

RESEARCH ARTICLE

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A preliminary Quantitative Analysis of Rural Development in Romania Using the PLS-SEM

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Abstract

As a consequence of the transition from a centralised economy to an open one Romanian farms have completely changed their productive structure even if the vast majority of these enterprises are scattered in small rural villages and the socio-economic unbalances compared to the other European Union nations have been very significant and arising. Pivotal has been the role and function of financial subsidies allocated by the Common Agricultural Policy in reducing the socio-economic marginalization of rural territories before the EU enlargement and after the accession of Romania to the European Union. The main purpose of this research was to assess by a quantitative approach the relationships among the financial subsidies allocated by the European Union Common Agricultural Policy and the socio-economic development in Romania in two different years: 2011 and 2016. The methodology has used the PLS-SEM. This modeling has been fundamental in assessing the main cause-effect relationships in a model able to estimate the rural development. Findings have corroborated the positive role of financial subsidies allocated by the Common Agricultural Policy in mitigating the socio-economic unbalances in Romania and in particular research outcomes have strengthened a positive and modest role of agritourism in reducing the socio-economic marginalization in rural areas. By contrast, pivotal has been the efficient use of financial subsidies and supports allocated by the EU towards Romanian rural territories.

Keywords: rural depopulation, agritourism, Common Agricultural Policy, second pillar.

1. Introduction

Romania is characterized by lots of small rural villages and it has got also a significant endowment of natural and touristic resources; by contrast, an inadequate level of social capital, financial capital and infrastructures and human capital are severe bottlenecks able to act to the rural development of the nation [9] [17]. Over the time and according also to the recent data published by the Romanian Institute of Statistics (INSSE) Romania has suffered a sharply decline of people which since 2005 to 2017 has had a drop of 2 million of people due to the emigration from the rural territories [10]. However, statistical data have pointed out an increase of urbanization in Bucharest-Ilfov area with the consequence to strengthen the dichotomy between rural and urban areas due to unbalances in economic variables and in political factors as well [25]. The emigration has involved predominately the rural population which represents more than 45% of the

Romanian people and it has suffered an overwhelming change in terms of structural and institutional scaffolding with direct effects on the competitiveness and employment opportunities in rural territories [19]. Comparing Romania to other European countries outcomes have pointed out significant economic imbalances due to institutional features and to the transition from a different economic context after the collapse of the Berlin's wall and consequentially the framework within which farmers have to operate is not so particular brilliant and in favour of Romanian rural territories which over the time have fostered the emigration towards urban areas deemed more socio-economic attractive than the rural ones [5][10]. Several scholars have criticized as subsistence farms do not have to be supported in a competitive and demanding agricultural productive framework without reducing the financial supports and aids towards farmers [5]. In the process of transition from a centralised economy to an open one the rural areas have suffered the most this

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phase and the development of individual farms no more collectivized and the level of social and human capital have driven and influenced the development in rural territories even if the age of farmers remains one of the most bottleneck in acting on the management and efficiency of farms [24].

A realistic growth in the Romanian primary sector of 3.5% per year and a production per hectare above a threshold of 2.500 euro per hectare are two pillars able to reduce the farmer's income imbalances in the next 20 years [7]. This implies the noteworthy role of the financial subsidies disbursed by the Common Agricultural Policy in lessening socio-economic disparities among EU countries throughout many opportunities in downsizing the socio-economic divide to other countries [9] [15]. Based on a long-time investigation using a quantitative approach the Romanian primary sector has also pointed out a significant increase of the labour productivity and the added value in the primary sector able to ensure to the Romanian agriculture level of produced output and technical and economic efficiency closer to other European countries by an intense use of input which are labour and time saving as well [30].

In general, the primary sector both in European countries over the last recent recession time occurred in 2008-2010 and also in other nations has had a positive role in reducing the poverty and in enhancing the development of rural areas which anyway need of specific initiatives aimed at reducing their socio-economic marginalization [1]. Lots of authors, whose studies have been focused on the new western European states, have pointed out a significant growth of on-farm activities such as rural tourism which have involved in particular disadvantaged rural areas where employment opportunities are scarce. Hence, this has emphasized, in particular during the economic crises in 2008-2010, the role of the primary sector in being a buffer sector able to avoid the socio-economic marginalization in rural territories with an adequate capability in setting up new job opportunities [2][9] [21] [22].

The public administrations both at a local level and also to the upper level such as the European Commission have to support lots of rural development initiatives in rural territories aimed at reducing socio-economic marginalization [2] [10] [11] [12] [21] [22] [29]. The Leader project seems to be more adequate than other initiatives financed by the European Union in supporting a local, cohesive and integrated rural

development path generating some specific networks in an integrated approach able to engaged all actors in promoting the rural development [11] [12] [16]. In fact, Romanian agriculture has different priorities than other typologies of agriculture widespread in other European countries which are high specialised and with level of farmer's income far away from the subsistence and semi-subsistence threshold found in Romania hence, the targets of Romanian farms have to be focused to the pluriactivity and multifunctionality where an adequate level of infrastructures is a *conditio sine qua non* for a balanced economic development of rural territories [20].

The agritourisms, rural tourism and other activities in farms with a low impact on the environment are pivotal in Romanian small scattered rural villages in the framework of a holistic and sustainable development [4] based on multifunctional farms pivotal for the rural development [6] able to exploit the cultural heritage endowment in rural Romanian areas. Agritourism solving partially the socio-economic issues in these areas at risk of marginalization is a good opportunity of economic growth and sustainability in Romania [27], in particular in areas where deep-rooted is the nexus between tourism-food-heritage capital. Before the enlargement of the European Union, some authors have argued the fundamental role of financial subsidies towards small farms managed by young farmers in new central and western member states of the EU considering that there is a significant dichotomy between large and small farms [26]. Comparing these results assessed by previous authors to a most recent investigation carried out after the accession of Romania to the European Union in 2007 till 2013 research findings have pinpointed significant disparities among European countries [3]; therefore, according these authors, the target of convergence has not been achieved due to a lag in infrastructures endowment and to a modest level of diversification in farms and in rural territories which are tingly linked to the primary sector and to the farm activities.

2. Aim of the research

The key purpose of this research was to asses by a quantitative approach the main relationships among the financial subsidies allocated by the European Union Common Agricultural Policy and the socio-economic development in Romania in two different years: 2011 and 2016. Further, the research main question was: is the rural development in Romania an holistic phenomenon? The source of the data used in this paper

has been made by some datasets published by the Romanian Statistical Institute (INSSE) in its own TEMPO time series. Furthermore the data published by the European Commission in the Farm Accountancy

Data Network website have been used in order to evaluate the financial supports allocated in the first and second pillar of the Common Agricultural Policy.

Table 1. Main correlations among investigated variables in all Romanian counties year 2011. In bold values with significance at 5%. (Source: author's elaboration on data on the website INSSE TEMPO time series; <http://statistici.insse.ro/shop/?lang=en> and FADN dataset published on the website http://ec.europa.eu/agriculture/rca/database/database_en.cfm)

	Population density	Population < 15 year	Population > 65 year	GDP per capita	Labour productivity	Poverty people	Agritourism	Bed in agritourism	CAP subsidies	RDP subsidies
Population density	1	0.713	0.793	0.752	0.611	-0.247	-0.114	0.291	0.171	-0.180
Population < 15 year	0.713	1	0.931	0.597	0.425	-0.031	0.036	0.130	-0.008	-0.158
Population > 65 year	0.793	0.931	1	0.630	0.459	-0.025	-0.011	0.161	0.023	-0.247
GDP per capita	0.752	0.597	0.630	1	0.904	-0.448	0.000	0.236	0.381	-0.076
Labour productivity	0.611	0.425	0.459	0.904	1	-0.536	0.068	0.254	0.543	0.060
Poverty people	-0.247	-0.031	-0.025	-0.448	-0.536	1	-0.256	0.224	-0.213	-0.637
Agritourism	-0.114	0.036	-0.011	0.000	0.068	-0.256	1	-0.047	0.003	0.504
Bed in agritourism	0.291	0.130	0.161	0.236	0.254	0.224	-0.047	1	0.656	-0.039
CAP subsidies	0.171	-0.008	0.023	0.381	0.543	-0.213	0.003	0.656	1	0.211
RDP subsidies	-0.180	-0.158	-0.247	-0.076	0.060	-0.637	0.504	-0.039	0.211	1

3. Methodology

In order to estimate the main relationships involved in the process of rural development and also in assessing the cause-effect nexus among socio-economic variables in Romanian rural territories one has used the Partial Least Square Structural Equation Modeling (PLS-SEM) through the software SmartPLS v.3.2.7 student version [23]. The software STATA 13 IC has been used in order to estimate the correlations coefficients among all investigated variables.

In literature, lots of studies in the framework of the multivariate analysis have defined an indicator and an estimator able to assess the impact of financial subsidies to Romanian farmers as investigated in other researches focused on investigating in depth the rurality and multifunctionality [8][9]; by contrast, not so common is to find the PLS-SEM approach in some researches in the primary sector aimed at estimating the rurality and which items have acted to the its construct.

The investigation has assessed the cause-effect relationships in a small sample of Romanian part of the FADN dataset in two different year as 2011 and 2016 by the non-parametric approach called Partial Least Square Structural Equation Modeling (PLS-SEM) which fits well to the features of the analysis such as scarcity of theoretical models and a modest dimension of the sample investigated [13] [14] [28]. In fact, the non-parametric model PLS-SEM needs of non-restrictive underlying assumptions compared to the CB-SEM (Covariance Based Structural Equation Modeling) which by contrast has well defined in literature the field of application, the theoretical framework, the constraints and other basic assumptions [14] in the frame of a parametric approach. Furthermore, the Partial Last Square Structural Equation Modelling is also adequate to estimate a modest sample size of investigation units because of there are not well-defined model specifications in the

model aimed at maximizing the difference to the variance [13] [14] [32]. The Structural Equation Modelling describes the causality among latent variables by an iterative methodology aims at estimating the internal and external correlations and values in all investigated latent variables [14] [28] [31] [32].

Roughly speaking the PLS-SEM model can be written considering the differences between exogenous and endogenous variables as [18]: $Y = YB + Z$

where Y is the exogenous and endogenous latent variable matrix and Z is the error which is assumed to be $E[Z]=0$ and the elements in the matrix of coefficients are assumed to be equal to zero when the elements of the adjacency matrix are zero as well [18] and each latent variable is tightly correlated in a direct expression of the previous latent variable in a system on interrelated equations [13] [14] [18].

4. Results and Discussion

In 2011 the variable population density correlated directly to the variables young and older population,

Table 2. Main correlations among investigated variables in all Romanian counties year 2016. In bold values with significance at 5%. (Source: author's elaboration on data on the website INSSE TEMPO time series <http://statistici.insse.ro/shop/?lang=en> and FADN dataset published on the website; http://ec.europa.eu/agriculture/rica/database/database_en.cfm)

	Population density	Population < 15 year	Population > 65 year	GDP per capita	Labour productivity	Poverty people	Agritourism	Bed in agritourism	CAP subsidies	RDP subsidies
Population density	1	0.742	0.795	0.768	0.587	-0.340	-0.101	-0.102	0.665	0.441
Population < 15 year	0.742	1	0.936	0.705	0.558	-0.154	0.039	0.069	0.448	0.271
Population > 65 year	0.795	0.936	1	0.709	0.539	-0.105	-0.060	0.019	0.434	0.180
GDP per capita	0.768	0.705	0.709	1	0.884	-0.507	0.147	0.082	0.698	0.584
Labour productivity	0.587	0.558	0.539	0.884	1	-0.533	0.302	0.106	0.771	0.697
Poverty people	-0.340	-0.154	-0.105	-0.507	-0.533	1	-0.333	-0.183	-0.404	-0.749
Agritourism	-0.101	0.039	-0.060	0.147	0.302	-0.333	1	0.810	0.203	0.455
Bed in agritourism	-0.102	0.069	0.019	0.082	0.106	-0.183	0.810	1	-0.154	0.251
CAP subsidies	0.665	0.448	0.434	0.698	0.771	-0.404	0.203	-0.154	1	0.691
RDP subsidies	0.441	0.271	0.180	0.584	0.697	-0.749	0.455	0.251	0.691	1

The descriptive statistics in the correlation matrix have pointed out in 2016 a completely and dramatically

labour productivity, GDP per capita and number of beds in Romanian agritourism (Tab. 1); by contrast the total financial subsidies allocated by the Common Agricultural Policy or rather pedominate by the first pillar of this EU policy have had a direct impact towards the level of GDP per capita, labour productivity and host capability in farms holidays farms expressed as a proxy variable of bed in agritourism (Tab. 1), Findings have also underlined a direct correlation between CAP subsidies allocated by the second pillar and agritourism and an indirect correlation between the variables people at risk of poverty and financial subsidies disbursed by the EU with the purpose to stimulate the multifunctionality and pluriactivity in farms through the second pillar. This has strengthened the main function of the financial supports for the rural development plan in implementing the agritourism endowment in Romania after the accession in 2007.

change in all Romanian counties (Tab. 2). The people at risk of severe poverty is a typical issue of a county

scarcely populated. This finding has corroborated the need of focusing all initiatives in the governance of the rural development towards these areas predominately located in rural territories.

In general, the amount of financial subsidies allocated by the first and second pillar of the CAP has been directly correlated to the population density. A direct correlation has been found between the variable aids and other financial supports disbursed by the second pillar of the Common Agricultural Policy and the growth of agritourism in 2016. Research outcomes have corroborated their own poor role of financial supports and aids in reducing the poverty in Romanian rural territories or rather that rural areas need of an integrated approach aimed at reducing the socio-economic marginalization in less favoured rural areas.

Table 3 showed the main characteristics of the items and endogenous variables investigated in 2011 and in 2016 in all Romanian counties using the Partial Least Square Structural Equation Modeling.

Findings of the PLS-SEM in all Romanian counties estimated in 2011 have pointed out as the endogenous variables social and gdp-productivity have had values

of R^2 close to 0.728 and 0.730 which implies as the model explain more than 50% of the variance and both these endogenous variable are able to influence and explain for more than 70% the variable rural features (Figure 1). The value of R^2 of rural features has been equal to 0.459 which implies a modest impact of this latent endogenous variable on the variable rurality. The item population density has had a positive and significative impact on the variable rural features; focusing in depth the investigation, findings have underlined as the financial subsidies allocated by the first and second pillar of the Common Agricultural Policy have had a direct and significant impact towards the rurality such as items emigration and people with an age above 65 years old to the endogenous variable social. Addressing the analysis to the significance of each item p values highly significantly have been found in the items productivity in the secondary and tertiary sector and GDP per capita towards the endogenous variable gdp-productivity. In fact, the value of the weigh above 0.50 and the loading above 0.70 have been assessed as an index of the direct impact of the item on the endogenous variable.

Table 3. Endogenous variables and items investigated in PLS-SEM over the time 2011 and 2016 in all Romanian counties

Endogenous variable	Description
social	Socio-demographic features of Romanian areas
gdp-productivity	Productivity in all economic sector and level of per capita income
rural features	Characteristics of rural areas in terms of areas and pluriactivity enterprises
rural	Role of financial subsidies allocated by the CAP
Item	Description
emigration	People permanent emigrated from Romania
over65	Old people living in all Romanian counties
gdppercapita	Gross Domestic Product for each Romanian people
prdprimary	Productivity in agriculture
prodsecond	Productivity in Romanian industries and in other economic sectors with a link to the secondary sector
prodtertiary	Productivity in the services and tertiary sector
Popudens	Population density in terms of people for km ²
agritourism	Romanian farms specialised in agritourism with beds and able to host tourists
land	Area in each county usable for agricultural and forestry activity
Commagr	Financial subsidies allocated by the first pillar of the CAP
Rurdevplan	Financial subsidies allocated by the second pillar of the CAP by the National Rural Development Plan

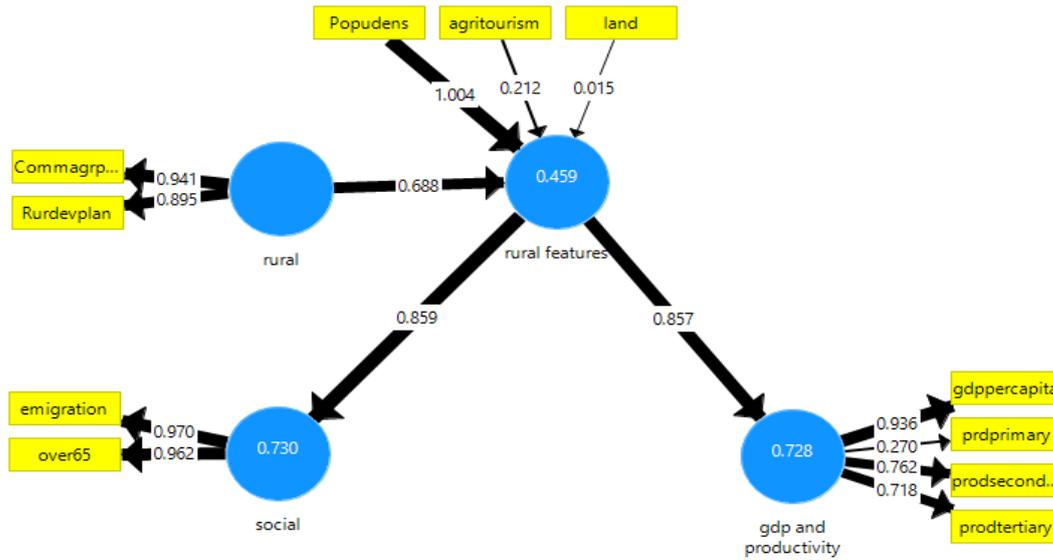


Figure 1. Partial Least Square-SEM findings in all Romanian counties assessed in 2011 (Source: author’s elaboration on data on the website INSSE TEMPO time series <http://statistici.insse.ro/shop/?lang=en> and FADN dataset published on the website http://ec.europa.eu/agriculture/rica/database/database_en.cfm)

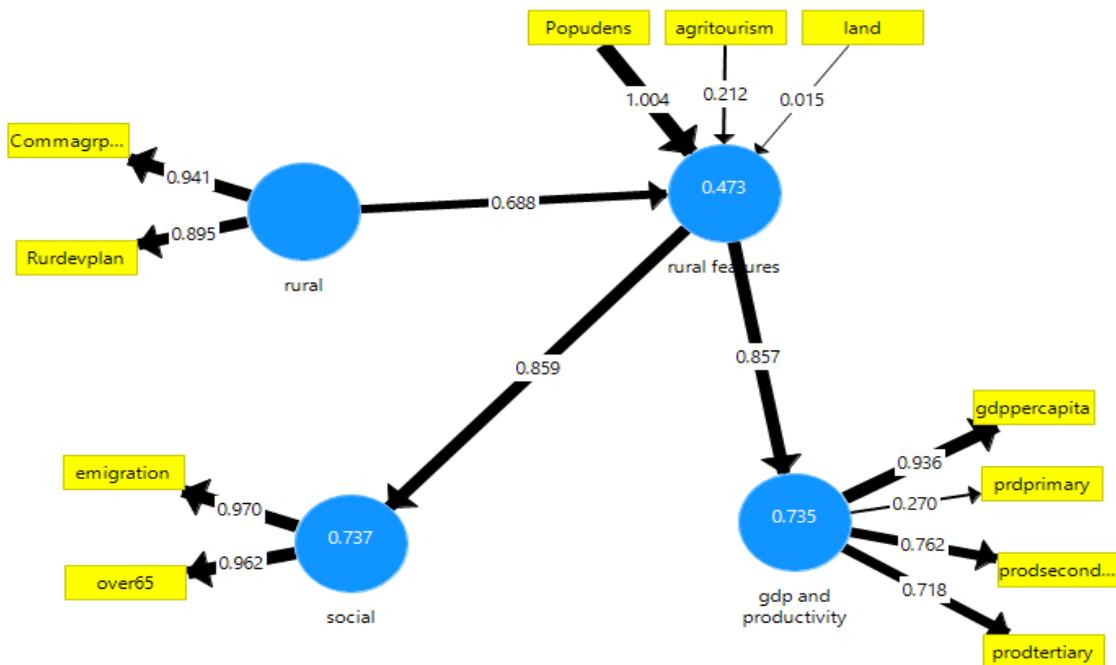


Figure 2. Partial Least Square-SEM in all Romanian counties assessed in 2016 (Source: author’s elaboration on data on the website INSSE TEMPO time series <http://statistici.insse.ro/shop/?lang=en> and FADN dataset published on the website http://ec.europa.eu/agriculture/rica/database/database_en.cfm)

The endogenous variables rural features, social and gdp-productivity have strengthened their own role to the rural variable in 2011 in all Romanian counties. The value of Average Variance Extracted (AVE), which explain the level of convergenet validity in the construct, has been above 0.50 in the endogenous variable gdp-productivity and above 0.80 both in the endogenous variables rural features and also in the

endogenous variable social; this has corroborated as the model is adequate to our target. In fact, all endogenous variables have pointed out values Absoulte Contribution (AC) above 0.70 has implied as the model fits well to investigated targets. The bottleneck in this research has been found in the Standardized Root of Mean Squares Residuals (SRMR) which has been close to the cut off threshold of 0.10 commonly used in the

CB-SEM even if in the PLS-SEM has not been introduced some specific threshold valuee [14].

Research findings in the PLS-SEM over the year 2016 have pointed out an high significance in all loadings and weights which have been above the threshold of 0.70 and 0.50 underlining also a significant role of the endogenous variables rural features, social and gdp-productivity towards the endogenous variable rural (Fig. 2). Comparing two years time of investigation, 2011 and 2016, there has been an increase of the impact of financial subsidies allocated by the Common Agricultural Policy on the variable rural features. Comparing also the outcomes, in terms of p value, assessed in 2011 to some of them estimated in 2016, there has not been significantly changes. In fact, no impacts has been assessed in the items agritourist in activity towards the endogenous variable rural features and productivity in the primary sector to the endogenous variable gdp-productivity. Positive has been the role and the impact of the financial subsidies allocated by the first and by the second pillar of the CAP towards the variable rural which can be assessed as a proxy variable of rurality in Romania. The value of Absolute Contribution has been above 0.70 in all endogenous variables and the highest value has been found in the variable social; the AVE has been above 0.50 in the endogenous variables rural and social instead, in the variable gdp-productivity the Average Variance Extracted has been equal to the threshold of 0.50 which has implied a modest fit of this variable to the model. The value of SRMR has been equal to the optimal value close to 0.10.

5. Conclusions

The role and function of the financial subsidies allocated by the Common Agricultura Policy has been, over the time of investigation, fundamental in the path of development of rural areas and in particular in some of them where the agritourism has been deeply-rooted since the collapse of the Communist regime in the early 1990s and pivotal for mitigating the socio-economic marginalization of rural areas.

The rurality is a complex index and lots are the variables influencing it; in fact, several socio-economic items such as the financial aids and supports allocated by the European Union have pointed out their own specific function in an integrated developmment of Romanian countryside. For the future, it is important to implement financial resources allocated in the second

pillar than the subsidies disbursed by the first one. The support of the CAP is important in poor rural areas and in particular in some of them where there is a significant share of old people aimed at enhancing the generational turnover. The role of the Leader initiative seems to be tailored well in order to face with the new challenges of rural areas because of its imitative ability towards other rural communities and able also to guarantee a diversification in farms supporting new initiatives creating an integrated social environment. In fact, it is important to support small measures able to differentiate rural territories. The cohesive impact of the second pillar of the Common Agricultural Policy is to generate innovative local rural enterprises based on an integrated and multi-sectorial aspects with the purpose to enforce the rural development and reducing the rural depopulation in particular in less favoured areas. In particular, the Leader approach seems to be mainly adequate for the new member states of the European Union because of its intrinsic capability to support local initiatives of socio-economic growth not only focus on the agritourism or rural tourism but to other economic activities tightly connected to rural areas and to support partially living conditions in scattered Romanian rural villages.

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