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Quantification of the influence of Písek City Forests Ltd. on the local economy of the region

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Abstract

Březina D., Hlaváčková P., Michal J., Slováčková H., Meňházová J. (2018): Quantification of the influence of Písek City Forests Ltd. on the local economy of the region. J. For. Sci., 64: 371–378.

The aim of this paper is to highlight the possible way of quantification of the impact of forest enterprise and forest management on the economic and social development of the territory by using the methodology of the local multiplier calculation and identifying potential cash flows associated with the implementation of socioeconomic functions of forest ecosystems. The economic indicators to be analysed are the local expenditures of Písek City Forests Ltd. on suppliers and employees in 2015. The local multiplier is a specific microeconomic indicator which enables quantification and evaluation of socioeconomic benefits of the selected operator for the local people and entrepreneurs. The results of the specific university research project of Mendel University in Brno with the title: Quantification of the Influence of the Selected Forestry Enterprise on the Local Economy of the Region will allow us to evaluate the effect of the special-purpose forest enterprise and forest management on the economic and social development as well as to identify the potential cash flows related to the fulfilment of socioeconomic functions of the forest ecosystems in the area of interest of Písek City Forests Ltd.

Keywords: economics; forest enterprise; local multiplier; local expenditure; management

The research topic of this field is a reaction to the so far untreated problems of the local economy in the field of forest management and protection of nature and landscape which result from the goals mentioned in the strategic documents of sustainable development and which are valid both nationally and internationally.

The aim of the project is to present partial results of the research focused on finding the benefits of a forest enterprise to the local economy by means of calculating the score of the local multiplier.

Shuman (2000) defined the economic localization as follows: "The process of economic localization means that locally-owned enterprises use local resources in a sustainable way, employ local workers for adequate wages and serve primarily to local consumers. Consequently, this process puts the decision-making processes back to the community and decreases its dependence on imports".

Localization of the enterprises into regions brings many advantages, especially for the local economies. This was confirmed for example by Douthwaite (1996) and Shuman (2000). The benefits of the forest enterprises to the local economies are combinations of social and economic benefits.

Since their management is bound to rural regions, the forest enterprises represent a specific part of the country's economy. The importance of

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small and medium-sized forest enterprises in the European Union for the employment and regional development was explored for instance by Tunkele et al. (2011).

A local economy which has preserved at least a part of its local economic links (enterprises owned by local people, local production using local sources, local sales and investing the local funds locally) is not only less vulnerable from the globally economic point of view but also more efficient in terms of lower energy and natural resources waste.

The local multiplier (LM) is highly suitable as an indicator of the sustainable development.

There are several types of local multipliers, but local multipliers 2 and 3 (LM2, LM3) are used most often.

The LM2 focuses on the first two rounds of the fund circulation – i.e. on the total revenues and the local expenditures of the investigated operator. The LM3 consists of the first two rounds with the same scheme as the LM2, but it adds an extra third round in which the local expenditures of all those who received funds from the investigated operator during the second round (i.e. the beneficiaries of the local expenditures) are quantified. In organizations, these beneficiaries are mainly suppliers and employees.

In the Czech Republic, the local multiplier calculation has not become general knowledge. The issue of local multipliers has been tackled by Johanisová (2007, 2008) and Kutáček (2007a, b). The calculation methodology was also employed in a small number of final theses, e.g. those of Došek (2006), Ježková (2008), Novotná (2011), Březina (2014), Rejmanová (2014), Březina et al. (2015), Silovská (2015), and Březina and Hlaváčková (2016). Of the foreign authors, the theme was dealt with for example by Sacks (2002) and Cimadomo, Bénassy-Quéré (2012).

The aim of this paper is to highlight the possible way of quantification of the impact of forest enterprise and forest management on the economic and social development of the territory by using the methodology of the local multiplier calculation and identifying potential cash flows associated with the implementation of socioeconomic functions of forest ecosystems.

MATERIAL AND METHODS

The Písek City Forests Ltd. (hereinafter referred to as "Písek City Forests") is a company founded by the city of Písek to manage a forest area of 6,500 ha. The company is owned by the city of Písek to which it is accountable for its managing. The running of the enterprise is also supervised by the appropriately elected members of the supervisory board. The forest administration, which is divided into 11 sections, ensures the overall running of the enterprise and governs the forest rangers. Its forestry assets are large; they reach from the forest Boudy u Mirotic in the northern part of the district through the forests around Dědice, on Lísek, and in Sloupovny to the mountain range of Písecké hory which is a part of the Písecké hory National Park and lies near to Albrechtice nad Vltavou (Písek City Forests Ltd. 2016).

The local multiplier has been used as a methodical tool to determine the ratio of the assessed forest enterprise. Calculation of the local multiplier is done in three rounds. In the first round, the total revenues of Písek City Forests are found. The expenditures of Písek City Forests spent on staff and suppliers divided into local and non-local ones were determined in the second round. The third round of the calculation explores how local employees and suppliers further re-distribute their payments.

The territory of the Písek district was chosen for the purpose of this research.

Sources

For the needs of the calculation of the first round of the LM2, LM3, the data were transformed from the economic information system of Písek City Forests (account class 6 – account groups 60, 64, or 69). For the needs of the calculation of the second round of the LM2, LM3 transformation of the data of account class 5 (account class 51, 52) was carried out. The specific used items of the revenues and expenditures of Písek City Forests are stated below in the methodology.

A questionnaire survey was carried out so as to gain the data for the calculation of the third round of the LM3.

The creation of the questionnaire for the employees, whose aim was to find out how the employees spend their funds either in the Písek district or outside it, was inspired by the statistical evaluation of household accounts used by the Czech Statistical Office. Only the employees resided in the Písek district were addressed within the questionnaire survey of the employees of Písek City Forests.

Example of the survey for the employees. Items of expenditure: (*i*) food, drink, tobacco, (*ii*) clothing, footwear, (*iii*) housing, (*iv*) water, energies, (*v*) transport, fuels, (*vi*) postal services, telecommunications,

(*vii*) property tax, (*viii*) other taxes, (*ix*) repayments (credits, loans, insurances, saving), (*x*) recreation, sport, culture, (*xi*) other goods and services.

The amount of the total annual income of the employees in thousands of CZK was divided into 7 categories. The first category started at the level of 100–150 thousand CZK.

The following division was by 50 thousand a category whereas the last category of income ranged from 400 to 450 thousand CZK (the mean value of the filled-in category of income was taken into consideration during the calculation). The individual items of expenditures on which the respondents (employees) spent their funds were expressed in percentages. The total income had to be converted to CZK.

Equally, only the significant local suppliers of the year 2015 with their registered office in the Písek district (see below) were addressed within the questionnaire survey of the suppliers of Písek City Forests (i.e. the group of suppliers on whom Písek City Forests spent 100 thousand CZK and more for services). Of the total number of significant local suppliers (46 in total), 91% provided Písek City Forests with their services directly related to forest care, non-forest land and nature protection. Other suppliers (i.e. 9%) provided management activities. In 2015, the total yields of Písek City Forests consisted in approximately 94% of revenues from sales of own goods and services (sales of wood, Christmas trees, decorative brushwood, forest chips, seeds, seedlings, and services related to accommodation) and in approximately 6% of revenues from transfers (financial contributions to activities in the form of subsidies). These types of yields were used to finance the services which were provided to Písek City Forests by their suppliers.

Example of the survey for the suppliers. Items of expenditure: (*i*) expenditures on staff, (*ii*) repayments of loans and credits, (*iii*) property tax, (*iv*) other taxes, (*v*) water, energies, (*vi*) rents, building operation, (*vii*) fuels, (*viii*) postal services, telecommunications, (*ix*) promotion, (*x*) advertisement, (*xi*) other goods and services.

The amount of the total annual expenditures of the suppliers in thousands of CZK was divided into 10 categories. In the case of suppliers, the financial range of each category of expenditures was adjusted to the specific legal form of the business activity. The first four categories corresponded with the ranges of expenditures of natural persons (NP) carrying out business activities based on a business licence or other authorization, categories five and six were demarcated by NP carrying out business activities based on a business licence or other authorization (with a definite number of employees) and the last four categories were used for the legal persons (LP). In the LP, also the publicly available information from the public register was used, namely that available at the JUSTICE portal (www.justice.cz) where the subjects publish their accounts statements (specifically the profit and loss accounts). The mean value of the filled-in category of expenditures was included in the calculation. The individual items of expenditures on which the companies spent their funds were expressed in percentages.

Methodology

Calculation of the LM2. Calculation pattern (Kutáček 2007a), as Eq. 1:

$$\frac{1^{st}\ \text{round} + 2^{nd}\ \text{round}}{1^{st}\ \text{round}} \quad (1)$$

where:

1^{st} round – total revenues of the investigated subject,

2^{nd} round – local expenditures of the investigated subject.

1^{st} round of the calculation includes the total revenues of Písek City Forests in 2015. Items of revenues: (*i*) revenues from sale of services, (*ii*) revenues from sale of own goods, (*iii*) revenues from rent, (*iv*) revenues from sale of tangible fixed assets (except for plots), (*v*) revenues from sale of material, (*vi*) revenues from transfers (subsidies for the activity), (*vii*) other revenues related to the main activity.

2^{nd} round of the calculation: the total expenditures of Písek City Forests for the year 2015 were sorted into the expenditures spent locally (in the Písek district) and those spent non-locally (i.e. outside the Písek district). The non-local expenditures are not included in the calculation.

With the local expenditures, it is necessary to find out:

(*i*) Expenditures on staff (only salary costs) who reside in the Písek district;

(*ii*) Expenditures on suppliers with their registered office in the Písek district.

Calculation of the LM3. Calculation pattern (Kutáček 2007a), as Eq. 2:

$$\frac{1^{st}\ \text{round} + 2^{nd}\ \text{round} + 3^{rd}\ \text{round}}{1^{st}\ \text{round}} \quad (2)$$

where:

3^{rd} round – local expenditures of the beneficiaries of the 2^{nd} round (beneficiaries of the funds from Písek City Forests – local suppliers, employees).

The 1st and 2nd round of the calculation contains the same items as in the LM2 (see above).

A questionnaire survey is necessary for the 3rd round of the calculation of the LM3 which will allow for determining:

(*i*) The net annual income of each employee of Písek City Forests resided in the Písek district as well as the structure of their expenditures (in the year 2015);

(*ii*) The amount of annual expenditures of the significant local suppliers of Písek City Forests with their registered office in the Písek district as well as the structure of their expenditures (in the year 2015).

Once again, only their local expenditures were included in the calculation.

Samples were created of the questionnaires – the sent questionnaires (N) and the obtained filled-in questionnaires (n) – so as to estimate the relative frequency (p) of the local expenditures of the local employees and the relative frequency (p) of the local expenditures of the significant local suppliers on the basis of the point estimation. To increase the informative value of the results, the interval estimation of the quantity (p) was performed using the correction coefficient (k) to correct random errors of relative frequency (σ_p).

Methods of calculation (modified according to Swoboda 1977), as Eqs 3–6:

Variance of the sample (s^2), as Eq. 3:

$$s^2 = p(1-p) \tag{3}$$

Standard sample deviation (s), as Eq. 4:

$$s = \sqrt{p(1-p)} \tag{4}$$

Random errors of relative frequency (σ_p), as Eq. 5:

$$\sigma_p = \sqrt{\frac{s}{N}} \tag{5}$$

Correction coefficient for random errors of relative frequency (k), as Eq. 6:

$$k = \sqrt{\frac{N-n}{N-1}} \tag{6}$$

RESULTS

The total revenues of Písek City Forests in 2015 were 77.7 million CZK.

The characteristics of the suppliers and the expenditures of Písek City Forests on suppliers in 2015 are shown in Tables 1 and 2 in both millions of CZK and percentages.

Table 1. Characteristics of suppliers of Písek City Forests in 2015

	Total	Local		Non-local	
		No.	(%)	No.	(%)
No. of suppliers	374	184	49.20	190	50.80
Total expenditures of Písek City Forests (million CZK)	47.3	29.1	61.52	18.2	38.48

Table 2. Characteristics of local suppliers of Písek City Forests in year 2015

	Total	Significant		Others	
		No.	(%)	No.	(%)
No. of suppliers	184	46	25.00	138	75.00
Total local expenditures of Písek City Forests (million CZK)	29.1	25.4	87.29	3.7	12.71

Table 1 shows that 184 suppliers of the total number 374 were local while 190 suppliers were non-local. In 49.20%, Písek City Forests used the services of local suppliers and spent 61.52% of their funds (29.1 million CZK) on the services of the local suppliers from the demarcated area of interest).

According to Table 2, of the total number 184 local suppliers, 46 were important local suppliers on whose services Písek City Forests spent more than 0.1 million CZK. In total, 25.4 million CZK was spent. The expenditures on these important local suppliers (46 in total) accounted for 87.29% of the overall local expenditures which Písek City Forests spent in the Písek district.

20 filled-in questionnaires were obtained by means of structured interviews with 46 important local suppliers (43.48%). Of the total number 20 suppliers, 14 were NP and 6 LP.

The number of ordinary employees of Písek City Forests was 70. In 2015, Písek City Forests spent 17.6 million CZK on labour costs. These costs represent locally spent funds since the employees resided in the demarcated area of interest.

29 filled-in questionnaires (41.43%) were obtained by means of structured interviews with employees.

In 2015, the total of 20 suppliers who were respondents of the questionnaire survey spent approximately 13.6 million CZK (locally approximately 8.1 million CZK and non-locally approximately 5.5 million CZK) whereas 59.37% were spent locally and 40.63% non-locally. The biggest item of the expenditures of the significant local suppliers was the expenditures on fuels, which was determined by the prevailing

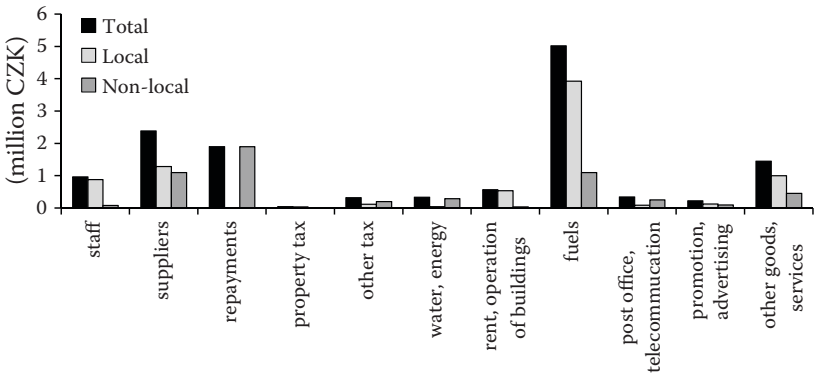

Fig. 1. The distribution of expenditures of significant suppliers of Písek City Forests per year 2015 in CZK

The local expenditures in each category of expenditures apart from the expenditures on credit repayments, water, energies, other taxes and postal services, telecommunications

number of NP. This was followed by expenditures on suppliers, credit repayments, other goods and services, employees, rents, building operation, postal services, telecommunications, water, energies, and other taxes. The lowest item was the property tax and expenditures on promotion and advertisement. The highest item of the local expenditures was fuels and expenditures on staff. This is documented in Fig. 1 (the data are in CZK for the sake of clarity).

In Table 3, the interval estimation of the local expenditures of suppliers is shown using the quantity $p = 59.37\%$ with the scope of the sample $N = 46$; $n = 20$; $p = 0.594$. At 95% confidence, the amount of the local expenditures of the significant local suppliers ranged between 53.87 and 64.87%.

Table 3. Interval estimation of local expenditure of the suppliers

	Coefficient	(%)
Standard deviation	0.491	
Random error of relative frequencies	0.072	± 7.2
Correction factor	0.760	
Random error of relative frequencies using weighting	0.055	± 5.5

29 employees in total who filled in the questionnaire spent approximately 5.4 million CZK (locally approximately 2.1 million CZK and non-locally approximately 3.3 million CZK) on expenditures in

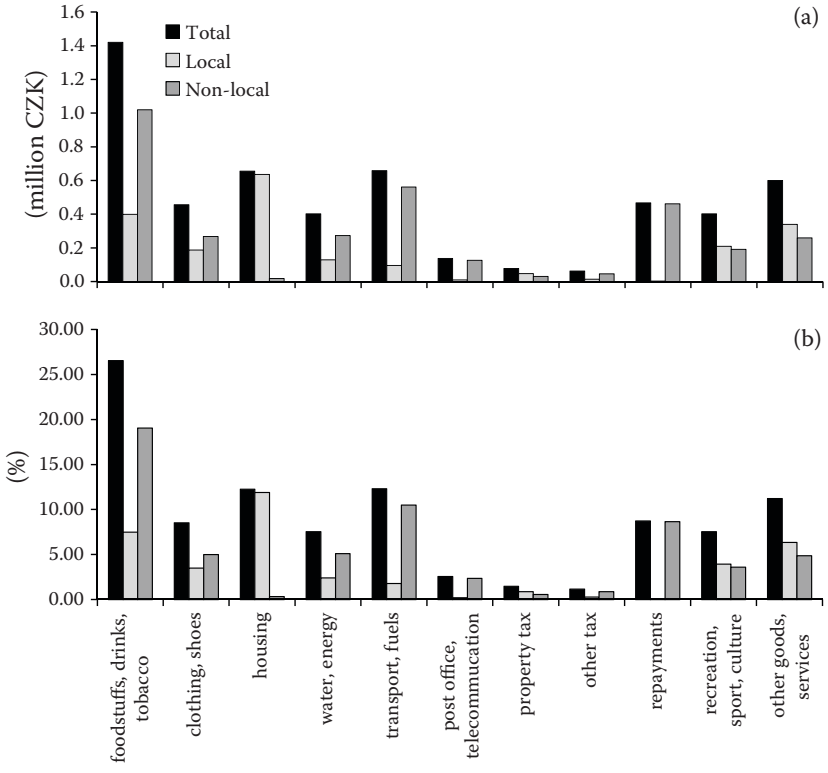

Fig. 2. The distribution of employee expenditures of Písek City Forests per year 2015 in CZK (a), in percentage (b)

Table 4. Interval estimation of local expenditure of the employees

	Coefficient	(%)
Standard deviation	0.488	
Random error of relative frequencies	0.058	± 5.8
Correction factor	0.771	
Random error of relative frequencies using weighting	0.045	± 4.5

2015. 38.93% were spent locally and 61.07% non-locally. The evidence for this statement is in Fig. 2a (the data are in CZK for the sake of clarity).

Food, drink and tobacco accounted for 26.56% of the total expenditures of employees. Housing, water, energies, transport, fuels, clothing and footwear accounted for the total of 40.67% of the overall expenditures. Together, all these items added up to approximately 67% of the total expenditures of employees in 2015. This statement is illustrated in Fig. 2b.

In Table 4, there is an interval estimation of the local expenditures of employees using the quantity p = 38.93% with the scope of the sample N = 70; n = 29; p = 0.389.

At 95% confidence, the amount of the local expenditures of the local employees ranged between 34.43 and 43.43%.

By means of calculating the LM2 score it was found out that, thanks to Písek City Forests, additional 85.5 million CZK were created for the inhabitants of the Písek district in 2015. The value of the calculated LM2 score was 1.60 (a high value of the score).

By means of calculating the LM3 score, it was found out that additional 104 million CZK were generated for the inhabitants in the Písek district in 2015 thanks to Písek City Forests. The value of the calculated LM3 score (1.73) represents a higher value of the LM score. That means that each 10 CZK which are gained by Písek City Forests as their revenues create 17.30 CZK for the local economy in the Písek district. Each crown of expenditures of Písek City Forests generates 1.73 CZK for the local economy. Each crown of expenditures generates additional 0.73 CZK of revenues for the local economy.

DISCUSSION

The value of the calculated LM3 score (1.73) represents a higher value of the LM score. This fact signifies a strong economy (1.73 – 1 = 0.73). Kutáček (2007a) stated that the value of the score about 1.80 signifies a strong local economy and argued that even though the LM3 score ranges from 1 to 3, the actual highest value of the calculated score fluctuates up to 2.20.

In the third round of the LM3 calculation, the calculations have been substituted with all the local expenditures of the suppliers of Písek City Forests despite the fact that Písek City Forests was not the only subject from which the companies or the physical persons conducting business on the basis of a trade licence or of other authorisation received financial funds (income). Due to the time-consuming nature of collecting data by means of questionnaire surveys, the suppliers have not been distinguished based on whether they only had income from Písek City Forests in 2015 or not. The abovementioned leads to further findings concerning the methodology of the LM3 calculation when applied to subjects active in forestry management, nature protection, and timber industry.

In 2015, 184 suppliers of all the suppliers of Písek City Forests (the total of 374) were local while 190 suppliers were non-local. The Písek City Forests used services of local suppliers at 49.20% and spent 61.52% of their funds (29.1 million CZK) on services of the suppliers from the Písek district. Březina and Hlaváčková (2016) stated that in 2014, 30 suppliers of the Training Forest Enterprise (TFE) Masaryk Forest Křtiny of the total 54 were local and 24 were non-local. TFE Masaryk Forest Křtiny used the services of the local suppliers at 55.56%, and spent 56.71% of their funds (13.3 million CZK) on local suppliers and on services by suppliers from the Brno-venkov and Blansko districts).

According to Březina et al. (2015), 166 of all the 306 suppliers of the Administration of Podyjí National Park were local and 140 were non-local in 2012. The Administration used the services of the local suppliers from the Znojmo district at 54.25%. At the same time, they spent 58.82% of their funds (11.9 million CZK) on services of suppliers from the Znojmo district. Comparing various types of organizations in different times, it is possible to see that the percentages of both the local suppliers and the spent funds in the operators' demarcated areas of interest are very similar. The economic benefit of the calculation of the local multiplier may be seen in the potential to increase the regional employment, to support local households, business entities and in increasing the total local economy in the region. Thus, according to Shuman (2000), the decision-making processes could return to the region and its dependence on imports could be decreased. The regional policy also plays a significant role (Armstrong, Taylor 2000).

Apart from the economic benefit, the change in enterprise management will also affect the environmental and social profile of the organization.

The main aim of localization is to strengthen local economies which ensure basic human needs in a sustainable way. Other goals are to diminish the difference between social groups and genders, to improve the respect for human rights and justice and control in the decision-making processes (Hines 2000).

The calculation of the local multiplier enables the enterprises to find out to what extent their economic activities contribute to the development of the local economy. Consequently, this finding can lead to a change in the decision-making management of the enterprise with the aim of sustainable development of forest management.

Effective decision-making on the ways of spending their funds may bring profit to local inhabitants and improvement in the competitiveness of the researched enterprise, including fulfilment of the strategic goals of the government.

If the local economy is strengthened, it may result in a decrease in fiscal expenditures, for example, on social welfare benefits.

Forest enterprises should focus on increasing the share of the local suppliers, or on the education of their employees.

Regarding the suppliers, the enterprise must observe the Act on Public Procurement, pursuant to which they cannot take into consideration whether a supplier is from the respective region. Affecting the consumer behaviour of the employees is also problematic; the enterprise is not able to order them to support local shops. The only possible solution is a change in the regional, or national, policy and implementation of tools to support local economies.

CONCLUSIONS

It follows from the above-mentioned that the calculation of the LM2 is applicable in practice. Therefore, it is possible to apply it to other subjects. To determine the LM2 score, available exact data of the accounting system of the researched organization can be used. The calculation of the LM3 is also applicable in practice, yet it must be said that the correctness of the calculated LM3 score depends on the questionnaire survey (i.e. the number of the filled-in questionnaires).

The local multiplier seems to be a potential tool for investigation of the cash flows in the local economy of a region as well as one of the possible methods to determine the potential of the socio-economic functions of forest management with regard to economic development of the area of interest.

The LM may be employed in the following ways:

(*i*) to explore the economic benefits of a forest enterprise (i.e. Lesy České republiky, s. p., Vojenské lesy a statky ČR, s.p., urban forests, communal forests, private companies in forestry, etc.) to the region;

(*ii*) to determine the economic benefits of the operator founded to ensure nature and landscape protection and conservation (National Park, Protected Country Area, etc.) to the region;

(*iii*) to determine the economic benefits of timber or furniture producers (private companies – Inc., Ltd.) to the region;

(*iv*) to explore the economic benefits of a town (as a lower local authority) to the region;

(v) to explore the economic benefits of any organization (also outside the forest management, forest and timber industries, and nature protection and conservation) to the region;

(*vi*) to determine the extent of the impact of recreation on the local economy in the demarcated area of interest, used in combination with the travel costs method and contingent valuation method – prevailingly, the approach focused on the will to pay is used;

(*vii*) to create an overall view of the economic independence of the region and of the extent of the region's dependence on subsidies from both national and European sources.

Above all, the economic benefit may be seen in the increase in regional employment, support to local households, businesses, and companies, and in raising the overall local economy in the region.

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