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RURAL AREAS DEVELOPMENT THROUGH ENDOGENOUS POTENTIALS

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Abstract

The main objective of the present paper is to reveal the most important reasons for admitting and supporting a local factor, such as a Union of Agricultural Cooperatives, by the rural residents of a typical Greek region. Moreover, the investigation of the possible dependence relationships among the socioeconomic variables of a market research, which refers to the willingness to purchase dairy products from the Cooperative (the dependent variable) and the independent variables, constitute the intention of the paper. From a methodological point of view, the study extends the employment of categorical multivariate methodologies into rural development issues. Interesting results are revealed from the segmentation of rural populations regarding the drivers of project adoption. In particular, the majority of the potential adopters of the local project face the same, more or less, challenges in supporting local cooperative projects and therefore in supporting their incomes. The survey results indicate the success of the investment project of the Union and the confidence of the local community in a local cooperative organization in supporting the development of the region.

Keywords: Cooperative Investment, Market Research, Milk, Rural Region.

JEL: C420, D190, R510, H540

Introduction

European policies and development strategies for the rural areas refer mainly to those areas with natural and geographical deficiencies, such as the mountainous, insular and less favored. Despite the shift of the Common Agricultural Policy (CAP) in European level towards strengthening the pillar for rural development, the results of these policies are generally characterized as positive, though, at the same time, are of limited range and concern specific areas.

Given the ongoing global economic crisis and the current market oriented developing framework, the local social and economic level might be a challenge and a potential opportunity for specific rural regions. In this context, endogenous local investments towards the exploitation of local primary products can stimulate the development of a region. Such a case is the Union of Agricultural Cooperatives of Amyndeo (UACA), in the Dytiki Makedonia rural region (NUTS 2). The UACA consist a socioeconomic pivot for the region supporting the local income and employment through various activities related to the rural sectors. While, the region is among the less developed in Greece with significant economic problems, it has the highest regional unemployment level (15%) and depends highly on specific economic activities such as mining, electricity production and agriculture.

Livestock is one of the most important sectors in the region, the animal capital, as well as the milk production that ranks among the first in Greece. Despite that, the livestock producers' income is continuously declining the last decade and their market power has been vanished due to the structure of the milk sector in Greece. The sector is dominated by an oligopolistic structure, few and large in size establishments exist with common price policy. The five largest brands dominate the market possessing about 80% market share. Within this context the UACA prefixing its important role for the development of the region as a local factor that is engaged in rural activities and enjoys the trust of the local population decided to investigate the feasibility for a regional dairy industry, in order to exploit the local milk production.

Historically rural cooperatives have been proved important; they were connected with rural life and many rural activities. In this framework, cooperatives as economic units, many times supported the local development (Madane 2002). In the past rural cooperatives activities were mainly related to traditional primary sectors as agriculture, livestock fishing, etc, (Bendick and Egan 1995). Due to the reduction of the primary sector significance and changes in the global economic environment, a decline in the dynamic presence of the cooperatives was followed. The cooperatives revival in turn, was based on their adjustment, either into new generation cooperatives or to specialized production cooperatives (Pischke and Rouse 2004). Modern cooperatives shift their activities to areas such as tourism, culture, energy and other modern services that meet the usual characteristics and resources of their region (Jodahl 2003). These developments have strengthened the cooperatives primarily economic nature, but subordinate and their role in local development process (Brennan and Luloff 2005).

Considering the above context the aim of the current analysis is to examine the willingness of the population of the region to admit and support a local factor, such as the UACA. In specific, the people to support the UACA attempt, to construct the milk-products establishment, that is going to use and exploit local sources and hence to support endogenously the development of the region. The local people by accepting and preferring to purchase the products of the under construction local investment induce the development of their region.

Methodological Background

Data collection

Data were collected through a survey addressing 500 consumers carried out in November 2009. Participants were randomly selected from a list of all consumers in the region, compiled by the national telecommunication organization.

The survey was designed to gain insight to issues related to rural life and especially to milk products adoption parameters of a new UACA plant according to a sample of randomly selected residents. In particular, part of the survey was designed in order to elicit data on respondents' attitudes about the new UACA industry and their views on several prospective changes, desirable or undesirable, according to the literature. The adoption or not of milk products by the local residents is examined in the present study by employing both descriptive statistics and multivariate analysis methodologies. In particular, categorical regression was used to handle the optimally transformed categorical variables in order to find out possible relations between a dependant variable and a set of selected independent ones. Figure 1 presents the general methodological framework of data collection, statistical analysis and obtained results.

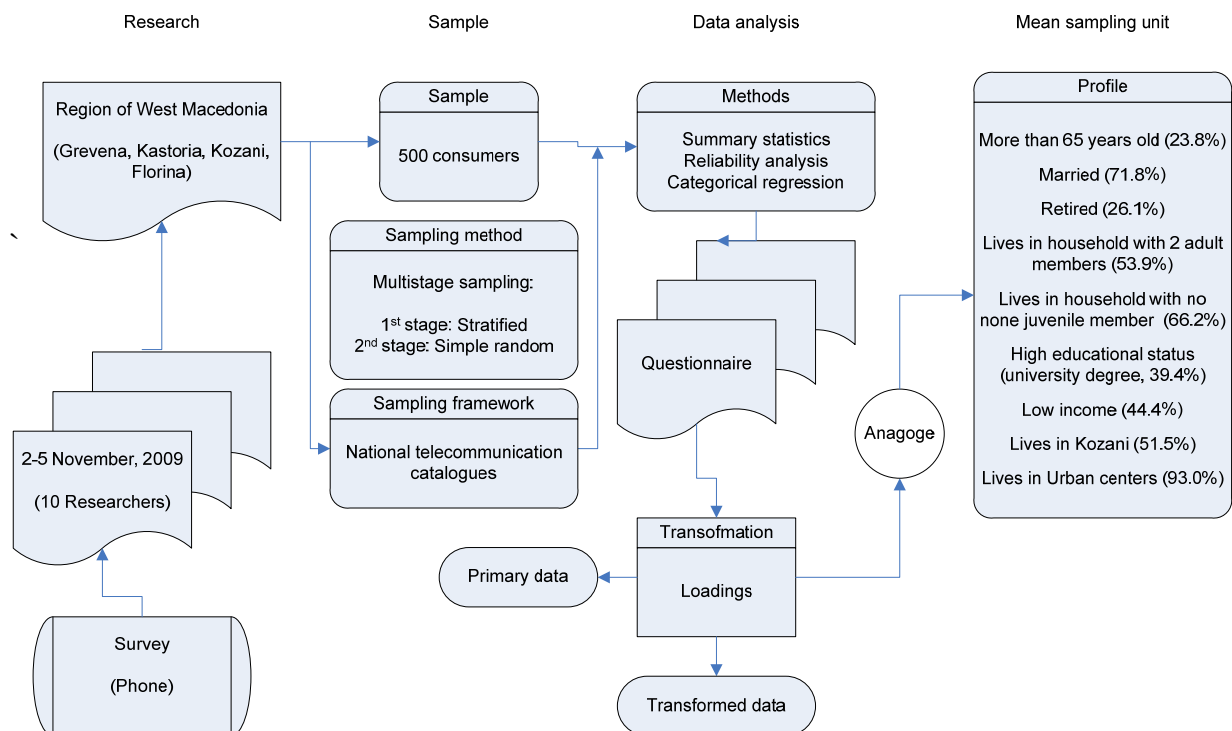


Figure 1. Methodological framework of data collection

Methodology

In this paper, we attempt to investigate the possible dependence relationships among the variables of the questionnaire which refers to the willingness to purchase dairy products from the Amynteon Agricultural Cooperative (the dependent variable) and the independent variables. In particular, we investigate how the individual characteristics of the consumers affect their willingness to purchase.

The interpretation of the contribution of each independent variable on the dependent will assist in the determination of the factors that affect the willingness to purchase of the respondents and will help us estimate the fitness of the model to the research data.

The methodology chosen as most appropriate is the categorical regression and is used when some of the variables are not numerical (equispaced or proportional) or there is suspicion that the relationships among the variables are non-linear (Siardos, 2002).

The categorical regression quantifies the data of categorical variables with the assignment of numerical values to the categories, aiming to the optimal linear regression of the transformed variables (Kooij and Meulman, 1997). This way we obtain the possibility to predict the values of the dependent variable for any combination of the independent variables (SPSS, 2007).

The quantification used for the categories of the variables is the one that maximizes the squared coefficient of multiple correlations between the dependent variable and the group of independent variables. The effect of each independent variable on the dependent is described by the value of the corresponding correlation coefficient while the direction of change of the dependent variable is depicted by the sign of the correlation coefficient.

In performing categorical regression, it is necessary to codify the categories of the variables by using integer numbers. Siardos (2002) states that it is common to use successive integers irrespective of whether the variables are ordinal or nominal. In the contrary, in the case of numerical variables, the relevant codifications are subject to more restrictions. Hence, any codification must maintain the differences between successive categories after their quantification.

Every variable can be analyzed using one of the three types of scaling: The numerical (equispaced or analogical), the nominal and the ordinal. With the numerical scale the categories are considered as ordinal and equispaced, while the differences between the values of the categories as well as the original rank of the categories of the variable are maintained after the quantification (SPSS, 2007). With the nominal scale, the observations that belong to the same category take the same quantitative value while with the ordinal scale we maintain the rank of the categories of the quantified variable.

For the quantification of the dependent variable, it is advisable to adopt its own scale (generally numerical). This way, we avoid the possibility to ignore the differences among the categories of the dependent variable while at the same time the properties of its categories reappear after the transformation (Siardos, 2002).

Regarding the independent variables, it is necessary to investigate the suitable measurement scale. If for all of them a nominal scale is adopted, we usually expect a high value of the coefficient of multiple determinations (R^2) since their nominal treatment does not impose restrictions on the quantifications of the categories of the variables. However, in such cases the interpretation of the results becomes very difficult.

It is worth mentioning that it is the graphs of the transformed variables rather than the values or signs of the correlation coefficients that help significantly in the selection of the suitable transformation scale. Moreover, the transformation of the variables aims to change the non-linear relationship between the original dependent variable and the independent ones into a linear relationship between the transformed variables.

Using the transformed values of the variables, we proceed to calculate the variance-covariance matrix of the variables in order to check for the presence of multicollinearity in the regression, the multiple determination coefficient R^2 for the control of the fit of the model to the transformed data, the multiple correlation coefficient R which measures the strength of the relationship between the transformed dependent and the independent variables and finally the adapted multiple determination coefficient \bar{R}^2 .

We also calculate the typical regression coefficients b , the typical errors, the simple correlation coefficients of zero grade, which express the correlation between the transformed variable Y and variable X (after having removed the linear effects of the remaining independent variables both on X and Y). Additionally, we implement the analysis for the control of the relationship between the dependent variable and the group of the independent variables with the allocation of the variance of its predicted values that are attributed to the regression and the variance not attributed to it (errors-residuals). Moreover, we calculate the “relative importance” measures of Pratt (1987) and the

tolerance measures in order to check for the presence of multicollinearity, as well as the quantifications for each one of the categories of variables and the quantified values of the original observations. Finally, we check the forecasting capacity of each of the independent variables as a result of their transformation, using residual analysis on the transformed data and their graphical plots (scattergrams) in relation to the quantified values of the variables.

The selection of the methodologies have been based on the following rationale: (a) according to SPSS (Ver. 17), to reiterate, ordinal and nominal variables can undermine traditional regression including stepwise and logistic, (b) for ordinal variables, the scale is arbitrary and yet different scales yield disparate findings, (c) for nominal variables, the output is difficult to interpret and may not provide information about all of the relevant comparisons, (d) fortunately, categorical regression analysis, one of the recent options in SPSS, circumvents these problems, (e) essentially, categorical regression converts nominal and ordinal variables to interval scales and (f) this conversion is designed to maximize the relationship between each predictor and the dependent variable.

Area profile

The Dytiki Makedonia region is one of the thirteen Greek regions located in the northwest part of the Greek state and especially in the western district of Macedonia. The region of Dytiki Makedonia includes four separate prefectures: (a) Florina, (b) Grevena, (c) Kastroria, and (d) Kozani. From a geographic point of view the Dytiki Makedonian region holds a central position in the general area of West Balkans as it represents the natural gate of Greece to the northwest borders and especially to Albania and to the Former Yugoslavian Republic of Macedonia (FYROM). The other Greek regions which are adjoining to the Dytiki Makedonia region are the region of Thessaly in the south, the region of Central Macedonia in the east and the region of Epirus in the West. The landscape of the region mainly consists of highlands (69.2%), forest areas (26.0%), rangelands (43.0%) and cultivations or fallow lands (24.0%). The Dytiki Makedonia region includes overall 9,451.6 Km² or 7.2% of the total Greek area (NSSG, 2003). Figure 2 shows the location of Dytiki Makedonian Region as well as the four Prefectures within the study area.



Figure 2. Dytiki Makedonia Region

Results

Table 1 presents the main reasons, on the part of consumers, for admitting and supporting a local factor, such as the UACA. In particular, for the potential adopters of the UACA, the most important reason for adopting the project (mean value=1.839) is that the proposed project will support the income of farmers throughout the Western Macedonian Region. In addition, many potential adopters indicated that the proposed project will support farmers' incomes and thus the income of other rural residents (mean value=2.000), the raw material (milk) is an excellent product (mean value=2.129), the

proposed project will generate cooperative products (mean value=2.286) and that they are coming from a family of cattle-breeders and therefore support the proposed project (mean value=3.263); those were the most important reasons for adopting a local factor, such as UACA. This suggests that the majority of the potential adopters of the local project face the same, more or less, challenges in supporting local projects and therefore in supporting their incomes and thus the income of other rural residents.

Table 1. Reasons for admitting and supporting a local factor, such as the UACA

Reason	Mean Values*
1. The proposed project will support the income of farmers throughout the Western Macedonian Region.	1.839
2. The proposed project will support farmers' incomes and thus the income of other rural residents.	2.000
3. The raw material (milk) is an excellent product.	2.129
4. The proposed project will generate cooperative products.	2.286
5. Coming from a family of cattle-breeders and therefore support the proposed project.	3.263

*Likert scale: 1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree

Further, investigating the willingness of the 500 questionnaire participants to consume dairy products of the Amynteon Cooperative, we included data which referred to 10 variables. After controlling for unusual statistical residuals ($>|\pm 3|$) the questionnaires that were finally included in the categorical regression analysis were reduced by nine (N=491). The co-correlations between the independent transformed variables gave values of the simple correlation coefficients close to zero, thus indicating lack of multicollinearity problems.

The multiple determination coefficient of the categorical regression R^2 took a value of 0.827 which signifies that 82.7% of the variation of the transformed dependent variable is explained by the transformed independent variables which participate in the regression equation. Moreover, the relevant variation analysis gave a value of $F=1.218$ which corresponds to a zero statistical significance level, indicating the good fit of the categorical regression model to the statistical data.

From the standardized correlation coefficients (Table 2) of the independent variables the highest value corresponds to the occupation variable (with a negative sign) followed by the age and gender variables with positive sign.

Table 2. Categorical regression model ($R^2=0.827$)

Independent variables	Standardized coefficients		F	Correlations			Relative importance	Tolerance	
	b	St. error		Zero order	Partial	Part		Before	After
Gender	0.236	0.080	8.060	0.282	0.258	0.228	0.245	0.931	0.775
Age	0.259	0.086	9.033	0.111	0.264	0.233	0.106	0.808	0.785
Marital status	0.112	0.079	2.014	0.097	0.128	0.110	0.040	0.963	0.747
Occupation	-0.293	0.086	11.694	-0.204	-0.297	-0.265	0.220	0.818	0.702
Adult members of household	0.120	0.082	2.145	0.080	0.132	0.114	0.035	0.902	0.882
Minor members of household	-0.115	0.080	2.063	-0.117	-0.129	0.111	0.050	0.942	0.950
Educational status	-0.187	0.080	5.528	-0.126	-0.209	-0.182	0.087	0.948	0.786
Monthly income	0.132	0.082	2.616	0.059	0.145	0.125	0.029	0.906	0.862
Prefecture	-0.227	0.079	8.210	-0.219	-0.252	-0.222	0.183	0.961	0.968
Urbanization	-0.027	0.080	0.117	-0.040	-0.031	-0.027	0.004	0.943	0.861

Among the zero order coefficients, (Table 2) highest are the coefficients that correspond to gender ($r=0.282$), the prefecture ($r=0.219$) and the occupation ($r=0.204$), indicating the bilateral relationship (positive in the first and negative in the other two) which relates each of the independent variables with the dependent, if all the other dependent variables are excluded.

The partial correlation coefficients after removing the linear relationship of the remaining variables from the particular independent as well as the dependent variable, present the highest value for the occupation variable followed by the variables accounting for gender and the prefecture. More specifically, the value -0.297 of the partial correlation coefficient explains $8.82\% [(-0.297)^2]$ of the variation of the tactical values of the dependent variable when the effects of all the other independent variables are removed.

As regards the coefficients of partial correlation the highest value corresponds to the correlation between the dependent variable and the occupation variable. The square of this coefficient expresses the proportion of variance of the dependent variable that can be explained by the quality, relative to the total, once the effects of all the other variables on the specific independent variable are removed. In particular, after removing the effect of all other variables on the occupation, the resulting percentage explains 7.02% of the variance of the dependent variable.

The relative importance of the independent variables appears greater for the gender variable, followed in turn by the occupation variable, the prefecture and the age variables. Taken together, these variables account for 75.4% of the aggregate importance. The lack of multicollinearity becomes apparent from the very high values of the tolerance of the independent, values that express the participation of the variance of each independent variable that cannot be explained by the remaining independent variables.

Figure 3 corresponds to the transformation diagrams, of the dependent variable on the one hand and the four independent variables of the categorical regression that presented high values of the relative importance coefficients on the other. From the transformation diagrams of the independent variables and in conjunction with the sign of the typical correlation coefficient b of Table 2, the willingness to purchase/consume dairy products from the Amynteon cooperative is explained relative to each category of the independent variable and simultaneously the possible differentiations among the categories are highlighted.

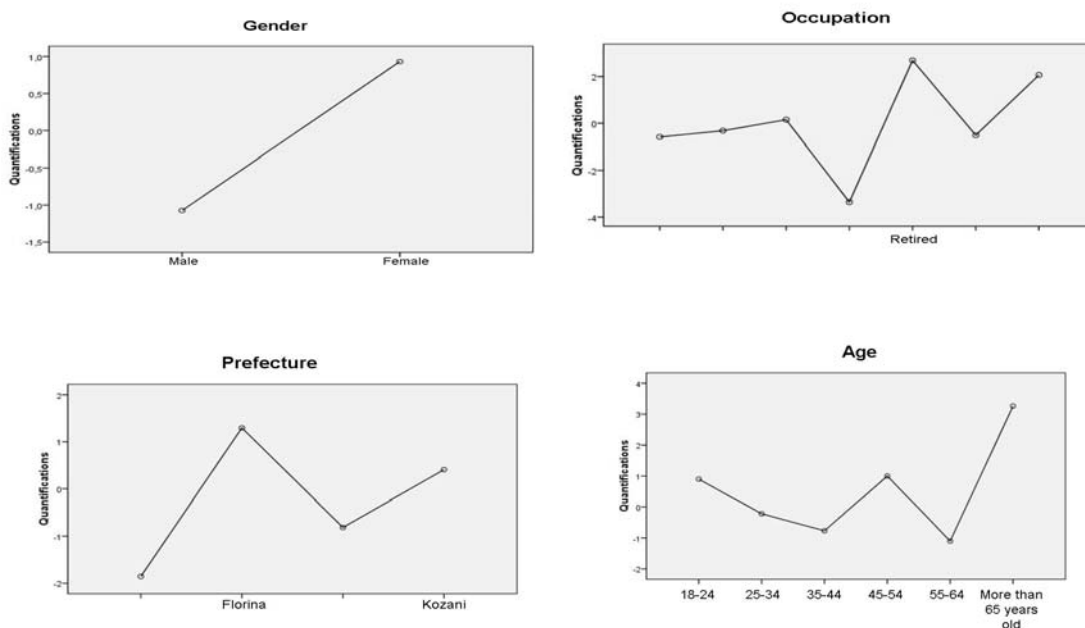


Figure 3. Transformation diagrams of the main independent variables

Conclusions

The proposed project, in order to exploit the considerable quantity of milk in the region and in order to be of assistance to keep the income of farmers in the region, intends to create a dairy industry for production of quality milk and dairy products. Feature is that a significant percentage (45.20%) are willing to buy milk products from the proposed company while an also significant percentage (40.60%) are willing to replace the dairy products respectively from the proposed company. Greater willingness to purchase consumption present the women consumers, retired residents, residing in the prefecture of Florina and consumers aged over 65. Also be noted that 75% of the respondents are willing to pay more money than usual and even some of the respondents (10.81%) are willing to pay more than 50% of the price of conventional milk products. The survey results indicate the success or otherwise of the investment project of the Union and the confidence of the local community in a local cooperative organization.

Nowadays rural areas need reinforcement of the rural development process, through investment and support of domestic production. Several cooperative organizations (associated with the processing and marketing of branded products) have failed to produce positive financial results and to contribute to the local economy and development. However, Greek dairy sector seems to have a positive outlook, which verified from the economic profitability of the largest dairy cooperatives. On the other hand, the local cooperatives, in an effort to gain from the opportunities provided by industry, but also to address the distortions created by dominance of large dairy market (reduction of the producer price, cartels, sales channels, etc.), leads to investment establishing a new dairy and cheese business and to modernize existing ones.

An interesting subject for further research is to extend the questionnaire and the analysis outside Macedonia. It would be useful to investigate if the establishment of the particular production facility could affect demand in the greater area and in the country. In this case, one could explore possible distribution channels, pricing policy scenarios, marketing strategy, packaging etc. The findings of the present study could be further investigated under the optimization model (before and after the realization of the project) with the use of linear programming methodology. It concerns in essence the optimum combination of production capabilities.

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