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THE ROLE OF INFRASTRUCTURE IN ECONOMIC DEVELOPMENT

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Abstract. The role of the business sector in local economic development derives from the fact that businesses, by exploiting local resources and creating new jobs, contribute to the diversification and economic development as well as to the social development of the community.

Therefore this article is based on quantitative research carried out by questionnaire-based survey among businesses in Covasna County. The study is aimed to identify the main infrastructure problems in Covasna County, as well as prioritizing action directions for its development in terms of the local business sector.

The results of research will be the pillars of the evaluation process regarding infrastructure in Covasna County, providing a tool for those charged with developing and implementing local development plans.

Keywords: infrastructure, investments, strategic priorities, economic and social development

1. Introduction

Research questions concerning the operation and development of infrastructure have gained considerable importance in the current economic literature. Regardless of approach, economic theory and practice recognize the key role of infrastructure in regional economic and social development:

Nijkamp [1] argues that infrastructure is one of the tools that lead to the development of a region. It can directly or indirectly influence the socio-economic activities. The author emphasizes that continuous improvement of infrastructure is a condition for regional development policies, but it cannot guarantee regional competitiveness, creating only the necessary conditions for regional developments.

Martinkus and Lukasevicius [2] argue that infrastructure services and physical infrastructure are factors that influence local investments and increase the region's attractiveness.

Infrastructure also has a positive effect on education and health: a healthy workforce with a high level of education induces economic growth [3].

As well as official documents of the institutional environment regarding the regional infrastructure development strategies, recognize its strategic importance:

Between the infrastructure of a region and its economic and social development is a biunivocal relationship. The development potential of a region is higher as the region has a more developed infrastructure. This is the reason why in the future regional development strategies among the priority axes it can be identified the development of the above mentioned infrastructure types [4].

Undoubtedly infrastructure is among the most important factors of national or regional economic competitiveness, along with macroeconomic stability, goods market efficiency, labor market efficiency, market potential, the level of workforce training [5].

2. Defining the problem to be investigated and establish research objectives

Based on these considerations, it was proposed to establish an empirical research based on a questionnaire among economic agents in Covasna County.

The aim of this study is to identify the degree of dependence of economic activities in Covasna County approach to infrastructure and outlining the way the issue of infrastructure development is perceived by local businesses.

Starting from a clear definition of the investigation purpose it should be established research objectives, namely:

– Identifying the role of infrastructure in the site selection for various economic activities;
– Determine the influence of the level of infrastructure development on economic performance of firms;
– Determining how public infrastructure contributes to private sector productivity;
– Identifying the infrastructure development by local businesses;
– Hierarchy directions of action to develop infrastructure of a county.

From the main purpose and the specific research objectives there were formulated **seven hypotheses**, each targeting distinct issues within research approach that will be presented later.

3. Research Methodology

To identify the perception of businesses to the level of infrastructure development in Covasna County it has been used a quantitative research based on a questionnaire technique.

The questionnaire contains thirty-five questions and it is divided into four sections. The first section is the introduction containing general questions about the organization that respondents lead and it's work.

In the second section are formulated questions that are meant to demonstrate directly the proportional relationship between economic activity and the level of infrastructure development.

The third section contains opinions about the current economic development of public infrastructure and its role and importance in Covasna County's economy.

Finally there were formulated some framing questions that group respondents in different demographic and socio-economic categories as: age, position in the organization that they represent, their educational attainment, gender and address of residence.

The research was carried out on a probability sample to ensure representativeness of the whole population. The sampling required to form probabilistic sample is the complete list of all businesses in Covasna County. Given that the sample has to follow the structure of the population regarding the relevant characteristics as well as the hypothesis due to which the answer of the respondents present differences in compared with the field of activity of economic units that they lead, the validation of the sample was carried out by using the activity field as the control variable.

The validation of the sample is carried out by means of a test for comparison of differences between the percentages [6]. One such test involves as the null hypothesis, for the variable considered, the equality of the percentage for the population studied (π) with the proportion existing in the sample (p) conversely, in case of the alternative hypothesis.

So H_0: $\pi = p$ and H_1: $\pi \neq p$

The relation of the difference test of the percentage is:

$$z_{calc} = \frac{|\pi - p|}{\sqrt{\frac{p(100-p)}{n}}} \quad (1)$$

If the probability that guarantee results is p = 95%, corresponding to the theoretical value of the coefficient z from the standardized normal distribution table, for a bilateral test is 1.96.

From Table 1 [7] it can be observed that in all cases calculated z is lower than its theoretical value, 1.96, as a result, it will be accepted the null hypothesis, which means that there are not significant differences between the percentage of firms in different fields and that registered at the level of the studied population. The sample was validated for all fields of activity.

Table 1. Representation on fields of activity of economic agents at the level of Covasna County and of the sample's level [7]

Branch	Population		Sample		$z_{calc.}$
	Absolute frequencies	Relative frequencies	Absolute frequencies	Relative frequencies	
Agriculture, forestry and fishing	219	5.18	4	3.17	1.28
Industry	660	15.60	16	12.70	0.98
Construction	391	9.24	12	9.52	0.11
Trade	1585	37.46	38	30.16	1.79
Transport, storage and communication	428	10.12	20	15.87	1.77
Hotels and restaurants	252	5.96	8	6.35	0.18
Financial intermediation, insurance, real estate and business services	431	10.19	18	14.29	1.31
Other activities and services	265	6.26	10	7.94	0.69
TOTAL	4231	100	126	100	

As shown in Table 1 the sample includes 126 companies from Covasna County. From the point of view of the main activities carried out by firms, it should be underlined the following:

⇨ 3.17% is active in agriculture,
⇨ 12.70% is present in production,
⇨ 9.52 % is working in construction,
⇨ 30.16% are commercial establishments
⇨ 6.35% has touristic activity and restaurants
⇨ 14.29% is represented by financial intermediation, insurance and professional activities,
⇨ 15.87% has transport and communication activity and 7.94% has other service activities.

The survey was sent to subjects mostly by electronic mail (email), but the questionnaire was administered personally as well at headquarters of the economic agents, completed in an autoadministrativ mode.

All raw data obtained after the questionnaires were processed using SPSS (Statistical Package for the Social Sciences) and Microsoft Office Excel.

4. The results of the research

Further it is presented the synthesis of hypotheses that have been made on the basis of validating or invalidating responses by the 126 operators in Covasna County, as follows:

Hypothesis no. 1. A large number of traders believe that infrastructure and accessibility of the location is a very important factor in the site selection for carrying out various economic activities.

After analyzing the responses given by the respondents (Figure 1), results that 56.3% of businesses believe that infrastructure and its availability is a very important factor in the choice of location. Likewise a large proportion, 27% of the economic agents believe, that this factor is important in terms of selecting of location for economic activity carried out. Therefore this first hypothesis is validated.

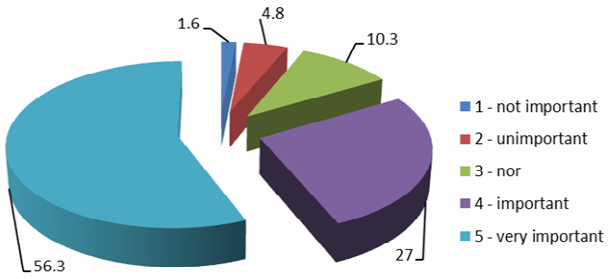

Figure 1. The importance of infrastructure in site selection

Hypothesis no. 2. The quality of any infrastructure is considered to be a very important factor in increasing the economic performance of organizations (Table 2).

The elements of technical infrastructure are considered most important in increasing the economic performance of firms, these answers have obtained the highest scores, namely: infrastructure, utilities, transportation, and telecommunications.

Social infrastructure components are represented by the "whatever" option, meaning that according to the respondents the existence or absence of such facilities does not affect in any way the performance of firms. Thus the second hypothesis is validated only partially, not all categories of infrastructure have the same importance in enhancing economic performance.

Table 2. Descriptive statistics to evaluate the importance that economic agents attach to different types of infrastructure in raising economic performance

		Utilities	Transport	Phone services	Internet	Cultural infrastructure	Health	Education	Tourism
N	Valid	126	126	126	126	124	126	126	126
	Missing	0	0	0	0	2	0	0	0
Mean		4.76	4.49	4.87	4.55	3.42	3.76	3.52	3.56
Std. Error of Mean		0.055	0.068	0.034	0.052	0.070	0.080	0.074	0.093
Median		5.00	5.00	5.00	5.00	3.00	4.00	3.00	3.00
Mode		5	5	5	5	3	3	3	3
Std. Deviation		0.612	0.767	0.379	0.588	0.777	0.898	0.827	1.047
Variance		0.375	0.588	0.144	0.346	0.603	0.807	0.683	1.097

Hypothesis no. 3. The majority of respondents believes that after the development of public infrastructure, the activity of the economic entities that they lead would register a substantial increase.

To highlight the link between improving the level of public infrastructure development and increasing economic performance of entities from Covasna County x^2 test was applied [8].

Testing will start from the statistical hypotheses:

H0: There is no significant difference between the frequencies obtained on the statement "After the development of public infrastructure the activities of economic entities would register a significant growth" and expected frequencies.

H1: There are significant differences between the frequencies obtained on the statement "After the development of public infrastructure the activities of economic entities would register a significant growth" and expected frequencies.

The paper is continued with the table of frequencies in which are compared the observed frequencies with the expected ones according to the null hypothesis for each category. According to null hypothesis for each category should be at least 42 people. The last column gives the differences from the expected values for each category.

Table 3. Do you feel that after the development of public infrastructure the activity of your company would register …

	Observed variables	Expected frequencies	Difference
an insignificant increase	44	42.0	2.0
a significant increase	74	42.0	32.0
no change	8	42.0	-34.0
Total	126		

Table 4. Values for x^2 (Chi- Square)

Chi-Square(a)	52.000
df	2
Asymp. Sig.	0.000

a 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 42.0

From 126 economic agents 74, representing 58.7% believe that from development of infrastructure the activity of firms would register a significant increase, while 44 (34.9%) predicts a slight increase.

The result of x^2 test validates as well the hypothesis ((x^2 calc = 52.00) > (x^2 0.05·2 = 4.30)), therefore the null hypothesis is rejected and the alternative hypothesis is accepted.

In conclusion it is guaranteed with a 95% probability that there are significant differences between the response options, with a focus on responses as: "a significant growth" and therefore it is accepted the general hypothesis as well meaning that after the development of public infrastructure the activity of firms would register a significant growth.

Hypothesis no. 4. A relatively large part of economic agents invest in their own infrastructure from predominantly external sources (credits).

Most companies (73%) in the last 5 years have invested in its own infrastructure, but the source of these in the majority of the cases (64.1%) were their own and this hypothesis is invalidated.

Even though economic agents do not have benefited so far from the opportunities offered by joint projects of public interest, 74.6% of them claim that public - private partnership would still mean a way forward for infrastructure development.

Hypothesis no. 5. A relatively small proportion of respondents consider that in the last ten years the development of public infrastructure in Covasna County has improved substantially.

Responses focused strongly on "improved" (72.85%) in all types of infrastructure. A substantial improvement was indicated by 14.28% of respondents. Substantial worsening of infrastructure has not been selected.

How unquestionably infrastructure development leads to economic and social development **hypothesis no. 6** was formulated: A relatively small part of economic agents believe that in the last 10 years the economic and social situation has improved substantially in Covasna County.

The economic agents were asked to evaluate changes in the last 10 years in the social and economic development of the county. The results are shown in Table 5.

Table 5. Table of frequencies concerning changes in the last 10 years in the economic and social development of Covasna County

		Absolute frequency	Relative frequency	Valid percent	Cumulative percent
Valid	substantially improved	2	1.6	1.6	1.6
	improved	78	61.9	61.9	63.5
	no change	36	28.6	28.6	92.1
	worsen	8	6.3	6.3	98.4
	substantially worsen	2	1.6	1.6	100.0
	Total	126	100.0	100.0	

Contrary to the hypothesis the majority of the economic agents (61.9%) feel an improvement in the economic and social situation of the county. An unchanged situation was indicated by 28.6% of economic agents, while only a small percentage 3.2% of the respondents believe that the changes that have occurred are negative.

Hypothesis no. 7. The majority of the respondents identified business infrastructure as the most important factor in economic development, therefore concerning the measures and actions considered in development strategies should be given priority to the development of such infrastructures (Table 6).

Table 6. Ordering directions of action for infrastructure development - Descriptive statistics

		Housing and public utilities	Transport	Telecommuni-cations	Health	Education	Cultural arts	Business and Tourism
N	Valid	124	124	124	124	124	124	124
	Missing	2	2	2	2	2	2	2
Mean		2.92	3.10	4.73	2.98	3.74	5.40	5.10

After evaluating the quality of infrastructure and the economic and social development level, the economic agents were asked to prioritize its targets in local development strategies to develop infrastructure of the county.

Priority number 1 will mean the type of infrastructure achieving the lowest priority number, priority number 2 will mean the next in size and so one.

Therefore based on the answers given by the local economic agents the final rank of priorities in infrastructure development is:

1. Housing and utilities infrastructure
2. Health infrastructure
3. Transport infrastructure
4. Educational infrastructure
5. Telecommunications infrastructure
6. Business and tourism infrastructure
7. Cultural artistic infrastructure.

Business and tourism infrastructure only occupies the penultimate place in the ranking.

The formulation of the ultimate hypothesis is based on the results of the multi-criteria analysis [9] carried out by authors with its help it was determined the importance of various types of infrastructure in determining the overall performance of the infrastructure, from where the following hierarchy results:

1. Business and tourism infrastructure
2. Telecommunications infrastructure
3. Transport infrastructure
4. Housing and utilities infrastructure
5. Cultural artistic infrastructure.
6. Educational infrastructure
7. Health infrastructure.

Other directions of action which in the opinion of economic agents would help raise the economic competitiveness of the county are:

– development of agriculture;
– supporting SMEs;
– improved quality of products and services;
– attracting foreign investors;
– use of renewable energy;
– completion of construction of highways and airport building Ghimbav;
– collaborations, partnerships and exchange with counties having similar character in other European countries.

As a conclusion of the research it can be underlined that, contrary to expectations, hypothesis made, the economic agents are pleased both with the investment efforts of local authorities in terms of infrastructure development as well as with the economic and social developments in Covasna County.

However in the context of the current analysis, there are present some recommendations:

– increasing financial allocations in infrastructure development;
– further attention to county infrastructure plans;
– promoting a regional economic policy compatible with the European Union aimed at the legal and institutional frame, deepening it and incorporating the principles of administrative and financial decentralization.

In the future with solving these problems the strategies will have the expected results

References

1. Nijkamp, P. (1986) *Infrastructure and regional development: A multidimensional policy analysis*, Empirical Economics, Vol. 11, no. 1, p. 1-21. Available at: http://link.springer.com/article/10.1007%2FBF01978142. Accessed at: 03.07.2012
2. Martinkus, B., Lukosevicius, K. (2008) *Investment environment of Lithuanian resorts: Researching national and*

local factors in the Palanga case. Transformations in Business & Economics, Vol. 7, no. 2, p. 67-83. Available at: http://connection.ebscohost.com/c/articles/35941239/investment-environment-lithuanian-resorts-researching-national-local-factors-palanga-case. Accessed at: 04.05.2013

3. Snieska, V., Simkunaite, I. (2009) *Socio-economic impact of infrastructure investments.* Engineering Economics, no. 3, p. 16-25, ISSN 1392-2785. Available at: http://archive.minfolit.lt/ arch/22501/22555.pdf. Accessed at: 04.05.2013
4. *** *Strategia de dezvoltare regională 2014-2010, Axa prioritară 1. Dezvoltare urbană, dezvoltarea infrastructurii tehnice şi sociale regionale* (*Regional Development Strategy 2014-2010, Priority ax 1. Urban development, regional technical and social infrastructure development*). Available at: www.adrcentru.ro/Detaliu.aspx?t=Strategia2014-2020. Accessed at: 16.07.2013 (in Romanian)
5. *** World Economic Forum, "*Global Competitiveness 2012-2013"*. Available at: http://www.weforum.org/issues/global-competitiveness. Accessed at: 04.12.2012
6. Lefter, C. (2004) *Cercetarea de marketing. Teorie şi aplicaţii* (*Marketing Research. Theory and Applications*). Infomarket Publishing House, ISBN 973-9240-13-5, ISBN 973-9240-70-4, Braşov, Romania (in Romanian)
7. *** *Direcţia judeţeană de statistică Covasna* (*Covasna County Statistics Department*). www.covasna.insse.ro (in Romanian)
8. Constantin, C. (2006) *Sisteme informatice de marketing* (*Marketing Information Systems*). Infomarket, ISBN 973-8204-89-5, Braşov, Romania (in Romanian)
9. Bogdan, L., Moga, M. (2013) *Multicriteria based ranking of territorial administrative units in Romania according to the aggregate index of infrastructure.* Research and Science Today, no. 1 (5)/ 2013, ISSN-e: 2285-9632, p. 233-245. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2245816. Accessed at: 06.04.2013