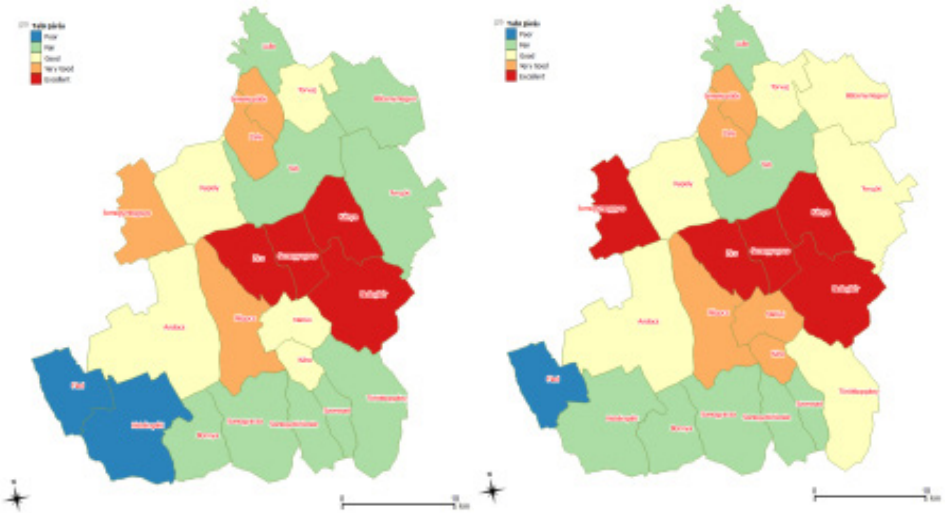


Figure 5

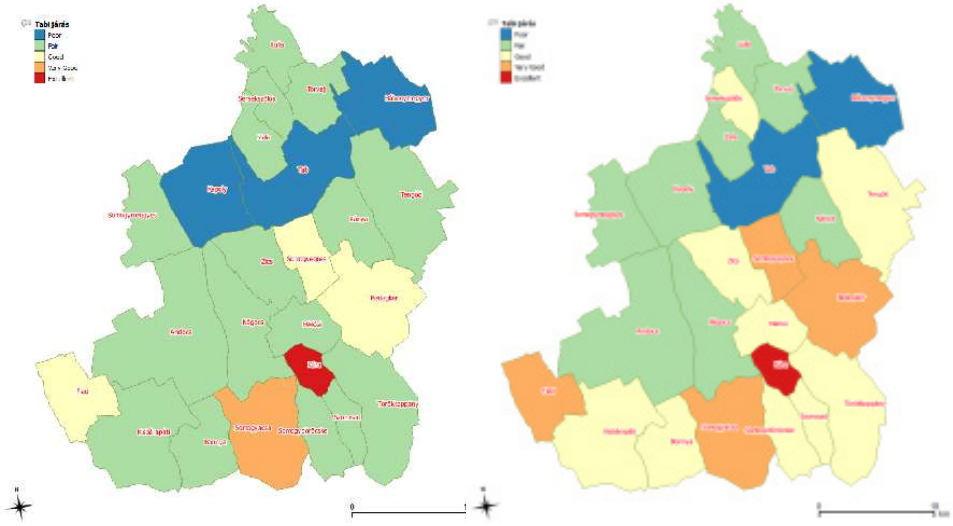
Thermal energy potential per hectare per settlement (equal interval on the left, natural breaks on the right)



The potential can also be projected for the inhabitants of the settlement, so we can depict the area based on the thermal energy potential per capita of the settlement, which can be interpreted as a kind of energy abundance indicator (*Figure 6*). According to this indicator, only Kára is the excellent settlement. This is explained by the fact that only 35 inhabitants live in the least populated settlement of the district, and the village is in the upper-mid dle part of the area according to the ratio of their arable land to the total area. The fact that the quality of the soil is one of the best here in the district also contributes to Kára's excellent position (GC: 17.29).

Figure 6

Thermal energy potential per capita
(equal interval on the left, natural breaks on the right)



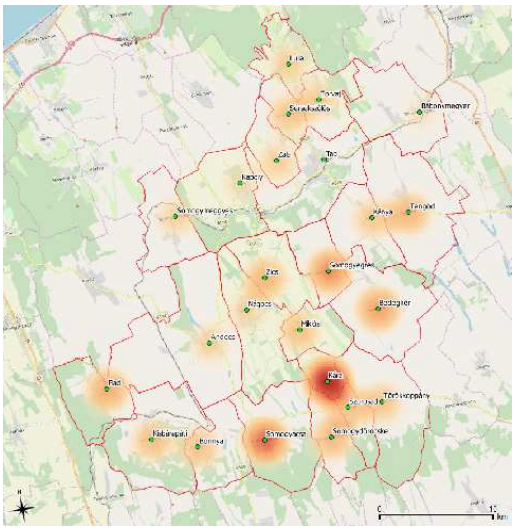
Based on the per capita values, the district has a more or less uniform picture, with most of its settlements falling into the poor and the fair categories. Tab, Bábonymegyer and Kapoly have the smallest potential, these settlements are among the most populous ones in the district.

According to the data depicted along the natural breaks, Kára is still the only settlement with excellent conditions, but besides Somogyacsa several settlements belong to the very good category (Fiad, Bedegkér, Somogyegres). People living in the south-eastern and western parts of the district are most abundant in thermal energy which can be "collected" from the soils. Tab, Bábonymegyer are also the weakest ones in this division.

Perhaps the differences are even more striking when the data is plotted on a heat map (*Figure 7*). This is also a clear indication that the „focal point" of the area is Kára. There is no category for the heat map, it heats up by its absolute value.

Figure 7

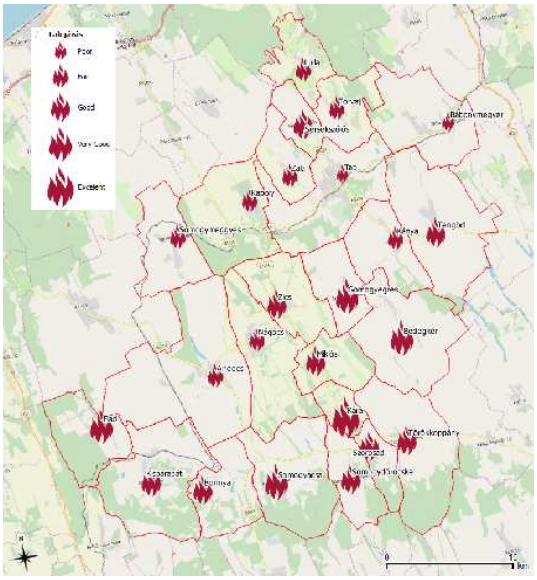
Thermal energy potential per capita per municipality



For example, if you want to present the analysis in a residential forum, you can use some spectacular symbol to illustrate the values. *Figure 8* illustrates the magnitude of the thermal energy potential of a flame of various sizes.

Figure 8

Thermal energy potential per capita on a graduated symbol map



CONLCUSIONS

The article attempted to illustrate the importance and practicality of the spatial illustration of the indicators created for environmental and economic analyzes. By mapping the data, we were able to observe a number of contexts that generate new questions and ideas within us. Settlements with different potentials in different parts of the region and adjacent to each other provide a basis for a number of organizational, transportation or management concerns. The new aspect can help in the decision-making process. As for energy management, in several other disciplines it is worth considering the regionality of the information processed. This will allow the intervention to be developed to be more closely related to the characteristics of the territorial unit under investigation, and regulation, investment or any development will be more in line with the principle of subsidiarity.

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Global Agruciltural Responsibility: The Role of Agroforestry Systems in Sustainable Food Production

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ABSTRACT

Today global agriculture is confronted in several areas with various interests in environmental protection. The global food economy will face major challenges in the coming decades. There is a need to use new technologies that can increase productivity while preserving natural resources and biodiversity, in a climate-friendly way and by maintaining site-specific ecosystem services. The purpose of this study is to explore the potential role of agroforestry systems in the sustainable development of global food production. In order to achieve this goal, we carried out the systematic processing of international and domestic literature and secondary data.
Keywords: sustainable agriculture, biodiversity, agroforestry systems

INTRODUCTION

We are experiencing an era of unprecedented and rapid change in several ways on Earth, which are often extreme and affecting the entire planet. For a long time, humans have sought to benefit from change, but it has now become clear that there is a close relationship between the destruction of the Earth's natural ecosystems and the satisfaction of human needs (food, security, health, well-being). Our planet's ecosystem is based on biodiversity. Since the second half of the 20th century, man has already been aware of the loss of biodiversity. Several global efforts and agreements have been made to remedy the problem, but their implementation has failed. These include the Convention on Biological Diversity in Rio in 1992. Although the problem is well known, climate change and sustainability commitments are now more likely to reduce damage. However, the only solution can be to reverse the declining trend of harmful processes, including the loss of biodiversity (*WWF*, 2018).

As *Friedman* (1970) wrote, the primary mission of companies is to maximize profit. While theoretically they can follow multiple target systems at the same time, the sad reality is that environmental and social profit maximization is only addressed secondarily and tertiary. Nowadays, farms often see natural factors as a usable resource over which they have unlimited power to maximize profits. The authors of the study wish to identify more closely with *Georgescu-Roegen's* (1993) paper, which states that the economy should be regarded as a subset of the environment. Accordingly, there can be no limit to economic development, there are natural constraints which

man must respect. Today's global environmental crisis is partly the result of disregarding these natural barriers.

The purpose of this study is to explore the potential role of agroforestry systems in the sustainable development of global food production. In order to achieve this goal, we carried out the systematic processing of international and domestic literature and secondary data.

THE SITUATION OF GLOBAL AGRICULTURE AND BIODIVERSITY TODAY

Global agriculture is today confronted with a variety of environmental interests, including soil erosion, loss of biodiversity, and high nitrate-containing groundwater resulting from excessive fertilizer use. In addition, extreme weather in recent years has affected both natural vegetation and the qualitative and quantitative parameters of production (*Vityi et al.,* 2018).

According to the FAO (2017) Report on the Future of Food Production, the global food economy will face major challenges in the coming decades. The world's population could be close to 10 billion by 2050, which, given the most likely economic scenarios, will result in at least a fifty percent increase in food demand (as the base year of 2013). Given the scarcity of land that can still be taken into production, this enormous increase in demand requires a radical increase in agricultural productivity. On the other hand, however, intensive food production systems are already eroding natural resources, reducing biodiversity and increasing the spread of global pests and diseases of plants and animal species. There is a need to use technologies that can increase productivity while preserving natural resources and biodiversity, in a climate-friendly way and by maintaining site-specific ecosystem services.

Achieving these goals together is a controversial task. *Landis* (2017) points out that the current model of agricultural intensification is constantly reducing landscape diversity, leading to a decline in agricultural biodiversity, ecological balance and critical ecosystem services. There is a need to design agricultural areas that can resolve this contradiction. Based on the results of *Kennedy et al.* (2016), it is possible to increase agricultural production as well as biodiversity and ecosystem services through conscious landscape-level planning that simultaneously takes into account economic and environmental goals. *Allen and Hof* (2019) propose the use of environmental taxes and agri-environmental subsidies to spread biodiversity and landscape conservation systems.

In our opinion, agroforestry systems meet the conditions described here. The specifics of these systems and their possible role are described below.

AGROFORESTRY AS A SOLUTION FOR SUSTAINABLE FOOD PRODUCTION

What do we call agroforestry?

The aim of agroforestry is to integrate woody crops into agricultural activities so that they create an economically and ecologically beneficial structure (*Kiss et al.,* 2017;

Csonka et al., 2018). The different agroforestry systems have different traditions from region to region. Agroforestry systems (*Mosquera-Losada et al.,* 2016; *Vityi et al.,* 2018) include plant protection zones (coastal and field hedges, forest strips), grazed forests, wooded pastures, wooded groves, forest gardens, crop production in forests, crop cultivation with alleys and municipal green infrastructure. Their significance is that they can have a positive impact on both the environment and farming. By choosing the right system you can increase your yield. In the case of arable crop production, agroforestry systems can provide protection for the crop, so farmers can expect higher yields (*Gyuricza and Borovics,* 2018). For livestock, better living conditions can be created, which can also have a positive impact on livestock. We should not forget the importance of agroforestry in the production of industrial wood, as large quantities of goods can be produced. In addition, agro-forestry plays an important role in improving air quality, protecting the soil and developing appropriate water management. It can contribute to halting the loss of biodiversity, as native woody and herbaceous plants can provide living space in different systems. Indigenous species will also be brought back to life in the associations formed. In addition to economic and ecological benefits, agroforestry can also have a positive impact on tourism, landscape diversity and the quality of the life of locals (*Szarvas,* 2010).

A Hungarian example: the situation of agroforestry systems in Hungary

In the Hungarian agricultural history, systems and technologies known as agroforestry today have centuries-old traditions, traces of this can be also found in the current land use.

Takács and Frank (2008) collected the following traditional domestic agroforestry practices:

- "acorning" pig keeping,
- pasturing of ruminants and horses in the forest,
- utilizations of wooded pastures,
- windbreaks and field hedges, forest strips,
- intercropped agricultural land or forests (crops between wood strips in monoculture, or crop rotation).

Out of the listed agroforestry practices, acrylic pig keeping and forest grazing are no longer possible due to laws protecting and restoring soil quality in forest areas. Utilization of wooded pastures, especially for ruminants, remains still available. *Varga and Bölöni* (2009) have pointed out that this form of land use is significantly diminished: most of the abandoned wooded pastures and grazing forests have a total domestic area of only 5,500 hectares. Almost half of this area (2500 ha) is located in Southern Transdanubia. Smaller amounts of wooded pasture are found in the Transdanubian Mountains (1300 ha), the North Central Mountains (500 ha), the north-eastern Great Plain (400 ha) and the Little Plain (250 ha). This land use heritage can provide a good basis for increasing the spread of wooded pastures. North European and North American examples demonstrate that this type of so-called silvopasture systems have significant environmental services (*Brann,* 1988; *Shrestha and*

Alavalapati, 2004) and also provide significant socio-economic benefits (*Escribano et al.,* 2015; *Gaspar et al.,* 2007; *Gaspar et al.,* 2016).

A wide range of ecological and economic benefits also characterize the shelterbelts, field hedges and forest strips (*Forman and Baudry,* 1984; *Earnshaw,* 2004). Against this background, it is particularly worrying that the domestic area of shelterbelts has decreased by 15% between 2011 and 2015 (*www.teir.hu*). At present, 40% of the approximately 11,400 hectares of land are located in the Great Plain, and another 20% in the Central Transdanubian region. South Transdanubia (884 ha) and Central Hungary (668 ha) are the least shelterbelts.

It can be seen from the above that the use of agroforestry technologies in Hungary has been limited and traditional agroforestry practices have been reduced to the end of the 20th century. At the same time, mitigating climate change and adapting to climate change as a double constraint is a great reason for the wider spread of agroforestry systems. In addition, the country has a high proportion of agro-environmentally sensitive agricultural areas, which justifies the use of systems providing complex ecosystem services (*Vityi and Marosvölgyi,* 2014). From the point of view of technology adaptation, nearly fifty percent of the Hungarian agricultural areas are used by individual farms, which are typically small-scale (*KSH,* 2019). The sustainability and rural development functions of agroforestry systems can prevail in such small farms (*Coulibaly et al.,* 2017; *Cole,* 2010).

However, the existence of agricultural policy incentives and subsidies are indispensable for the better exploitation of the domestic potential of agroforestry (*Gaspar et al.,* 2016; *van Zanten et al.,* 2013). Due to the complex effects of sustainability and rural development, the promotion of the introduction of agroforestry systems has become part of the European Union's Common Agricultural Policy (CAP) 2013-2017 and 2014-2020. *Mosquera-Losada et al.* (2016) highlight, from the 2007-2013 rural development program, 27 support measures that are (directly or indirectly) linked to agroforestry. Of these, measures 221 („First afforestation of agricultural land") and 222 („First establishment of agro forestry systems on agricultural land") have the highest agroforestry relevance in Hungary.

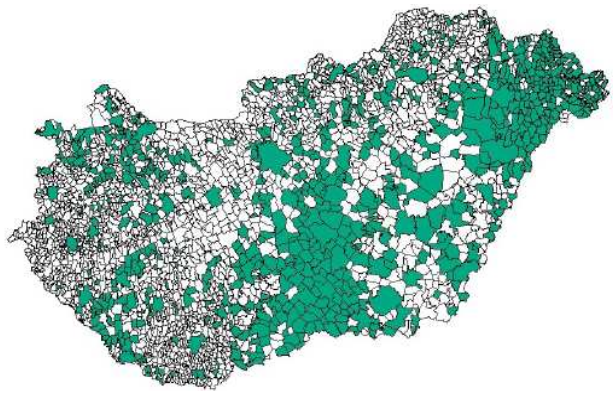
The primary purpose of the aid for the first afforestation of agricultural land is to support forestry in areas less suitable for agricultural production (*MVH,* 2010). Through its primary objective, the measure contributes to mitigating climate change and its effects, improving soil quality and water management, and enhancing biodiversity. In addition, the aim is to improve rural employment and living conditions. The support is available for the first afforestation, for up to five years after planting and to compensate for the loss of income from the planting. We agree with *Mosquera–Losada et al.* (2016) that Measure 221 does not directly support the spread of agroforestry systems as it subsidies afforestation and forest management in a given area rather than as a complement to agricultural activity. At the same time, it is important to emphasize that the first afforestation subsidies indirectly contribute to the spread of agroforestry in Hungary. They encourage farmers to include forestry in their activities, especially in areas with less agricultural potential. As a result, the measure

can also be seen as the first step, the „vestibule", towards the establishment of agroforestry systems. However, this indirect agroforestry potential can be only realized if agricultural activities in the newly established forest lands and the active management of wooded areas are supported by the CAP in the future.

In the 2007-2013 programming period (with payments until 2015), farmers received around HUF 47.5 billion in subsidy for the first afforestation of agricultural land. The settlements affected by the subsidy are shown in green in *Figure 1*. The settlements of the receiving farmers form two contiguous zones in the Great Plain. One of the affected areas is the north-eastern part of the country, Szatmár-Bereg Plain, Nyírség, Hortobágy and Hajdúság. The area covering the Kiskunság, the Solti-plain and the Bácska-loess is even larger. In addition to these two large zones, the settlements of Nagykunság, Körös-Maros, Inner and Outer Somogy, and some settlements of the Little Plain have subsidized farms.

Figure 1

First afforestation of agricultural lands (code:221) supported in settlements between 2007 and 2015 (marked with green).



Source: Based on www.teir.hu

The spatial inequality of supported afforestation is a controversial phenomenon from an environmental and especially agri-ecological point of view. On one hand, the predominance of support for the Great Plain is favourable: the Great Plain forests play a key role in the protection against deflation and desertification, thus preserving the fertility of agricultural land (*Kovácsevics,* 2014). According to *Führer and Járó* (2005) the effect of forests on soil protection and landscape improvement also justifies the Great Plain as the most important target region for forest plantations. On the other hand, afforestation of arable and grassland areas in sub-humid climate areas may lead to a reduction in groundwater levels and salt accumulation (*Jobbágy and Jackson,* 2007; *Nosetto et al.,* 2008; *Szabó et al.,* 2012). The results of *Balog et al.* (2014) from 31 pairs of forest control boreholes in the Great Plain confirm the

groundwater level reduction effect of the forests planted. The large-scale afforestation of agricultural land in the Great Plain is therefore a ‚double-edged weapon' which, besides its many positive effects, has serious environmental risks.

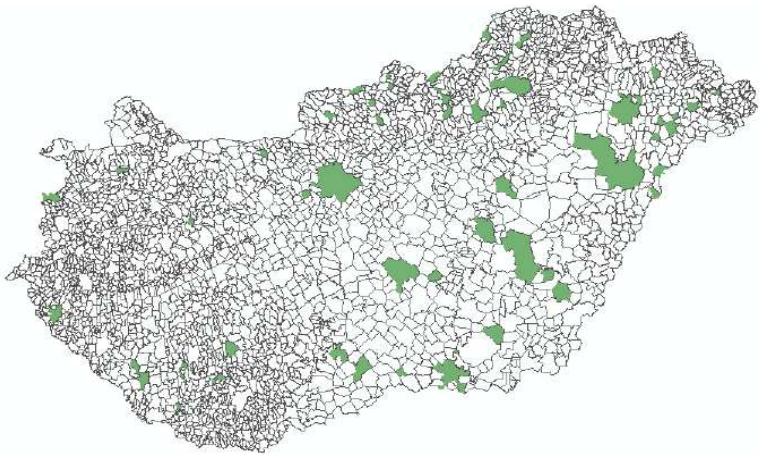
Let us turn to the other side of the same problem! The high proportion of settlements in the Great Plain also means that farmers from settlements outside the Great Plain received a much smaller share of the afforestation subsidy. It should be noted here that this is not due to the practice of processing aid applications: far fewer aid applications were submitted by farmers from these areas. *Mosquera–Losada et al.* (2016) points out that Hungary has used less than sixty percent of the planned amount of afforestation support for the period 2007-2013. This does not mean that users of agricultural land outside the Great Plain did not have access to the aid because of competition for subsidies or an unfavourable allocation mechanism for them. Rather, regional disparities are due to differences in the willingness of farmers to afforest. However, a lower propensity to afforestation does not mean that afforestation of agricultural land will not have a positive environmental effect in these areas.

The uneven and contradictory use of afforestation subsidy presented here illustrates the need to develop systems where afforestation and agricultural production are not a substitute but a complement to domestic agricultural holdings. To this end, subsidy has been given since 2007 for the first establishment of agroforestry systems. This item is intended to cover the installation and maintenance of woody plants and other investment costs necessary for setting up the system. The utilization rate of the measure in the 2007-2013 and 2014-2020 cycles was very low. It gives some hope for the future that the range of eligible activities will continue to expand in the next funding cycle. If farmers across all parts of the country understand that the introduction of agroforestry can improve both their income-generating capacity and their biodiversity and ecological services, as well as their climate-adaptive capacity, subsidy can become an important tool on the road to sustainable agricultural development. *Louah et al.* (2017) highlight the importance of path dependency and cognitive lock-in as barriers to the development of temperate agroforestry. Usually, farmers accept common old technologies as established and unquestionable, so they react negatively to new technologies. Path dependency and cognitive lock-in effects can be reduced by ecological education and learning within innovation networks. Based on a semi-quantitative questionnaire, *Sereke et al.* (2016) have concluded that payments for ecosystem services (e.g., agroforestry systems) cannot change attitude lockin as long as farmers' expectations and knowledge are not appropriately addressed. It therefore appears that agroforestry-related CAP subsidies should be supported by well-designed training systems and innovation networks in order to motivate agroforestry adoption.

Considering the measure 222, which is more directly related to the establishment of agroforestry systems, the Hungarian implementation rate was extremely low (28%, in contrast to the 58% utilization of measure 221) between 2007 and 2013 (geographical distribution of settlements implementing measure 222 can be seen in (*Figure 2*). Thus, the findings regarding cognitive lock-in, training systems and innovation networks are also of great importance in direct agroforestry subsidies.

Figure 2

First establishments of agroforestry systems (code:221) supported in settlements between 2007 and 2015 (marked with green).



RICHER BIODIVERSITY AND A LIVELIER COUNTRYSIDE

Today's globalized world has had an impact on the outlook, the ingredients and the tastes of food, or even their uniformity (*Nábrádi,* 2010). Foods and products sought by consumers can have a negative impact on the sale of traditional and regional products, which can trigger a number of negative processes. The livelihoods of local communities, food choices, local economic growth and cultural heritage can be threatened. An important element of a livelier area is traditional and regional food, which is specifically linked to the region. The re-emergence of native wild plants, herbs and animal species that once found in agroforestry systems and forest edges could partially incorporate them into short food chains. In order to preserve the biodiversity of the countryside, the image and the characteristic of the landscape and to improve it, it is important that agriculture is not only seen as a productive sector, but as it is closely linked to culture, traditions and rural life. Locally produced traditional and landscape foods play an important role in achieving this goal (*Pallóné Kisérdi,* 2010).

CONCLUSIONS

In the coming decades, agroforestry systems will be an important tool, both globally and domestically, for developing agriculture that enhances biodiversity, ecosystem services and climate adaptation. The promotion and support of agroforestry activities in the less favored areas and in areas at risk of erosion and deflation should be promoted. Successful technology adaptation requires, in addition to financial support, the development of an appropriate consultancy and innovation support network, as well as the development of a training system providing the competences required for new technology.

The CAP-measures related directly or indirectly to agroforestry need a further revision during the next planning period. Although the range of eligible agriforestry activities and costs increased in the 2014-2020 period, the issue of utilization of subsidies and territorial inequality is still unresolved. Both increasing the utilization rate and reducing territorial inequlaties require the development of a national implementation strategy that takes into account territorial disparities. This territorial strategy must be based on the different natural, social and economic conditions of the different regions and micro-regions of the country, as well as on the resulting challenges, even on the settlement level. By currently ignoring the territorial dimension, neither an increase in the utilization rate nor a reduction in inequalities is achievable.

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Game Damage Tendencies by Kaposvár Forestry - from 1998 to 2017

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ABSTRACT

In Hungary, most of the game damage is located in a few counties. 75-80% of the agricultural game damage originates from 5 counties, but those take only 24% of Hungary's area. During the hunting season of 2016-17, the amount of agricultural game damage almost reached 2.6 billion HUF and a quarter of it was paid in Somogy County. SEFAG is the largest game management company in Somogy that manages half of the county's forests. The investigated Kaposvár Forestry is one of the eight forestries of SEFAG and it has 7 600 hectares hunting area. Our research shows that game damage is decreasing and it is centralized around a few settlements in this area. Also, we found a significant change in the structure of crops affected by game damage.
Keywords: Game damage, SEFAG, Kaposvár Forestry, Somogy county, corn, vineyard

INTRODUCTION

There are many noticeable forms of human–wildlife conflicts. One of the greatest problems is the game damage that negatively affects the agricultural management. The amount of it varies in space and time. Not only the species cause the damage differing from continent to continent but the responsible official body, too. In Europe, game damage is mainly caused by wild boar and red deer. In most cases, the bearer of the hunting right has to pay the compensation, but there are countries, where there is no legal regulation for compensating (*Bleier*, 2014).

The Hungarian Parliament has realized the importance and actuality of this topic and created the Act LV of 1996 on conservation of the game, game management and hunting to ensure the protection of nature and reasonable game management. The law contains the rules of game damage prevention and compensation. Chapter 5 lays down that the owner of the hunting right has to pay compensation to the affected party. It states that 90% of the damage caused in forests and agricultures by wild boar, mouflon, roe deer, fallow deer or red deer and 90% of the damage caused in vineyards, fruit gardens, nurseries, and arable lands by hare, roe deer or pheasant are considered as game damage. The 10% is considered as the farmers' private financial participation.

Since 2015, the game managers have been obligated to set up a game damage fund to cover the compensation for damages in a separate account. For that reason, prevention of game damage is an important task for both farmers and game mana-

gers and there are several different methods available. Farmers can protect their crops in various ways starting from the obvious (fence or guarding) to modern methods (electric fence, ultrasonic alarm or game repellent). Even though these modern methods are expensive, they are effective. *Kovács et al.* (2014) studied the effects of three types of game repellent (namely: Vadóc K, Vadóc V, Forester) in oat culture and found that all three products had sufficient repellent effects. In the area sprayed with Forester, there was no chewing damage and the trampling damage was irrelevant.

Hunters may carry out an alert, can hunt against game damage and can cultivate so-called wildlands for the game to prevent game damage. The prevention of game damage is in the interest and responsibility of both parties, so they often act together to achieve the goal.

Former research showed that the amount of agricultural game damage was very variable within the country. Only a few counties face most of the game damage and in other counties there is almost no game damage. 75-80% of the agricultural game damage originates from 5 counties, but those take only 24% of Hungary's area.

During the hunting season of 2016-17, the largest amount of agricultural game damage was paid in Somogy County, Hungary. It reached 657 028 thousand HUF (*OVA*, 2017). Because of the paid game damage, game management is unprofitable almost every year. SEFAG is the largest game management company in the county. It currently manages half of the forests of Somogy County on nearly 80 000 hectares of forested areas, and in addition more than 6 000 hectares of arable land, lawn and other fields. The green part of *Figure 1* shows the areas managed by SEFAG Zrt.

The forests provide varied habitats for pheasants, hare, wild boar, mouflon, roe deer, fallow deer and the world-famous red deer. The management is carried out by eight forestries: Barcs Forestry, Iharos Forestry, Kaposvár Forestry, Lábod Hunting Forestry, Marcali Forestry, Nagybajom Forestry, Szántód Forestry and Zselic Forestry (*SEFAG*, 2019).

The hunting area of the investigated Kaposvár Forestry is 7.618 hectares. In this region, most of the game damage is caused by red deer and wild boar and corn, wheat, grape and sunflower are mostly affected by it. Arable lands are likely enclaved into the forests. There are no big, continuous fields; and the distances among forests are not greater than one km (*Barna et al.*, 2007).

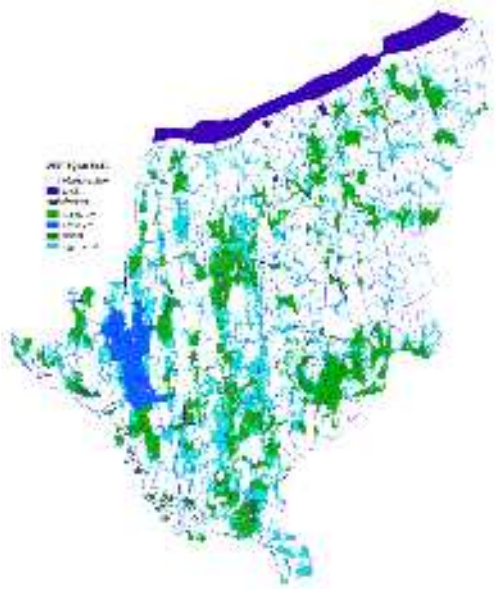
Drăgan and Cocean (2017) suggest organic production and traditional products for highlands with similar characteristics to this area. In our opinion, the agroforestry system could be a good alternative at Kaposvár Forestry. Agroforestry is a land use management system in which trees or shrubs are mixed with crops or with livestock farming (*Vityi et al.*, 2018). Agroforestry systems can be economically, socially,and ecologically advantageous over conventional agricultural and forest production methods. In 1 hectare agroforestry system, we can reach the same yield as in 0.8 hectare arable land and 0.6 hectare forest altogether in conventional production (*Honfy et al.*, 2016).

In their research, *Elblinger et al.* (2006) and *Barna* (2005) highlighted the connection of the local damaging with numerous characteristics of the land. *Barna* (2005) in

his dissertation found a significant connection between the size of the forests and the game damage in Southern Transdanubia region. Also, he found that red deer caused more damage than wild boar. Former research showed that not only the forest, but the settlements also had a border effect in the area of Kaposvár Forestry (*Barna et al.*, 2007). Games occur more and more times in inner areas and cause damage there.

Figure 1

State-owned areas managed by SEFAG Zrt. and Kaszó Zrt.



Source: SEFAG Zrt.

MATERIAL AND METHODS

The examined data are coming from the records of Kaposvár Forestry, which were originally on paper and we had to digitalize them. It means entirely 1154 records in the period from 1988 to 2017.

Through the data processing, we have recorded the following data:

- date of record,
- date of damage,
- date of report,
- game damage prevention actions.
- damage causing species,
- type of damage,
- place of damage (name of the settlement and lot number.),
- damaged area (ha),
- damaged crop,
- loss of income (HUF),
- costs that are not incurred due to the damage (HUF),
- amount of game damage (HUF),
- amount of farmer's financial participation (HUF),
- deduction due to non-adequate preventing (HUF),
- amount of paid game damage/ game damage compensation (HUF).

In the course of data processing, we faced several problems and we had to find solutions for them. Records have different form and content, depending on the recorder of it and the recording date. Some data (such as type of damage or deduction due to non-adequate preventing) have only been available on a certain type of record since 2011. In some cases, the amount of paid game damage is not equal to the amount of the real damage because of an agreement between the farmer and the game manager. For example, the game manager builds an electric fence around the arable land and the farmer relinquishes the half of the game damage compensations for the next 10 years. There was a case where a farmer had game damage on arable lands located in different settlements and the compensation was documented on one record in total. The calculation was not available for us, so we divided the amount of paid game damage between the settlements proportionally.

We made the above mentioned corrections on the data and then transformed them from current value to real value to eliminate the inflation's effect on it.

In our study, we characterized the time series of game damage with a trend (deterministic time series analysis), where we examined the extent of game damage paid in relation to the period of occurrence of the game damage (*1* and *2*).

$$\hat{y}i = a + b * t_i + \varepsilon, \quad (1)$$

$$\hat{y}i = b_0 + b_1 * t_i + b_2 * t_i^2 + \varepsilon \quad (2)$$

where:

$\hat{y}_i$: expected degree of game damage in ith period
b's: linear coefficients of the OLS model
t_i: i-th period of time
ε: error

Former investigations have shown that the amount of game damage varies depending on several factors (such as the number and the composition of the species, the size of the continuous living space, the amount of the available feed, etc.). Data was limited for us to investigate this in detail (what and how has an impact on the amount of the game damage), but we could prove the statement in general. The regression was proved to be not significant between the frequency of the game damage and the average compensation. We defined Pearson's r and R square (*3*).

Pearson's r formula:

$$r=⟦cov⟧\_(x,y)/\sqrt{(⟦SQ⟧\_x \, ⟦SQ⟧\_y)} \quad (3)$$

We have shown the distribution of the settlement by descriptive statistics (ratio) and we illustrated the time series of the composition of the agricultural crops by a cumulative bar chart.

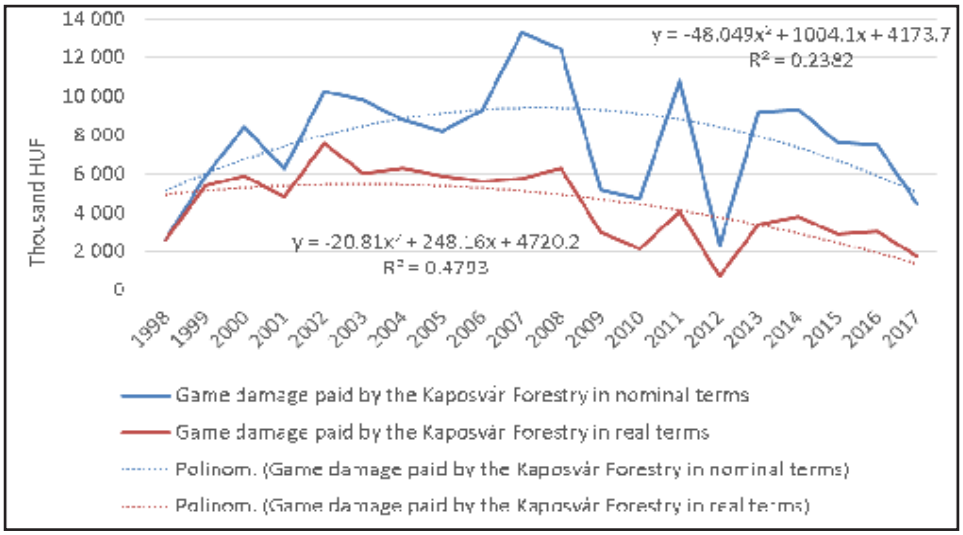
The statistical analysis was made in MS Office Excel.

RESULTS

Firstly we compered the development of the agricultural game damage paid by Kaposvár Forestry both in nominal and real terms (*Figure 2*).

Figure 2

The development of nominal and real agricultural game damage paid by Kaposvár Forestry between 1998 and 2007



The chart clearly shows that inflation greatly affects the value of game damage paid. Fitting a trendline to the data, it can be observed that at nominal value the game damage shows an increasing trend until 2007, and then it decreased. Examining the data in real terms, the upward trend can be observed until 2003.

In nominal terms, the progress of the years determines the trend by 23% while in real terms by 48% but but for both data sets, the hecticity of the data degraded the accuracy of the fit. Comparing the two data sets, it can be seen that that data at face value is characterized by stronger volatility.

Next, we examined the development of the paid agricultural game damage in real terms at Kaposvár Forestry, in Somogy County and country level (*Figure 3*).

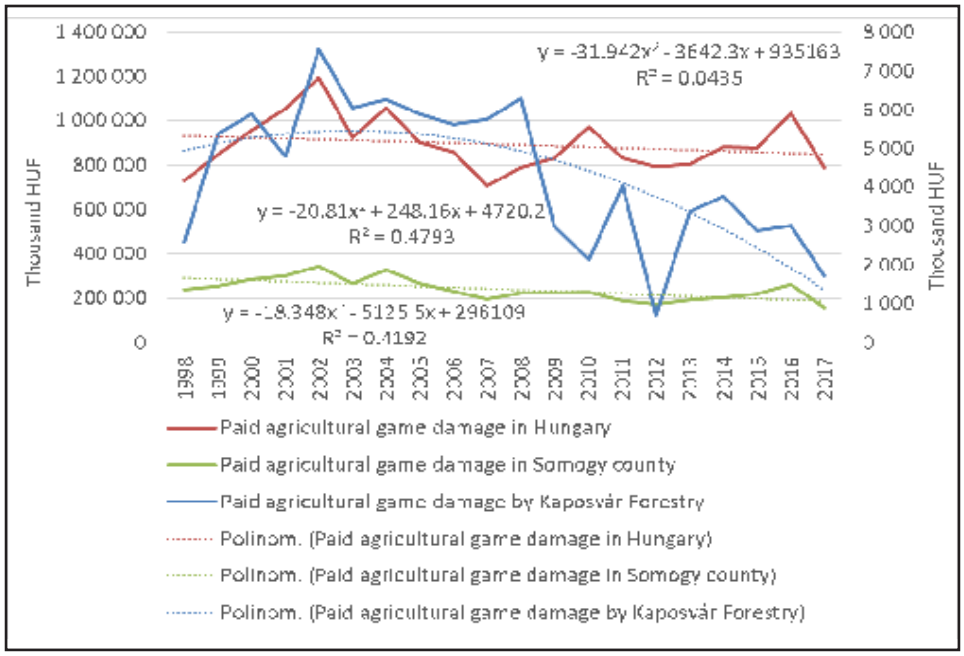
The value of game damage paid at Kaposvár Forestry (blue solid line) is insignificant compared to Somogy county and to the national values, so it was plotted on the secondary axis to ensure the comparability of trends. Plotting the data on the primary axis would result in a constant straight line image.

The value of agricultural game damage paid at Kaposvár Forestry showed a hectic but definite increase until 2003. It showed a decreasing amount afterwards. The progress of the years has determined this trend by 48% however, the goodness of fit was low. The periods 2000-2003 and 2008-2013 were characterized by strong volatility.

The data for 2009-2010 and 2012 deviated significantly from the expected value in a negative direction. However, the discrepancy does not necessarily indicate a drastic reduction in game damage. During these years, SEFAG Zrt. lost its hunting rights in certain areas, therefore according to the law, it was not liable for the compensation of game damage.

Figure 3

Paid agricultural game damage in real terms at Kaposvár Forestry, Somogy county and Hungary



The value of agricultural game damage paid nationally and in Somogy county is also hectic and shows a decreasing trend in real terms in the period under review. The agricultural game damage paid in Somogy county follows the nationally paid agricultural game damage but national values are characterized by stronger volatility. In the case of national data, the progress of the years determined the trend in 4% and in the case of Somogy county in 42%.

Figure 2 indicates that the paid agricultural game damage in real terms shows a negative trend at Kaposvár Forestry, Somogy County and nationally, but in the case of Kaposvár Forestry this decline is faster than in Somogy county or nationwide.

As the next step of our study, we looked for correlations between the average paid game damage compensation in real terms and the number of game damage events. They were first plotted as a line diagram illustrated in *Figure 4.*

Both data sets are hectic, and inverse proportionality can be assumed between them based on the figure. In the years when the number of game damage events deviates positively from the trend line, the average game damage compensation paid in real terms is below the trend line.

Subsequently, the average paid game damage compensation in real terms and the number of game damage events were illustrated (*Figure 5*).

Figure 4

Average real game damage paid in real terms and the number of game damage events between 1998 and 2017

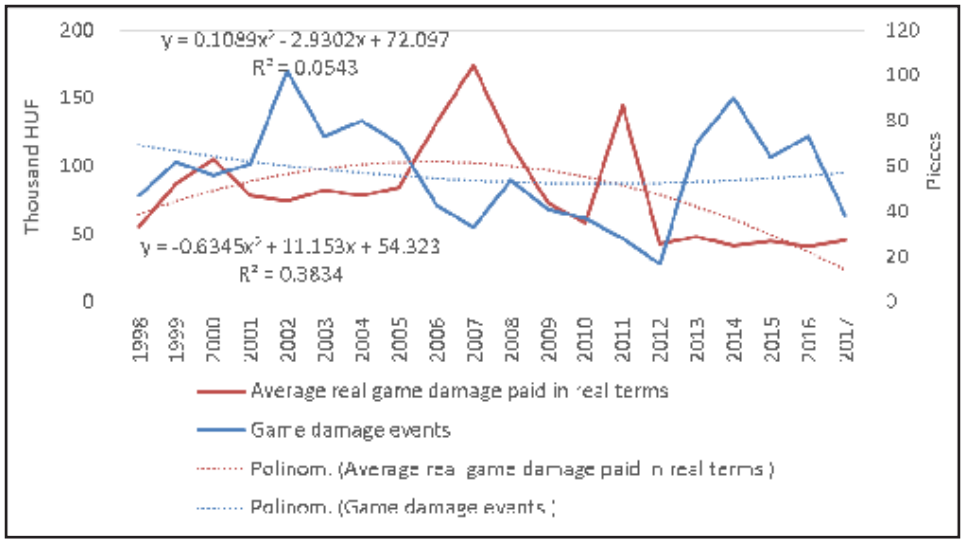


Figure 5

Scatterplot of average paid game damage compensation in real terms and the number of game damage events

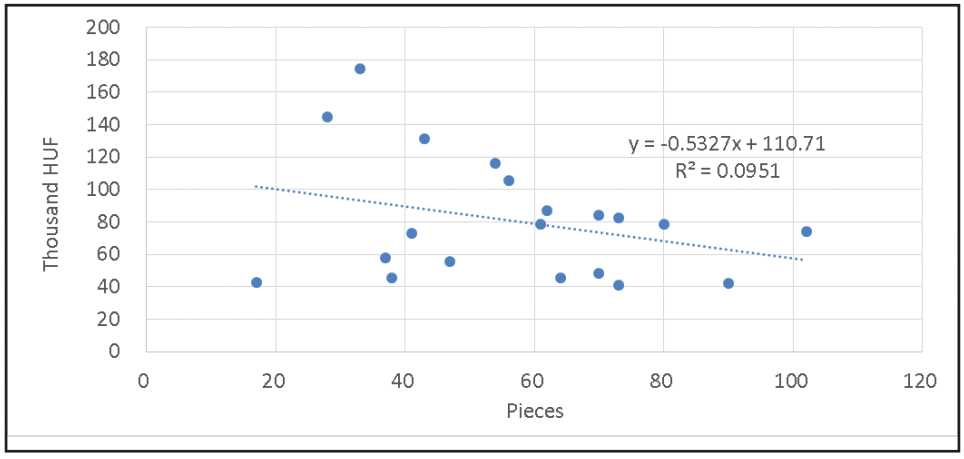


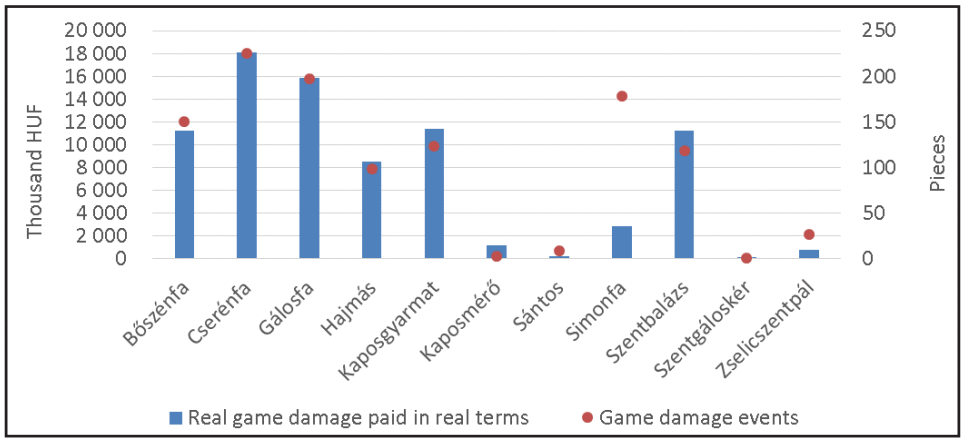
Figure 5 shows that the regression line has a negative slope, which confirms the previously assumed inverse proportionality. The points are scattered, away from the line, indicating a weak correlation between the variables. The value of the coefficient of determination can be read from the figure (r^2=0.0951), according to which 10%

of variation of average game compensation paid in real terms can be explained by the number of game events.

In the following, it was examined how the game damage was distributed among the settlements of Kaposvár Forestry, and whether any centralization could be observed. *Figure 6* shows the distribution of the game damage paid in real terms and the number of game events by settlement.

Figure 6

Compensation for game damage paid in real terms and the distribution of the number of game events by settlement between 1998 and 2017



In the examined period, most of the game damage occurred in Cserénfa according to both the number of events and the amount paid, followed by Gálosfa in the second place. Regarding the paid game compensation, Kaposgyarmat is the third in line, while in terms of the number of game damage events, Simonfa is the third one.

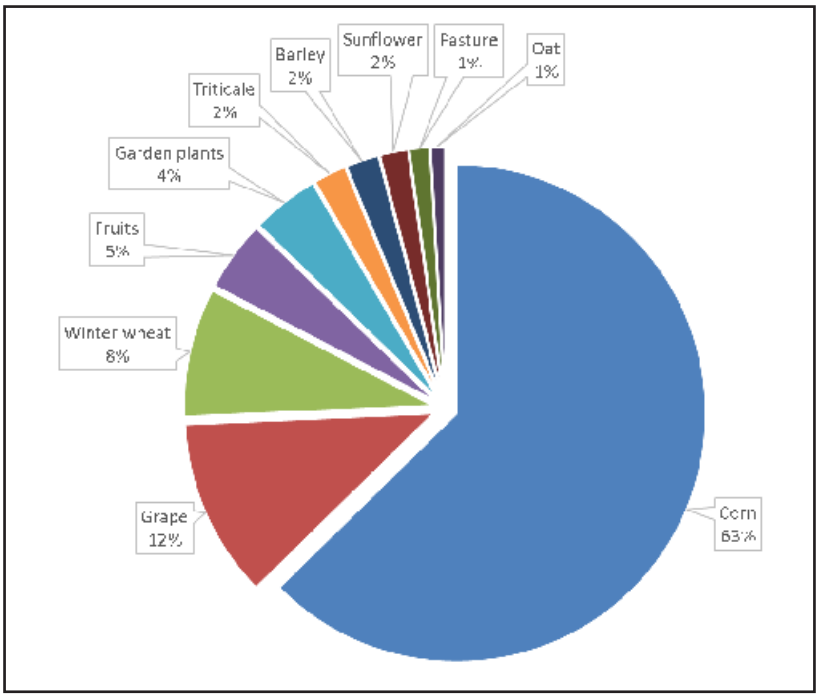
In most settlements, the amount of game damage paid and the number of game events move together, but in the case of Kaposgyarmat, Kaposmérő and Szentbalázs, it can be observed that relatively fewer claims receive more compensation. In the case of Simonfa and Zselicszentpál there is an extreme difference between the number of game damage events and the game compensation paid, while for Simonfa 178 compensations totalling HUF 2.8 million were paid in real terms, in the latter case a total of slightly more than HUF 750,000 was paid in 27 cases.

Examining the game damages paid in real terms, it can be observed that 93% of the payments were made in the territory of six settlements (Cserénfa, Gálosfa, Kaposgyarmat, Bőszénfa, Szentbalázs, Hajmás). Examining the number of game damage events, the five most game-damaged settlements (Cserénfa, Gálosfa, Simonfa, Bőszénfa, Kaposgyarmat) had more than two third of all cases (77%). Kaposmérő, Sántos, Szentgáloskér and Zselicszentpál are the municipalities least affected by game damages, both in terms of the compensation paid for game damage in real terms and in terms of the number of game damage events.

As a final step of our study, game damage was examined regarding the damaged crops. *Figure 7* shows the distribution of the number of damage events per crop.

Figure 7

Distribution of the number of damage events by crop between 1998 and 2017



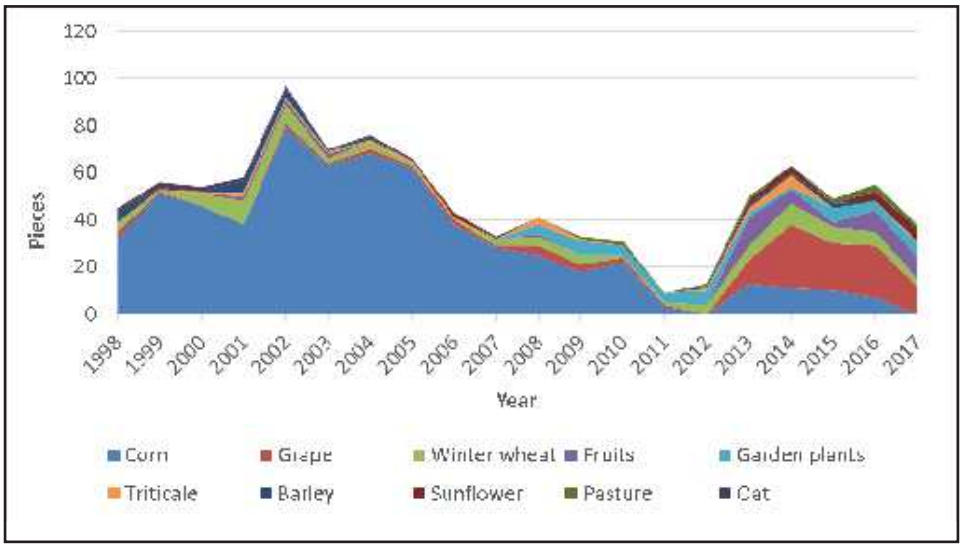
The pie chart shows that corn was the crop with the highest number of game damage during the study period, with more than 62% of all cases. In terms of game damage, grapes are in the second place with more than 11% thus, the two cultures together account for almost three-quarter of game damage incidents. Garden plants and fruit (excluding grapes) are affected by almost the same number of game damage and together account for 9% of game damage events. Together, the five most damaged crops cover 92% of the damage events.

The large number of game damage in vineyards and orchards, as well as in garden plants, confirms the impact of urbanization. The natural habitat of wild animals is constantly declining due to various habitat-narrowing effects (agricultural area payments, fencing of agricultural land, etc.), so that they make their way to the interior parts in the hope of easier forage access. The unfenced vineyards and small gardens serve as a perfect source of fodder.

To investigate further trends observed regarding agricultural crops, they were shown on a cumulative area diagram (*Figure 8*).

Figure 8

The number of damage events to the affected crops by crop and year between 1998 and 2017



The diagram shows that in the period between 1998 and 2012, corn was the most affected crop by game damage, however, from 2014, grapes became the most damaged crop. There are several possible reasons for the change in the damage structure. In addition to the previously mentioned urbanization effect and the increasing degree of protection, it may also have been affected by the declining economic situation. Farmers have become more sensitive to game damage and, even after minor game damage, report their claim to the game farmer, which they have not done before.

CONCLUSIONS

Even though the fact that similar trends (just like the border effect of the forest and settlement because of the globalization) are noticeable by Kaposvár Forestry and in Hungary, we can state that the amount of the paid game damage by Kaposvár Forestry shows bigger decrease than in Somogy or in Hungary. We suggest repeating the research in other forestries and to make the comparison of the forestries of SEFAG Zrt.

Our research has found that there is no statistical connection between the amount of paid game damage and the number of game damage at the area of Kaposvár Forestry. Former investigations have shown that the amount of game damage varies depending on several factors (such as the number and the composition of the species, the size of the continuous living space, the amount of the available feed, etc...). Unfortunately, data was limited for us to investigate this in detail, but we suggest a general OLS model on numerical and nominal factors.

We have found that game damage is restricted to a few settlements in the area of Kaposvár Forestry. We suggest investigating this with the usage of geoinformatics.

Our research showed that from among the crops, corn was the most affected by game damage during the period from 1998 to 2013, but from 2014, the most damage happened to the grapes. We suggest investigating the factors that can affect this.

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The Applicability of Kapferer's Brand Adentity Prism in City Branding Through the Example of Kaposvár

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ABSTRACT

Kaposvár started to consciously build its brand in 2016 when the General Assembly accepted the city branding strategy of the settlement, its management has been trying to refine and clarify the positioning of the Kaposvár brand. Kapferer's prism may make it feasible. This essay makes an attempt to estimate the applicability of brand identity prism on the city branding strategy of Kaposvár, thus exploring the opportunities in city brand positioning provided by Kapferer's method. The paper examines the desirable image of Kaposvár detailed in the strategy from the six aspects of Kapferer's prism, and tries to define the attributes which may strengthen the Kaposvár brand.
Keywords: city branding, brand identity prism, Kaposvár

INTRODUCTION

Jean-Noel Kapferer elaborated a method with the help of which any brand identity can be measured. His brand identity prism analyses brand identity form six different aspects, in this way it gives a complex but comprehensible diagnosis about its objects. In the last couple of decades, due to the constantly intensifying competition of countries, cities and regions, marketing studies reached geographical entities also, resulting in the evolution of a subfield: regional and settlement marketing. Although Kapferer does not tell a word about cities when talking about his brand identity prism, he refers to its applicability on place brands as he writes: "A [town] brand is therefore a known name with which the audience spontaneously associates positive, attractive and unique values, both tangible (the advantages of living or working there) and intangible (the town's style and heritage, etc)" **(***Kapferer***,** 2008)**.** Since Kaposvár started to consciously build its brand in 2016 when the General Assembly accepted the city branding strategy of the settlement, its management has been trying to refine and clarify the positioning of the Kaposvár brand. Kapferer's prism may make it feasible. This essay makes an attempt to estimate the applicability of brand identity prism on the city branding strategy of Kaposvár, thus exploring the opportunities in city brand positioning provided by Kapferer's method. The paper examines the desirable image of Kaposvár detailed in the strategy from the six aspects of Kapferer's prism, and tries to define the attributes which may strengthen the Kaposvár brand.

LITERATURE REVIEW

City image as an advantage in the competition of settlements

While, according to certain authors, the earliest traces of city marketing activity can be found not only decades but centuries ago, branding of settlements means a relatively new area of science, and in the last two decades it underwent an extraordinary evolution. In 2004 Kavaratzis still stated in his thorough literature review that the activities that most of the texts called branding of cities hardly went beyond city marketing (*Kavaratzis*, 2004). Anholt and Hospers can be considered to be the pioneers of the practice-oriented branding settlement, because – in addition to that they both criticized the use of traditional marketing tools which they called „propagandistic", in the competition of settlements – they recommended conceptual and actually implemented development of settlements. They pointed out that the complex nature of the place product did not make it possible to manage it as a simple brand: they think that during the formation of the settlement's brand the city's image has to be dealt with, an approach which is just partly similar to that of corporate marketing (*Anholt,* 2010, *Hospers*, 2011). A construction of an image requires covering all the positive attributes of the city. But this complexity makes measurability much more complicated (*Hankinson*, 2015).

A considerable barrier of measurability: the complex nature of place products

The place product is a combination of several simple services. Since these service providers are often organizationally separate from each other, not surprisingly, the target groups also show a considerable heterogeneity. Thus, these services view their consumer groups, which are frequently the same, from a different starting base. They have very different concepts of quality. (*Garamhegyi and Boros*, 2009)

As the traditional marketing mix (product, price, place, promotion) interpretations are not applicable directly in city marketing, István Piskóti developed the city marketing toolkit constituted by 2C-s instead of 4 P-s: content competency and communicational competency. Positioning, therefore, has to be made according to the diverse elements of the content competency of the city (*Piskóti*, 2012).

One of the most complex and still fiercely debated question of city branding is positioning (*Garamhegyi*, 2004). One of the clearest differences between a traditional product and a product in regional marketing is that the sale of the latter does not result in a transfer of its ownership title (*Kozma*, 1995). Bearing in that mind, we applied the method of positioning through experience (*Janiszewska and Insch*, 2012). Strengthening the existing sensuous and cognitive contact between the consumers and the image of the city seems to be the most appropriate way of position the main brand Kaposvár.

Positioning can be built on an only main attraction solely when it is outstanding, remarkable, well-known and profitable enough to function as the focus of the city brand around which sub-brands can be arranged. In the absence of characteristic attraction, any other conceptual consideration may advance the image creation, however, there is a significant danger of undesirable shift in the balance of the branding

process in this case as well. An ill-chosen direction it can de-emphasize or overshadow the strengths that – remaining excluded from the overstrain mainstream of the branding process – they lose their key role in the brand image and increasingly get out of the potential tourists' sight (*Lackó*, 1995).

MATERIALS AND METHODS

Jean-Noël Kapferer's theory offers an opportunity for brand identity and image to be measured. He makes brand identity a central issue in his approach – it expresses the vision of the brand together with its distinctive features, values, competence, recognizable features and the needs that have been able to be met by it. Kapferer's brand identity prism can be described along six dimensions. Each dimension is needed to be treated in order to construct the correct picture of the brand in the consumer's mind (*Bauer and Kolos*, 2016).

Florek and Janiszewska warn that although the Kapferer's measurement method can perfectly be used for consumer goods brands, its application to place brands is restricted. They point out that "the method's key limitation is its synthetic nature which involves focusing on distinct and unambiguously defined brand areas. In the context of place brands, the abundance of target groups and the complexity of the place product largely hinder adoption of the Brand Prism as a tool for building up a brand identity. The method may prove useful only with reference to small territorial areas focused on a single, narrowly-defined group (e.g. inhabitants) with a strong and clear point of difference" (*Florek and Janiszewska*, 2013). Nevertheless, brand identity prism can surely make a city brand more coherent as Kaposvár's example detailed below perfectly shows.

This essay was written on the basis analysis of the following surveys previously ordered by the local government: twenty in-depth interviews with experts conducted by Infinit Media Ltd. in the summer of 2015, Tourism Development Plan 2014-2020 made by Ecorys Hungary Ltd. for Kaposvár and the Zselic region Tourist Destination Management Association in September 2014, Research Report about the Image of the Kaposvár and the Zselic region Tourist Destination written by EconoConsult Ltd. in 2011 (*EconoConsult*, 2011). Besides that, the qualitative analysis uses the City Branding Strategy of Kaposvár from 2016, which contains those main targets that predict the main characteristics of a desirable brand of the settlement.

RESULTS AND DISCUSSION

Positioning of the Kaposvár brand

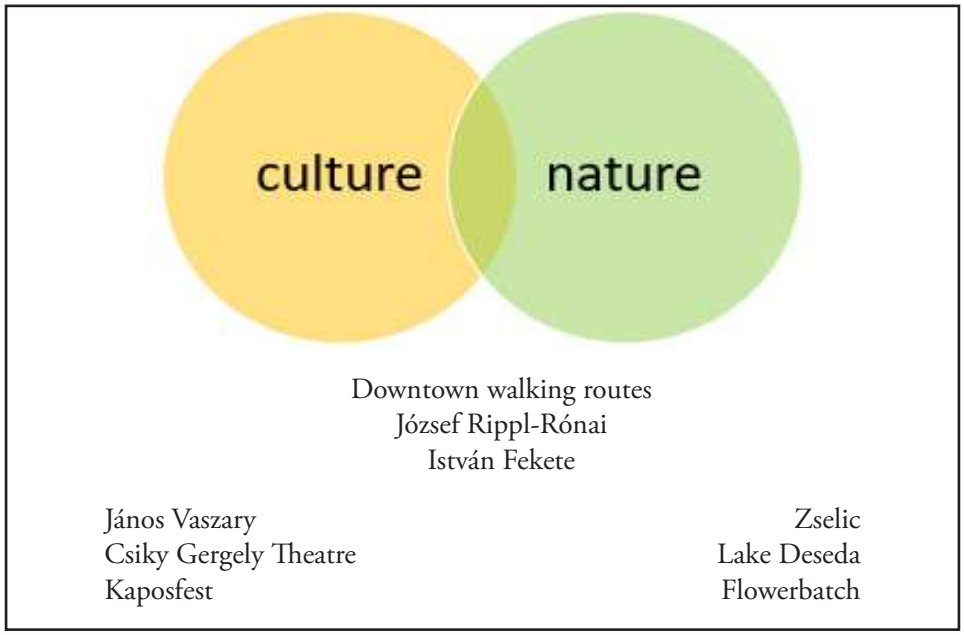
The primary aim of positioning the main brand Kaposvár – and the branding strategy as a whole – is to meet the already existing expectations and demands of the potential target audience. This requires the most suitable and authentic summary of them, which works as a logline of a movie (*Papp-Váry*, 2017). There is a description about Kaposvár, which can be found on numerous internet blogs – it perfectly synthesizes the mood created by the core values of the city, and reads as follows:

"The city is the northern gate of the Zselic. One of its most lovely parts is the main street in which you can see beautiful buildings and inviting cafés wherever you turn. Life is brisky and breezy throughout the year, festivals, celebrations, exhibitions, fairs, theatrical performances, carnivals overlap in the calendar, furthermore, museums, private collections, and galleries offer themselves for the lovers of culture. Such a dense concentration of arts is not a new phenomenon at all in the city, the famous painter József Rippl-Rónai was born and lived here, his late residence is a museum today." (*Utazok*, 2016)

The sub-brands of the main brand Kaposvár are intended to realize each factors of the account above, and build an image of the city, which complies with the description as much as possible. According to the preferences of the target audience, the strategy classified the sub-brands into two brand clusters. These principal categories represent the two primal aspects of the main brand. As shown in *Figure 1*, the endorsed brands can be divided into two sets: culture and nature (active recreation).

Figure 1

Structure of the Kaposvár brand



Nevertheless, due to the complex nature of the core values, they cannot be clearly separated, their connection is complicated, there is an intersection of the two. The sub-brand of Rippl-Rónai is a good example: while the artistic heritage of the painter is a cultural factor, rethinking the park of his late residence already belongs to the theme of nature and recreation. The reproduction of one of his paintings from flowers has been planted according to a huge pattern made from his work.

The strategy provides recommendations not only about the ways of communicating the tourist attractions and the core values they represent, but on their operation and contents to improve the experience they can give their visitors. Due to a relative shortage of human resources, a municipality cannot control or instruct product development activity behind the adventures, it can set out recommendations in order to guide their actions properly.

Physique of the Kaposvár brand

Although, according to Kapferer, physique is probably the most important feature of the identity of a brand, due to its complex nature, it is not easily demonstrable in a place product. However, Kaposvár brand is still under construction, therefore, its physique is the most easily analysable aspect of its brand identity prism.

Kevin Lynch wrote his book "The Image of the City" in 1960, in which he concludes that the settlements primarily appear as graphic depictions, images in the consumer's mind. According to the urbanist author, the visitors of a city make mental maps based on their perceptions of built environment and orient themselves by the help of them. There are five main types of the built environment: paths, edges, districts, nodes, landmarks (*Lynch*, 1960).

The key notion of Lynch's book is so-called legibility: by this, the author compares three metropolises (Los Angeles, Boston and Jersey City) examining how easily the mental maps they result in a human mind can be read. "In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world that is held by an individual. This image is the product both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action" (*Lynch*, 1960). Consequently, a management of a settlement can form the city image consciously constructing its built environment.

Nevertheless, a city may also be successful in shaping its image by conceptually communicating its given physique, its already existing built environment. Kaposvár tried to exploit this academic experience during the development of its own uniform, corporate visual identity: the city logo forms a K letter, the initial of the settlement's name, while it consists of the pictographic depictions of the building of the main square. The basic graphic elements of the corporate visual identity use the simplified projection of the environment of the downtown built in the art nouveau and classical-style, thus enforcing "the image of the city" in the Lynchian sense as well. Yellow cobblestones are probably the most particular elements of the urban walking routes which the city branding strategy of Kaposvár mentions. The municipality is going to change 100 normal grey-coloured cobblestones, scattered throughout the whole city centre, to yellow ones. These new stones will decorate the paving stone surfaces, and give the essential information about the mysterious history of the nearest building. The image thus can be shaped, organized and amplified according to the intentions of the city management.

The visual conception of the branding strategy of Kaposvár also appointed ITC Garamond and MB Empire to be the official typefaces of the city. ITC Garamond

is a classical-look serif font, which thus refers to the elegance of a town with more than 300 years of history, MB Empire is a modern-look, grotesque, sans serif typeface, which thereby creates an association with youthfulness and mobility. Corporate colours, Pantone Yellow C and Pantone 282 C dark blue are based on tradition. The flag and the coat of arms of Kaposvár have been including both shades for a very long time. The colour yellow can be also related to Rippl-Rónai, whose favourite colour – according to his journal entry about the zinnias in his garden from 1911 – was chrome yellow. Therefore, this up-to-date shade of yellow associates culture with nature, and both with the administrative traditions of the city.

Personality of the Kaposvár brand: cooperativeness and the mayor as the brand ambassador

It is ambiguously considered by different authors what Kapferer meant by the personality of a brand identity. Some marketing experts propose brand managers to choose a brand ambassador who represent the nature and attitude of the brand, while others suggest a kind of impersonation of the brand to disclose its real personality (*Azoulay* and *Kapferer*, 2003).

Personification of a place brand is quite a complex issue as different target groups find different types of personalities attractive. While tourists expect openness, helpfulness and hospitability, local residents require cooperativeness and orderliness, investors look for diligence, qualifiedness, educatedness, effectiveness and hard-working nature.

A SWOT-analysis from 2016 shows that the mayor Károly Szita's awareness is extremely high (*Infinit Média*, 2015). Being the mayor of a settlement for the longest period in Hungary, his name is strongly connected to that of the city – this characterises not just the target group of local residents but the tourists and investors as well irrespective of their political views. This fact points out the intricate connection between city branding and political marketing: none of them can exist or operate without the other.

Clean and flowery Kaposvár was considered to be a political slogan for the elections at the beginning of the 2000's, but it became cornerstone of the city's marketing activity in the following one and a half decades, therefore, city branding strategy could not leave it out either in 2016. The motto obviously refers to the tidy and near-nature character of Kaposvár.

Cooperativeness could be a main attribute of the humane Kaposvár. The city management emphasizes that the population of the city works together for their aims, and that is the main reason for the successful development of the settlement. Accordingly, this can be considered as a political mean, but it unquestionably characterises the city marketing activity as well.

Culture of the Kaposvár brand: the folklore of Zselic and Rippl-Rónai

The brand culture is also an important factor, which is about how the brand interprets the world around them, and how it defines its own role in it. Culture around the

brand is an important area of its differentiation, as the ideology and values broadcast by the brand can have a big impact on consumer judgement.

Several associations which belong to this area of Kapferer's brand identity prism are linked to the brand's place of origin. In the case of a place product place of origin is the physical place itself, while brand culture is the culture in which local residents live their everyday life. In this sense the culture of Kaposvár brand can be defined as a special segment of Hungarian culture. The place of origin of Kaposvár brand is the South Transdanubian region and more precisely Somogy County and the Zselic district, which, of course, has its own special values among the national ones.

The countryside in Zselic is one of nature's wonders. Being one of the least light polluted areas in the world, it is the perfect destination for those interested in the starry sky. The Star Park of Zselic provides an experience with its expert staff, observatory, telescopes and programmes organised on a regular basis. This experience is unique throughout the country; therefore, it is suitable for being a main focus during the brand positioning process. The small villages dotted in the Zselic area have their own special values. The deer farm in Bőszénfa, the Europa Nostra Award winning Ethnographic museum in Szenna or the adventure farm in Patca all represent the special cultural values mentioned above.

Motivation-based segmentation is the basis of the destination image building, because it determines the preferences, motivations, leisure spending habits of the target group whose members find the Zselic and Kaposvár attractive destinations, in comparison with competitors. According to the consumer insight of the image audit in 2011, the potential target audience is primarily composed by child- and family-centered, active, hospitable people who are interested in local traditions, culture and discoverable values (*EconoConsult*, 2011).

Therefore, in the case of the Kaposvár brand, culture does not only serve as the background of it – it also provides a strong factor in positioning as well: Rippl-Rónai's lifework is probably the most powerful endorsed brand of Kaposvár. His oeuvre offers a wide range of opportunities in a visual sense, his hedonistic lifestyle gives diverse and abundant source material for the storytelling activity, moving the whole branding process forward in this way.

Arriving at the Rippl-Rónai mansion on Róma Hill, visitors may barely feel anything from the original atmosphere, therefore, the attraction needs a very considerate improvement, since it should offer a memorable experience to its guests. Even the signage system of the mansion or the visitors' centre do not have a uniform design. Experience-oriented interactive instruments would make the enormous cultural heritage more comprehensible thus attracting a lot of interest.

Souvenirs are also crucial components of the sub-brand. The painter's most famous works are adaptable to a great variety of gift items at a wide array of qualities – from a simple mug, a postcard, a shopping bag through an umbrella or a handkerchief to an expensive premium quality perfume with the name of Rippl-Rónai's wife, Lazarine.

In May 2016, visitors of Kaposvár could see an exhibition of Rippl-Rónai's paintings from his "corn kernels" period – although, not in a traditional museum or gallery space, but on twenty billboards placed along the main roads leading to the city. This was the first thematically organised exhibition in Hungary appearing on advertising boards. Along with the paintings, elements of the city's new identity also appeared on the posters. Increasing the conceptual nature of the campaign, souvenirs were produced in accordance with the visual language of the exhibition. Unlike the traditional way of purchasing gift items in a museum shop, Rippl-Rónai souvenirs were distributed by a street vendor during the Rippl-Rónai Festival in Kaposvár. This open-air exhibition concept was the first milestone in the creation of a strong Rippl-Rónai brand. During the coming years, a number of creative and awareness-raising campaigns are going to follow this unusual exhibition.

Relationship of the Kaposvár brand

According to Kapferer's theory, brands function as a relationship that expresses the nature of connection between them and their customers. Being a complex place product, Kaposvár cannot communicate the same quality of relationship towards its all target groups, nevertheless, the city has its own voice with each of them.

Every fourth local resident has his/her own Kaposvár Card which provides a wide range of discounts. The municipality introduced the card in September 2005. The number of discount providers is constantly increasing, not to mention the number of cardholders, which now means almost 23,000 people. High popularity is not accidental, in addition to the opportunity of material savings, the card has now become the symbol of local patriotism for thousands of people living in Kaposvar. The card offers itself with the slogan The city with you (Veled a Város), which makes an attempt to evoke a feeling in the consumers' (i.e. cardholders') mind that they are accompanied by the whole city, and may belong to the community of Kaposvár – particularly because a permanent residence card (certification of domicile) is required for owning a Kaposvár Card.

The relationship facet also appears in the touristic events and programmes of Kaposvár. As the main brand strongly builds on Rippl-Rónai's cultural heritage, it almost goes without saying that one of the biggest festivals organized by the municipality bears the name of the famous painter. Rippl-Rónai Festival uses the slogan Rippl paints with you (originally Rippl Veled Fest – which is built on the similarity of word forms between the Hungarian word "fest", which means paints, and the word "fest", which is a shorter version of the word "festival"), which also refers to the friendly nature of the relationship between the city and its visitors.

Friendship appears in the settlement's communication with its potential future investors as well. The brochure entitled Reasons for Kaposvár includes a pair of pages in which readers may be informed about the opportunities, the special benefits and supports guaranteed for those who would like to invest in Kaposvár. Here the text mentions the settlement as a friend of investors.

To conclude, the municipality presents itself as a friend of its consumers from all the three target groups.

Reflection of the Kaposvár brand

Every brand has its own typical consumer, a type of person who potentially wants to choose the product. But Kapferer goes further: according to his theory, there is a type of person who wants to be a type of person by using the product. The brand works like a mirror which shows its desired picture or image to the consumer standing in front of it. The author calls it reflection of the brand. Kapferer warns his reader against mixing the notions of reflection and target up (*Kapferer*, 2008).

Although further examination would be able to define the Kapfererian reflection, as for now, we only have the result of the image audit on Kaposvár conducted in 2011 which defined the potential touristic target group of the city: middle-aged, high-income person, who travels with a partner or in a group of friends, likes to spend his/her frequent holidays variously, but typically with cultural or gastronomical programs. Monuments, museums, galleries and other attractions are dominant in its motivation, complemented by other cultural programs (i.e. theatre, concerts) as well as bathing, trips and walks. This is now excessively broad, therefore, Kapferer's prism provides a good opportunity in a future image audit on Kaposvár.

Self-image of the Kaposvár brand

The possible reflections of Kaposvár have not been measured yet. We still do not know anything about the self-image of the consumer evoked by it. It cannot be defined what kind of self-image will be built in the consumer by using the services of the city.

Nevertheless, there were several attempts in the former marketing activity of the city which were to exploit the opportunities provided by this facet of the brand prism. The slogan, for example, which the city used to promote itself, was quite talkative in this sense: Kaposvár, the city of opportunities. This motto was intended to awaken the image that the consumer can build a successful future in Kaposvár, where one may fully realize oneself.

Kaposvár's international chamber music festival, the Kaposfest uses the slogan Freedom of joy which is also to refer to the opportunity of being free, and enjoy music and the rhythm of the city without borders.

CONCLUSIONS

We can conclude that it may be stated that the system or structure, which the six facets of Kapferer's brand identity prism offers, would be able to make Kaposvár brand more attractive among its target groups. However, it is needed to be added that the city brand is still under construction, moreover, shortage of human resources and the stuffy, narrow-minded approach of many participants of the branding process still create barriers to it. Nevertheless, product development is a much longer process in the case of a place product where the complexity of different services requires a longer period to change (*Garamhegyi and Boros*, 2009).

It is clearly visible that Florek and Janiszewska's concerns proved to be unfounded, and – in spite of its complexity and synthetic nature – the prism is applicable to place brands as well. However, the method needs a completed and fully formed brand, and in the case of a Kaposvár-scale settlement, this evolution of such an image takes much more time than in case of a normal tangible product or an intangible but more clearly defined service.

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