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Analysis of resilience in Romanian rural farm areas by a quantitative approach

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Abstract

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Romanian rural territories are characterized by small farms grouped, due to their modest land capital endowment, predominately in the clusters of semi-subsistence and subsistence enterprises which are strongly sensitive and dependent to the payments and financial subsidies disbursed by the second pillar of the Common Agricultural Policy. Very interesting has been to define the resilience of rural areas able to stimulate a cohesive reaction fruitful in reducing the socio-economic marginalization in rural territories. The core purpose of this study was to assess by the Partial Least Square Structural Equation Modelling (PLS-SEM) an index able to estimate if rural areas have been able to be resilient in halting their socio-economic marginalization assessing the role and function of financial subsidies allocated by the Common Agricultural Policy towards rural areas development. In this paper the index of resilience in Romanian countryside has been estimated using the data published by the Farm Accountancy Data Network since 2007 to 2017 and other direct statistical sources published by the Romanian Institute of statistics. Research findings have pointed out in the framework of resilience the role of financial subsidies allocated by the European Union, predominately in the first pillar, in reducing the socio-economic marginalization.

Keywords: rural development; Common Agricultural Policy; subsidies; FADN; rural territories

Introduction

The main drawbacks of Romanian rural territories are correlated to two productive bottlenecks such as the ageing people and the poor land capital which have generated a low level of investments in new technologies labour saving and output efficient. Addressing the attention to less favoured areas and inner mountainous rural territories farms need special financial supports allocated by the Common Agricultural Policy (CAP) aimed at reducing the rural permanent emigration and the marginalization of local communities. In turn, it is fundamental to subsidize adequately by less favoured areas payments farmers living in rural areas at risk of depopulation with the core purpose to partially mitigate in one hand the permanent out-emigration and in the other increasing the generational turn-over in the countryside (Galluzzo, 2018a; 2018b; 2018c; 2018d). Stimulating the diversification in the path of the multifunctionality by the second pillar of the CAP towards rural areas some measure of the National Rural Development Programme (NRDP) have been a milestone in the process of transition from a productivism model to a post-productivism paradigm as argued or criticized by several scholars (Almstedt, 2013; Van der Ploeg et al., 2002; Ilbery, 1998; Wilson, 2001; Galluzzo, 2018d). This has implied a new sense of land capital use, more integrated and holistic than before, emphasizing the role of farmers in the provision of environmental services and activities in rural areas as a whole (Almstedt, 2013; Mather et al., 2006).

Romanian rural areas have suffered more than urban territories of an intense permanent emigration as a consequence of the collapse of a centralized and planned economy and a further transition towards an open economy which required a very demanding level of technical efficiency and an arising total factor productivity in farms consequence of an intense capital endowment which has implied a slightly convergence process in productivity in Romania such as in other new eastern countries belonging to the European Union since 2004-2007 (Kijek et al., 2019). Insights published by the Romanian Statistical Institute (INSSE) and by other scholars have found as the phenomenon of rural socio-economic pauperisation and consequently rural depopulation has been mainly concentrated in rural depressed territories close to the border of Moldavia and Bulgaria where highest is the percentage of population at risk of severe poverty or social exclusion. Thus, the European Commission has increased its own efforts in order to reduce the worsening of socio-economic conditions in Romanian rural areas allocating specific funds predominately before the second enlargement to eastern countries in 2007 focused on the upgrade of existing infrastructures (Cionga et al., 2008). During the second enlargement of the European Union in 2007, the Romanian National Rural Development Programme, in terms of indirect payments and financial funds allocated in the second pillar of the Common Agricultural Policy, has subsidized initiatives and specific measures addressed to the diversification in Romanian farms with the purpose to reduce the socioeconomic marginalization in rural areas by agritourism, rural tourism and other traditional activities tightly connected to agricultural and rural traditions able to revitalize the rural contexts.

Lots of studies and researches have pointed out as one of the most crucial bottleneck in Romanian agricultural productive fabric is due to the modest size of utilized agricultural areas which is lower than 5 hectares with negative consequences in technical efficiency in farms and in their total productivity (Madau et al., 2017; Latruffe et al., 2017; Lund & Hill, 1979; Alvarez & Arias, 2004, Galluzzo, 2018d). Furthermore, the modest level of land capital endowment does not enable increasing investments in productive infrastructure and in innovative technologies labour and time saving (Burja & Burja, 2010; Galluzzo, 2018d) supported by decoupled payments aimed at reducing gaps among rural territories (Severini & Tantari, 2013a; 2013b).

In Romania the impact of subsidies allocated by the Common Agricultural Policy towards farmers has been very important and highly path dependent on the level of farm's specialization and on the size of farms in terms of usable agricultural areas (Cionga et al., 2008). According to these authors, large size farms have benefited the most from payments and aids allocated by the European Union; hence, a uniform and standardized typology of governance correlated to the Common Agricultural Policy has corroborated the theoretical hypothesis according to which financial supports subsidized by the CAP have different impacts to the European countries (Anders et al., 2004; Erjavec et al., 2011).

According to the Romanian Statistic Institute, in Romania more than 50% of population live in rural areas and radical transformations occurred in the early 1990s after the collapse of Communist regime have involved the rural space with direct impact towards small farms and their socio-economic continued existence hence, the Common Agricultural Policy by its own specific subsidies has been pivotal in agricultural production and in farmer's level of income (Hubbard & Hubbard, 2008; Galluzzo, 2018d). Hubbard & Hubbard (2008) have argued as farms located in poor rural areas at risk of socio-economic marginalization have been particularly sensitive to financial payments and to exogenous subsidies not coupled to the yield consequence of a transition in the CAP process of reform started in the early 1990s which has had direct and indirect impacts on the resilience and rural development.

Before the definition of resilience it is opportune pointing out as in the theoretical framework this concept which is more complex involving the community, families and organizations taking part in the process with the consequence that this aspect is changing over the time and within different contexts and different topics able to give us an interdisciplinary approach (Steven et al., 2014) which has escaped the concept of resilience in some strictly domains such as biology or psychology.

According to many authors, resilience is a process able to adapt and to cope actions against an adversity (Allen et al., 2011; Luthar et al., 2000). However, this definition is not so clear and it is not a plane explanation of a concept involving several variables. In the same time, an ambiguous definition in the concept of resilience has been tightly linked to different approaches in measuring the resilience in different domains of research using a quantitative methodology and lots of ethical implications (Hosseini et al., 2016; Bergström et al., 2015). In general, Woods in 2015 has clustered the resilience in 4 groups in function of different adjective able to explain this aspect such as a return to *ex ante* phenomenon, robustness and a network able to solve external upsetting phenomenon.

In rural areas the level of resilience in particular in older people communities is completely different from urban areas (Wells, 2009). In fact, according to this latter author, resilience is directly correlated to other inner factors such as the level of skills and knowledge, income, personal status

and age; hence, comparing generally different areas, findings have pointed out in adult communities, different social ties and mental status which are important in resilience (Wells, 2009; 2012). Other scholars, have argued as the resilience is influenced more than the location where investigated people live by other socio-economic variables (McManus et al., 2012).Rural communities have had a significant socio-economic decline in particular in small village; hence, it is important to stimulate interactions in rural community, in their services with the purpose to increase a sense of community and resilience (McManus et al., 2012). Social networks and resilience have been important in older community generating a resilience in rural communities (Wells, 2009). The multifunctionality in agriculture is a positive tool in reducing the socio-economic marginalization in rural territories and in its structural change and transition with direct impacts and links on the resilience (Wilson, 2001). In the same time, very important has been to stimulate in local communities a large and intense process of cohesive initiatives aimed at improving sustainable socio-economic initiatives (Franklin et al., 2011); hence, the second pillar of the CAP and specifically the LEADER initiative has been a pilot measure in increasing the level of rural resilience in disadvantaged rural areas.

Many European rural areas have faced with lots of external socio-economic issues enforcing different actions aimed at halting their socio-economic vulnerability and their capability in contrasting external shocks which is a good tool in describing the rural resilience (Schouten et al, 2009). Heijman et al. (2007) have introduced the concept of rural resilience describing it as a blend of ecological, economic and cultural resilience and some changes in one of this pillar of resilience can affect other domains directly or indirectly connected to it.

A quantitative approach about the assessment of a resilient index in rural areas has been proposed in 2015 by Cox and Hamlet in a framework of the capability of a community to face with external shocks; thus, an adequate arrangement in the role of citizens and in their local culture and social endowment has had impact in the resilience. By contrast Glover (2012) investigated and argued as small enterprises have carried out resilient strategies by innovative actions and a newly culture process in particular during difficult times.

Scott in 2013 has proposed a twofold approach in describing the application of the resilience in rural contexts of research which has broadened alternative quantitative methodologies of research hence, each rural areas is characterised by new perspectives of study, new attributes and functions towards rural areas with direct and indirect effects on strategies in rural policy and in planning their development in a framework of network which has got narrow linkages among all involved institutions, citizens and farms. According to this author rural resilience is an innovative toolkit and an analytical methodology in the path dependence analysis in rural territories which can blend roughly speaking rurality and resilience.

In some European countries such as in Greece, in particular after recent socio-economic crises, rural territories have been pinpointedtowards rural communities which were able to offer a shelter to social and employment degradation with the consequence to increse significantlythe phenomenon of counterurbanization (Anthopoulou et al., 2017). These authors have pointed out in the framework of rural resileince as farmers have deal with a decline in financial subsidies allocated by the Common Agricultural Policy, a drop in job opportunities and a severe downturn putting into actions strategies that have not been well supported by policy makers. This has streghtened the main role of public authorities in supporting and subsidizing the rural resilienceby specific actions in the National Rural Developmnet Programme which has included other different topic and concepts such as the social capital and the realtionships among all stakeholders (Skerratt, 2013; Rockenbauch & Sakdapolrak, 2017).

Aim of the research

The core purpose of this study was to assess by the Partial Least Square Structural Equation Modelling (PLS-SEM) an index of resilience or rather investigate if rural areas have been able to be resilient in halting the socio-economic marginalization in rural areas.

In this paper the quantitative assessment of resilience in rural areas has been carried out over a 20-year time since 1997 to 2017 using other direct statistical sources published by the FAO statistics and by the Romanian National Institute of Statistics (INSSE).

Methodology

The source of data has been made by the findings published by the Romanian Statistical Institute (INSSE) and by FAO statistics. The main target of the paper has been focused in estimating an outline of the resilience in Romanian rural regions using other different variables (Table 1) expanding the time of investigation from 1997 to 2017.

In the assessment of the index of resilience in Romanian rural territories the reliance has been built as an exogenous variable function of other endogenous variables such as areas, made by arable and natural pasture surfaces, infrastructures, proxy variable of the remoteness and segregation in terms of kilometres road according to which the lower is the

Table 1. Main variables investigated in the index of resilience since 1997 to 2017 in Romanian rural areas

Variables name	Unit	Description
Arableland	ha	Arable surface in Romanian countryside
civileconpopulation	n°	People living in Romania
divorcesruralareas	n°	Divorced people in rural territories
Emigration	n°	People permanent emigrated from rural areas
libraryruralareas	n°	Libraries located in rural areas
Museum	n°	Museums in rural territories
naturalpastures	ha	Natural pastures in rural areas
Routesinkm	km	Routes in kilometres
socialprotection	€	Amount allocated to social protection
sports_association	n°	Sport association in rural areas

kilometres the higher is the remoteness. Other social aspects correlated to the general living conditions and proxy variable of the level of resilience in the countryside have been museums and libraries able to implement the level of skills and the touristic flows in rural areas and consequently the social capital endowment. This last endogenous variable is able to describe the level of interactions among people and other social relationships.

The analysis has been carried out using the software Smart PLS 3 in order to estimate the cause effect relationships among variables in the Partial Least Square Structural Equation Modelling (PLS-SEM) (Ringle et al., 2015).

The PLS-SEM is adequate for research's targets because it fits well to the specific features of the analysis and the sample of observation such as: a scarcity of theoretical models in literature able to be copied in other areas of investigation and also a modest dimension of the sample investigated (Hair et al., 2017; 2016; Tenenhaus et al., 2004; Galluzzo, 2018a; 2018b; 2018c). In fact, the non-parametric model PLS-SEM needs of non-restrictive underlying assumptions compared to the Covariance Based Structural Equation Modelling (CB-SEM), which needs of indicator variables distributed normally and it has in literature a well define field of application, *a priori* assumptions, a theoretical framework, some constraints in the model and other basic theoretical general assumptions (Hair et al., 2011; Hair et al., 2012; Hair et al., 2016; Galluzzo, 2018c; 2018d).

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 (Hair et al., 2017; 2016; Tenenhauset al., 2004; Wong, 2013; Galluzzo, 2018a; 2018b; 2018c).

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 (Hair et al., 2017; 2016; Tenenhaus et al., 2004, Wong, 2013; Vinzi et al., 2010; Galluzzo, 2018a; 2018b; 2018c).

The Partial Least Square Structural Equation modelling is a multivariate analysis adequate to estimate unobserved variables indirectly assessed by other independent variables with the purpose to link factor analysis and regression (Galluzzo 2018a; 2018d).

Roughly speaking the PLS-SEM model can be written considering the differences between exogenous and endogenous variables as proposed by Monecke & Leisch (2012):

$$Y = YB + Z,$$

where Y is the exogenous and endogenous latent variable matrix and Z is the error which is assumed to be $E[Z] = 0$; further, the main elements in the matrix of coefficients are assumed to be equal to zero when the elements of the adjacency matrix are zero as well (Monecke & Leisch, 2012); hence, each latent variable is tightly correlated in a direct expression of the previous latent variable in a system on interrelated equations (Hair et al., 2017; 2016; 2011; Monecke & Leisch, 2012).

Results and Discussion

In all Romanian counties part of the FADN dataset findings have pointed out a significant fluctuation in the usable agricultural areas which has been between 5 to 31 ha and in average it has been close to 10 ha due a wide surface cultivated with pastures and forage. The income of farms has been three times higher than the standard threshold defined by the European Union and equal to 1,200 euro even if the minimum value has been consistently under the optimal threshold established by the EU and close to 500 euro. The percentage of people at risk of poverty has been noteworthy above 20% which has implied as in rural areas are the highest risks of severe social and economic exclusion.

Findings in the quantitative model aimed at assessing the rural resilience in Romanian rural areas have pointed out as the endogenous variable social capital has had the highest value of R^2 even if in general the endogenous variables in the model have partially explained the main cause effect relationships and this has corroborated the theoretical hypothesis of a complexity of the resilient topics and the variables involved in its explanation and in its quantitative analysis (Figure 1). Addressing the analysis to the pattern's coefficient outcomes have underlined as between rurality resilience and endogenous

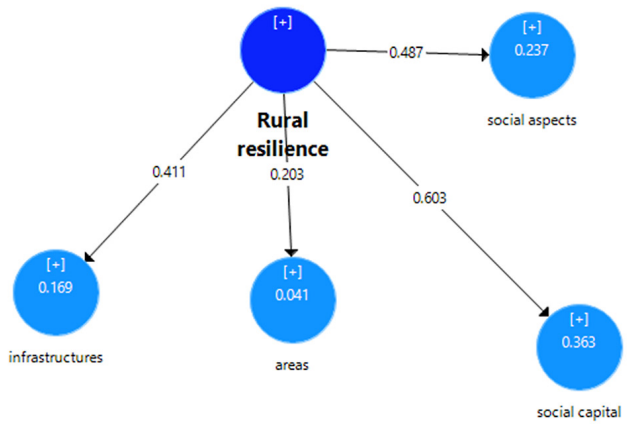

Fig. 1. Main correlation and R^2 values in the resilience estimated by the PLS-SEM in all Romanian regions in the inner model

Source: author's elaboration on datahttp://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and http://ec.europa.eu/agriculture/rica/database/database_en.cfm

variables social capital and social aspects there have been the highest values above the value of 0.40 (Figure 2).

The rural resilience estimated by a quantitative model throughout the PLS-SEM has pointed out as the investigated variables have had an impact towards all endogenous variables (Figure 3). In particular, the items number of sport association, proxy variable of the level of social interactions and relationships and consequently a pretty adequate parameter to estimate the social capital, has had the highest value such as the items number of museums and library in rural areas.

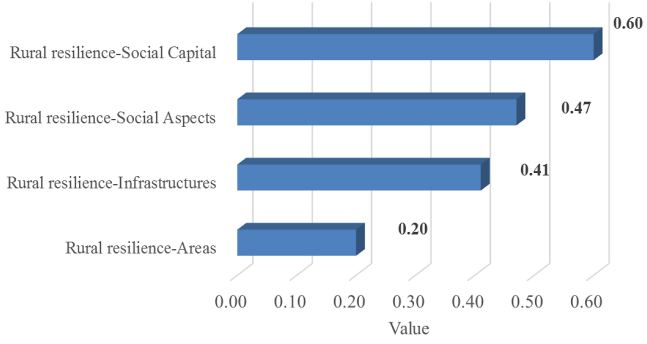

Fig. 2. Analysis of path coefficients in the structural rural resilience model

Source: author's elaboration on datahttp://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and http://ec.europa.eu/agriculture/rica/database/database_en.cfm

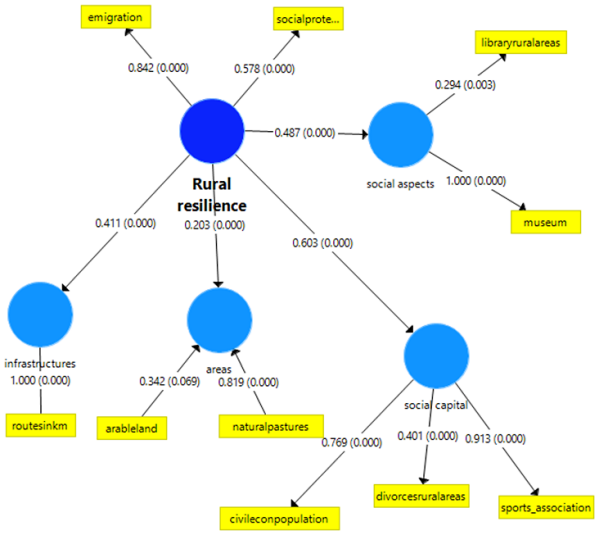

Fig. 3. Main results in the index of rural resilience investigated in all Romanian counties by the PSL-SEM approach

Source: author's elaboration on datahttp://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and http://ec.europa.eu/agriculture/rica/database/database_en.cfm

Conclusion

This research has pointed out an alternative typology of analysis using the quantitative approach for the assessment of the resilient index in rural territories even if in this latter estimation findings have pointed out the complexity in the assessment of this index due to lots of variables involved in it.

Drawing some concise conclusions, findings have argued the positive role of financial subsidies allocated by national and European authorities in strengthening the rurality in Romanian rural areas. The social capital, in terms of generation of a cooperative environment, has had positive impact in stimulating the resilience in rural territories which has been particularly sensitive to the emigration. Summing up, the different level of resilience has been correlated to adequate levels of social capital and other social aspects able to catalyse the growth in rural territories corroborating outcomes investigated during economic crises in some European countries by Anthopoulou et al. (2017).

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