Transition to Solidarity Economy: a composite indicator for the assessment of territory vocation

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Abstract

This study concerns the possible implementation of "Economic Solidarity Districts" (ESD) in the Friuli Venezia Giulia Region (FVG), located in the North East of Italy. The ESD are geographical areas where the practice of "Solidarity Economy" could be initiated by converting to productive activities and changing the relationships between producers and consumers. Looking at experiences of ESD already operating in Italy, a number of indicators are to be found, aimed at characterizing all municipalities in FVG. This analysis shows that the situations within territories moving towards Solidarity Economy are varied.

1 Introduction

The transition to an economy that respects the environment and acknowledges responsibility for the crisis of global capitalism implies the regions' ability to resume sovereignty on different sectors.

The Western world is not merely facing a financial and economic crisis, but the crisis of a system that involves environmental sustainability, climate emergency (McMichael, 2011) and a system of values and culture (Bonaiuti, 2001). What are the reasons for this crisis? What are the scenarios that lie ahead? What are the strategies needed to recreate a new model of equitable, sustainable and long-lasting coexistence? Moreover, how can such a transition be made?

Many scholars today are approaching the issues of the economy critically, seeking new meanings in a discipline that originally dealt with the management (Eisler, 2015) of the relations between people in the home, the place that more than any other summarizes the essence of people being together with other people.

For many years, a number of economists (Roegen, 2003, Boulding, 1992, Daly, 2001, Bonaiuti, 2001) have focused their attention on the inability to separate the economy from the environment (Bio economist), on the finiteness of the environmental system and the impossibility of infinite growth in a system of finite resources (Hansson and Wackernagel,1999).

Many alternative but significantly different models have been proposed, amongst which: Civil Economy (Bruni and Zamagni, 2004), Economy of Communion (Lubich, 2001), Degrowth (Latouche, 2007), Health economics (Eisler, 2015), Solidarity Economy (Laville, 2003), Economy for Common Good (Felber, 2012) Bioregionalism (Berg, 1978, Hansonn and Wackernagel, 1999). These are all based on the rediscovery of the founding nucleus of the territorial community.

Solidarity Economy is briefly defined as an economic activity that is governed by the principle of reciprocity and initiated by civil actors (Laville, 2003) and Bioregionalism that refers to the organisation of human society within the ecological capacity of a natural region (Gray, 2007) that means living in and acting in a bioregion (Hansonn and Wackernagel, 1999). These movements reconsider the importance of the local community, not only as a space for human relations but also as a space to rediscover the territorial dimension of "being" in a defined physical environment and culture. (Berg, 1978, Gray, 2007). The movement of Bioregionalism proposes locally controlled and locally situated economies that maintain natural capital and provide the maximum quality of life with minimum environmental impact.

Some of these principles were documented and signed at the UN Summit on Environment and Development in Rio de Janeiro in 1992, when a much discussed document, Agenda 21, was released with the innovative proposal to think of a model as building and sharing a subsidiary of Local Action Plans.

Much has been made concrete through proposals that have spread in the north and south of the planet from the various worlds of environmentalism, associations, and groups of local citizens.

Several forms of alternative economic networks are also spreading in Italy.

This study concerns the possible implementation of Solidarity Economy Strategies using a Bioregionalism approach, in the Friuli Venezia Giulia Region (FVG), located in the North East of Italy. This strategy is based on the necessity to re-embed communities in the place in which they live, maintaining the local economy in a proactive relationship with the territory, returning the product to its place of origin, giving centrality back to producers and value to their products, defending both the landscape and Commons as essential components for a better quality of life.. (FVG Regional Law n.4, 23/03/2017). In particular, a composite indicator has been developed, which allows the assessment of the vocation of territories in supporting solidarity economy paths to become "Economic Solidarity Communities" (ESC) meaning: well defined territories, where economic processes are based on relations that are socially, ecologically and environmentally responsive. Vocation is understood to be the ability to initiate and consolidate an ESC. The indicator is based on several elementary indicators, constructed and evaluated with the help of experts.

This composite indicator is applied to an area that corresponds to Territorial Union of Municipalities (TUM) of Friuli Venezia Giulia (Fig.1) which are new institutions (serving several municipalities) in the Friuli Venezia Giulia Region (Regional Law 12 December 2014, n. 26), aimed at the development of a polycentric system that favours the integration of social, environmental and economic policies.

[Figure 1 here]

The study also aims to provide regional and local administrators with information regarding the strong points and the weak points of each Territorial Union of Municipalities in order to address the actions that need to be undertaken to make the region's communities more resilient and sustainable.

The paper is organized as follows. Section 2 introduces the concept of Economic Solidarity Districts. It is followed by Section 3 where, after some arguments related to the choice of a set of measurements of vocation to solidarity economy, the methodology and the data are presented. Section 4 is focused on the discussion over the results while the final Section 5 draws the conclusions.

2   New Economic Solidarity Institutions

In order to discuss transition towards an economic system that takes into account the limits that the environment imposes and that is both fairer and more just, it is necessary to consider which organizational forms can support these paths. In Italy, the network of Economic Solidarity has promoted the development of Economic Solidarity Districts that are defined as laboratories for civic, economic and social experimentation. These ESD networks protect such forms of economy from the destructive competition of the global market. In recent years, numerous ESD's have arisen in various regions of Italy and are made up of citizens who are local producers (firms) and local consumers who share the principles of a solidarity economy (Piani and Minatelli, 2016).

They direct the flows preferentially within the local community as "a model of a small-scale society that is socially and ecologically responsive". In this model, "communities are organised primarily around naturally defined regions, but are outward looking and globally engaged", (Gray, 2007:790). In practice, an ESD operates within a given territory, geographical areas, exchanging cultural, social and economic values, focusing on local dimensions (Santarossa and Piani, 2011).

In the FVG region, a bottom up new law (n. 4/2017) recognizes and evaluates the Community of Solidarity Economy as consisting of new institutions formed by residents of the Territorial Inter-

municipality Unions who meet in the assembly. The law aims to support Solidarity Economy, as a socio-economic and cultural model centered on local communities and based on principles of solidarity, reciprocity, environmental sustainability, social cohesion, care for Commons, and as a key instrument in dealing with situations of economic, employment and environmental crisis. These new institutions are aimed to propose a democratic model through forms of direct participation, where the community and the territory are in relation to each other and the production system is directed towards a local development model in which local assets regain value as a function of the needs and well-being of the community. The strength of these new institutions depends on the willingness of community members to be actors in their own development.

These new institutions will be more active in relation to the existence of good practices of solidarity economics on the territory. These in fact can support economic processes in solidarity through the construction of networks.

The directive is to activate chains of solidarity economy in the territory aimed at meeting the essential needs of a community according to a systemic logic, through: production, self-production and neighbourhood exchange, based on: voluntary work, solidarity, and donation without the intermediation of money; and on: production, processing, sales and consumption of goods and services, where the supply chain actors sign specific agreements with each other. The chains are distinguishable from a global economy and are primarily: the food chain; the housing chain; the clothes chain and the community services chain.

The objectives are: the production of ecologically and socially sustainable goods and services; the reduction of unnecessary consumption; the safeguarding of the environment and biodiversity, the rights of future generations; the promotion of the spirit of cooperation, solidarity, dialogue and participation, peace, supporting the weak, and the protection and valorisation of Commons such as air, water, land, and knowledge.

3   Materials and Methods

On one hand the indicator definition takes into consideration those elements that characterize Solidarity Economy, on the other hand the experience of those districts active in Italy and the guidelines in terms of objectives and local chains as described in the regional laws of Friuli Venezia Giulia (Fig.2).
[Figure 2 here]
The underlying idea is to rethink the territory on the basis of self-sustainability in both production and consumption, leading them both back to a local dimension, enhancing the resources and the people of each territory (Magnaghi and Fanfani, 2010).
The "Vocation to solidarity economy" is a complex phenomenon that cannot be captured by only one single variable so it is necessary to find a set of indicators that are capable of reflecting different aspects of it (Moldan et al., 2012, Lievens, 2010). The selection of the set of indicators is based on
  - the analysis of the experience of ESD in Italy;
  - the opinion of experts, identified in the academic world and in the area of associations and met in three focus groups.
Additional discussions with experts and data availability check allowed 38 indicators to be identified nested in 5 themes: 1. Society; 2. Economy-Production; 3. Economy-Consumption; 4. Environment; 5. Local institutions.
The main data sources are official institutions such as ISTAT (Istituto Centrale di Statistica) and Regione Friuli, Venezia Giulia. Data are collected at municipality level (218) nested in 18 TUM of Friuli Venezia Giulia.
The list of 38 indicators was then submitted to 12 experts and scholars in various fields, areas with some connection to the ESC. The experts were asked to give a score from 1 to 4 to each indicator and to each pillar, reflecting the relevance of the indicator/pillar in analyzing solidarity economy.

After some exploratory statistical analysis, data availability and relevance expressed by the experts a final set of 31 indicators was obtained. Table 1 provides an overview of the indicators used in the analysis

[place Table 1 here]

The present aim is to compare the vocation to solidarity economy in the municipalities or in the TUM of Friuli Venezia Giulia. The comparison by means of the set of 31 indicators is not simple because of multivariate outputs. The composite indicator (CI) approach is a tool that avoids multiple indicators comparison as it "summarizes" the information in a uni-dimensional index. Following Nardo *et al.* (2005:7) a CI is defined as "a mathematical combination of individual indicators that represent different dimensions of a concept whose description is the objective of the analysis". This definition underlines the scope and usage of composite indicators that play an important role in many fields such as economy, society, environment, innovation, etc. However, CI can send misleading information if they are poorly constructed or misinterpreted, see for example Nardo *et al.* (2005) and OECD (2008) for a critical assessment and for a summary of pros and cons of using CI. Here the CI is the "Vocation to solidarity economy", the VSE Index, and the 31 indicators are the individual indicators. Building a CI involves many steps with several alternatives, that contribute significantly to the "quality" of the final result. These steps can be summarized as follows (Mazziotta and Pareto, 2013, Lauro and Nappo, 2011, OECD, 2008):

1. Define the phenomenon to be measured. Vocation to solidarity economy is the concept measured by the CI. It Is defined as "an attitude of a territory to implement a solidarity economy";

2. Individual indicators selection. A set of 31 individual indicators (Table 1) was selected on the basis of expert opinion, data availability and quality, minimization of redundancy (highly correlated individual indicators);

3. Individual indicators normalization. Normalization "avoids adding up apples and pears" (Nardo *et al.*, 2005:11) as it makes indicators comparable, given that in general, they are collected with different measurement units. The normalized indicators are dimensionless numbers. There is a wide set of normalization methods (Nardo et al., 2005), such as: ranking, standardization, re-scaling, distance to the maximum. The choice of the appropriate normalization method should take into account the data behaviour and the objective of the CI (Nardo et al., 2005, Ebert and Welsh, 2004). In normalizing, it is important to identify the polarity (correlation), positive or negative, between an individual indicator and the CI. The idea is to use normalization so that normalized indicators are positively correlated with the CI (if a normalized indicator increases then the CI also increase). In accordance with this rule, three individual indicators show a negative polarity: population density, average farm size and municipal waste while the others show a positive polarity. In this paper, we will deal with four normalization methods that will produce different outcomes for the VSE index.

4. Choice of a suitable system of weights and of aggregation function of the normalized indicators. This process combines, in a meaningful way, all the normalized indicators to obtain the CI. The problem of the choice of a system of weights, that reflects the "importance" of each transformed indicator in building the CI, introduces an arbitrary component. There are different ways to choose a system of weights; the easiest (but not always the most suitable) is "equal weighting" that assigns equal weights to all the normalized indicators. An alternative is to assign weights that are set by a group of experts or based on some multivariate statistical methods, i.e. Principal Component Analysis, Factor Analysis, Data Envelopment Analysis, Benefit of the Doubt approach (Cherchye et al. 2008). Here the elementary indicators were weighted to build a VSE index using two different weighing systems. The first assigns the same weight to all elementary indicators. The second method calculates the weight through the analysis of the opinion of the 12 experts interviewed by using a questionnaire. The matter

of aggregation of information comes together with the weighting problem. Again, there are different aggregation rules and again different choices implying different assumptions and consequences. Linear aggregation, that is the simplest and most common method, implies full compensation/compensability: poor performance in some indicators can be compensated by sufficiently high values in other indicators. This means that a deficit in one dimension can balance a surplus in another (OECD, 2008). In this paper, we will consider linear aggregation.

5. Sensitivity analysis. Sensitivity analysis assess the robustness of CI. As the construction of a CI involves several subjective choices (*i.e.* normalization method, system of weights, aggregation function) it is useful to compare different scenarios to evaluate changes in CI performance. For example for the VSE index, we have 8 scenarios: 4 normalization methods by 2 systems of weights.

6. Back to the details. A CI can also be decomposed such that the contribution of sub-components can be identified and the analysis of municipality/TUM performances extended. Here the VSE index has five sub-components, which contribute differently to the aggregated composite indicator and municipality/TUM rankings. The decomposition of the composite indicator can thus improve the information related to the overall performance of a given municipality/TUM.

Formally, the value of the VSE index, at municipality level, can be expressed as

$$VSE_i = \sum_{j=1}^{31} t_{ij}^{(h)} \omega_j^{(r)}, i = 1,2,\ldots,218; j = 1,2,\ldots,31; h\, i = ,3,4; r = 1,2 \qquad (1)$$

Where $t_{ij}^{(s)}$ is the normalized value of individual indicator j for municipality i, with normalization method h and $\omega_j^{(r)}$ is the associated weight, with r denoting the weighting method.

Table 2 summarizes the normalization methods used in the analysis; x_{ij} is the value of the individual indicator j for municipality i, $\overline{x_j}$ is the mean and σ_j is the standard deviation of indicator j.

[Table 2 here]

The equal weighting method assigns equal weight to each normalized indicator

$$\omega_j^{(1)} = \frac{1}{31}, j = 1,2,\ldots,31.$$

while the system of weights that take into account the opinion of the 12 experts is based on the median, for each individual indicator and each pillar, of the level of importance. Denoting with $Med(x_j)$ the median importance for indicator j and with $Med(T_k)$ the median importance for theme k, $k=1, 2,\ldots,5$ this system of weights is defined as

$$\omega_{jk}^{(2)} = \frac{Med(x_j) * Med(T_k)}{\sum Med(x_j) * Med(T_k)}, j = 1,2,\ldots,31; k = 1,2,\ldots,5.$$

Appling these methods to the data set of 31 individual indicators observed in 218 municipalities we will rank municipalities with respect of their degree of vocation of solidarity economy. As we have 8 scenarios, due to 4 normalization methods and 2 systems of weights, we will obtain 8 different ranks. The VSE index, at TUM level, can be expressed as a weighted mean

$$VSE_t = \sum_{i=1}^{n_t} VSE_i \left(\frac{n_i}{N_t}\right), \quad t = 1,2,\ldots,18. \qquad (2)$$

Where weight $\pi_i = n_i/N_t$ is the ratio between the population of municipality i and the population of TUM t.

To assess the robustness of the analysis we will use
- the Spearman correlation to measure the degree of association between couples of ranks;
- the average shift in municipalities' ranks as measure of uncertainty (Saisana et al., 2005). The average shift is, for each scenario, the average of the absolute differences in municipalities' ranks with respect to a median rank (reference ranking) over the 218 municipalities:

$$\bar{R}_s = \frac{1}{218} \sum_{m=1}^{218} |rank_{med}(VSE_m) - rank(VSE_m)|, s = 1,2,3,\dots 8.$$

4   Results and discussion

Applying formula (1) to the 8 scenarios we obtain 8 ranks. Table 3 shows the degree of association between ranks.
[Table 3 here]
Results in Table 3 show some discrepancy between the ranking method and the other standardization methods whereas there is a high correlation between the standardization methods, re-scaling and comparison with the maximum. The correlations do not vary much when comparing the two weights systems; this means that by using the weights assigned by experts the rankings do not change significantly.
Table 4 shows the values of the average shift in rankings $\bar{R}_s$ for the 8 scenarios. Values more close to zero mean more similar ranking to the median rank.
[Table 4 here]

The weighting approach has a weak influence on the municipalities' ranks, whereas the normalization method affects the ranking. In particular, ranking method shows the largest difference. This is probably caused by the loss of information on levels of the individual indicators. The rescaling is the method that shows the smallest difference. There is no high difference in the order of the values of $\bar{R}_s$ based on the other normalization methods excluding ranking method.
Based on the analysis of robustness the VSE index, achieved by the re-scaling method and equal weights, was chosen.
Table 5 summarize the final ranking of the top 5 and bottom 5 municipalities.
[Table 5 here]

According to formula (2) the VSE index was calculated also at TUM level and then decomposed into the five themes to highlight how the sub-components contribute differently to the aggregated VSE index and TUM ranking. Figure 3 shows the aggregated VSE index (Overall) and the 5 sub-components (Society, Economy-Production, Economy-Consumption, Environment and Local Institution). For example, TUM 1 "Giuliana" has a low level of overall VSE index, but it is strong in Local Institution. The decomposition of the VSE index can thus shed light on the overall performance of a given TUM.
The analysis of suitability to solidarity Economy, through a composite indicator (CI), shows that there are territories with different characteristics within the region (Fig 3).
In detail, analyzing the results, the theme of urban/ rural relations clearly stand out , showing the need for a model that manages to connect the territory as well as build synergic relations between urban areas and countryside (Magnaghi, Fanfani, 2010).

In fact the results show that the areas less suitable to become Economic Solidarity Communities are: Giuliana, Friuli Centrale, Noncello, Alto Isontino and Basso Isontino, which correspond with the urban and suburban areas.

One possible interpretation of this result is the fact that the basic needs of the population play an important role in our model, defining the vocation of being Economic Solidarity Communities. These Communities are in fact formed by the main towns of the region and neighboring municipalities, which have often lost their agricultural role and have become sites of commercial and industrial activity.

In these territories the particularly high population density and the characteristics relating to primary production make it difficult to build supply chains in the food industry at local level.

They are therefore areas where it is difficult to initiate Solidarity Economic paths initiating from the resources of the territory. Therefore, they require relations with the surrounding territories, which are instead characterized by a strong rurality.

5 Conclusions

This study concerns the assessment, through a composite indicator, of the vocation of territories communities in the Friuli Venezia Giulia region in supporting solidarity economy path. In particular the new regional law on "Rules for Valorisation and Promotion of the Solidarity Economy" (FVG n. 4/2017) divides the territory of the region into 18 Economic Solidarity Communities that run to the Territorial Union of Municipalities (TUM) (Fig.1) which are new institutions (serving several municipalities) in the Friuli Venezia Giulia Region (Regional Law 12 December 2014, n. 26), aimed at the development of a polycentric system that favours the integration of social, environmental and economic policies.

Even if this paper represents the beginning of a work in progress, as CI's are open to debate in respect to their capacity to facilitate the paradigm shift (Lievens, 2010), it can offer a tool that can contribute to monitor the vocation of municipalities/TUM to solidarity economy.

Looking at the first concrete results obtained in relation to those social innovation paths developing in the Friuli Venezia Giulia region, we can see that in areas where the composite indicator signals a greater aptitude for solidarity economy, the people are organizing from the bottom up. In detail: in the Territorial Unions of Municipalities (Fig.1) the cooperative District of Social Economy of Central Friuli was recently formed with the purpose to establish closer cooperation between municipalities and citizens for the development of a new and different model of agriculture for their territory. The project "Pan e farine dal Friûl di mieć" (Bread and Flour of Central Friuli) was initiated, and aimed at starting a local supply chain of wheat flour and derived products with sustainable and inclusive characteristics.

The actors participating in this project are farmers, silo storage centres, millers, small bakeries, local consumers, small retailers and local municipalities.

A Pact has been signed in which a set of rules is shared that relate to the amount and method of production for farmers, the amount purchased for consumers, the preservation method, the product price and the maximum margin for the end seller, taking into account the whole supply chain on a fair trade basis promoting responsible production and consumption and shrinking the environmental impact. In this agreement the municipal institutions act as guarantors in the contract between the two parties in the supply chain.

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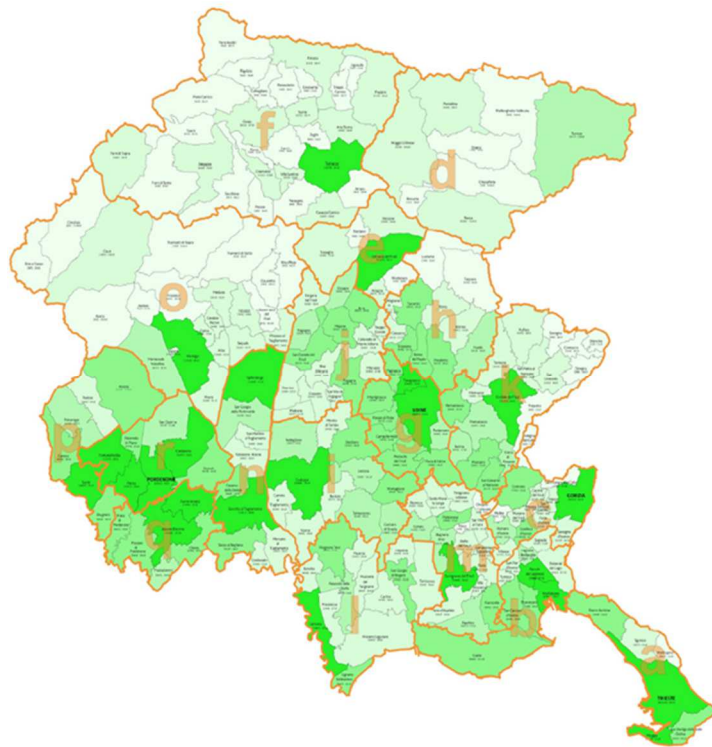
Fig.1 Territorial Union of Municipalities (TUM) of Friuli Venezia Giulia. Source: LR 26/2014, ART. 4, COMMA 6 - DGR 1282/2015.
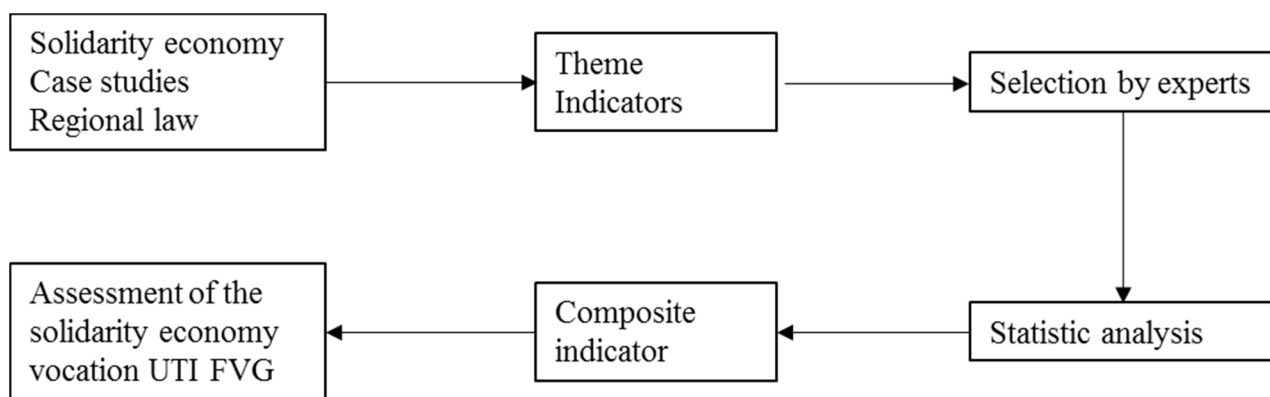
Fig 2 Process of developing and using indicators.

Society	Economic Production	Economic Consumption	Environment	Local Institution
population density	number of small enterprises/10000 inhabitants	number of solidarity purchasing groups/ 10000 inhabitants	protected natural areas/municipal area	number of youth centers/10000 inhabitants
unemployment rate	number of artisan companies/10000 inhabitants	number of farmers markets/10000 inhabitants	municipal waste per capita / year	number of information centers for youth/10000 inhabitants
water referendum affluence rate	number of organic farms/10000 inhabitants	number of farms with sales/10000 inhabitants	Separated waste/ municipal waste	common properties area/municipal area
ageing index	organic Utilized Agricultural Area (UAA) / total UAA		number of photovoltaics systems/10000 inhabitants	number of virtuous festivals/10000 inhabitant
birth rate	Number of organic transformation firms/10000 inhabitants			
Number of social and educational farms / 10000 inhabitants	LSU - livestock units/10000 inhabitants			
volunteers in non-profit institutions/10000 inhabitants	UAA / municipality inhabitants			
number of social cooperatives / 10000 inhabitants	UAA /municipal area			
number of small shops/10000 inhabitants	number of farms with UAA			

	<10ha/10000 inhabitants			
	average farm size			
	number of branches of local and ethical banks/ 10000 inhabitants			

Tab. 1 Themes and indicators towards sustainability.

Method	Equation
1. Ranking	$t_{ij}^{(1)} = Rank(x_{ij})$
2. Standardization	$t_{ij}^{(2)} = \dfrac{(x_{ij} - x_{ij})}{\sigma_j}$
3. Re-scaling	$t_{ij}^{(3)} = \dfrac{x_{ij} - min(x_j)}{max(x_j) - min(x_j)}$
4. Distance to the maximum	$t_{ij}^{(4)} = \dfrac{x_{ij}}{max(x_j)}$

Table 2. Summary of normalization methods.

Normalization Method	Equal Weights	Expert Weights
Ranking vs Standardization	0.650	0.668
Ranking vs Re-scaling	0.639	0.660
Ranking vs distance to the max	0.639	0.674
Standardization vs Re-scaling	0.965	0.969
Standardization vs distance to the max	0.967	0.971
Re-scaling vs distance to the max	0.990	0.994

Table 3. Spearman correlation between normalization methods with two system of weights.

Standardization Method	Equal Weights	Experts Weights
Ranking	36.37	36.41
Standardization	8.03	10.05
Re-scaling	6.57	7.38
Distance to the maximum	7.32	7.90

Table 4. Uncertainty measure: the average shift.

Top 5		
Rank	Municipality	TUM

1	Dolegna del Collio	Alto Isontino
2	Cimolais	Dolomiti Friulane
3	Vivaro	Dolomiti Friulane
4	Camino al Tagliamento	Medio Friuli
5	Coseano	Collinare
Bottom 5		
Rank	**Municipality**	**TUM**
214	Monfalcone	Basso Isontino
215	Lignano Sabbiadoro	Bassa Friulana Occidentale
216	Muggia	Giuliana
217	Clauzetto	Dolomiti Friulane
218	Trieste	Giuliana

Table 5. Final ranking of the top 5 and bottom 5 municipalities.
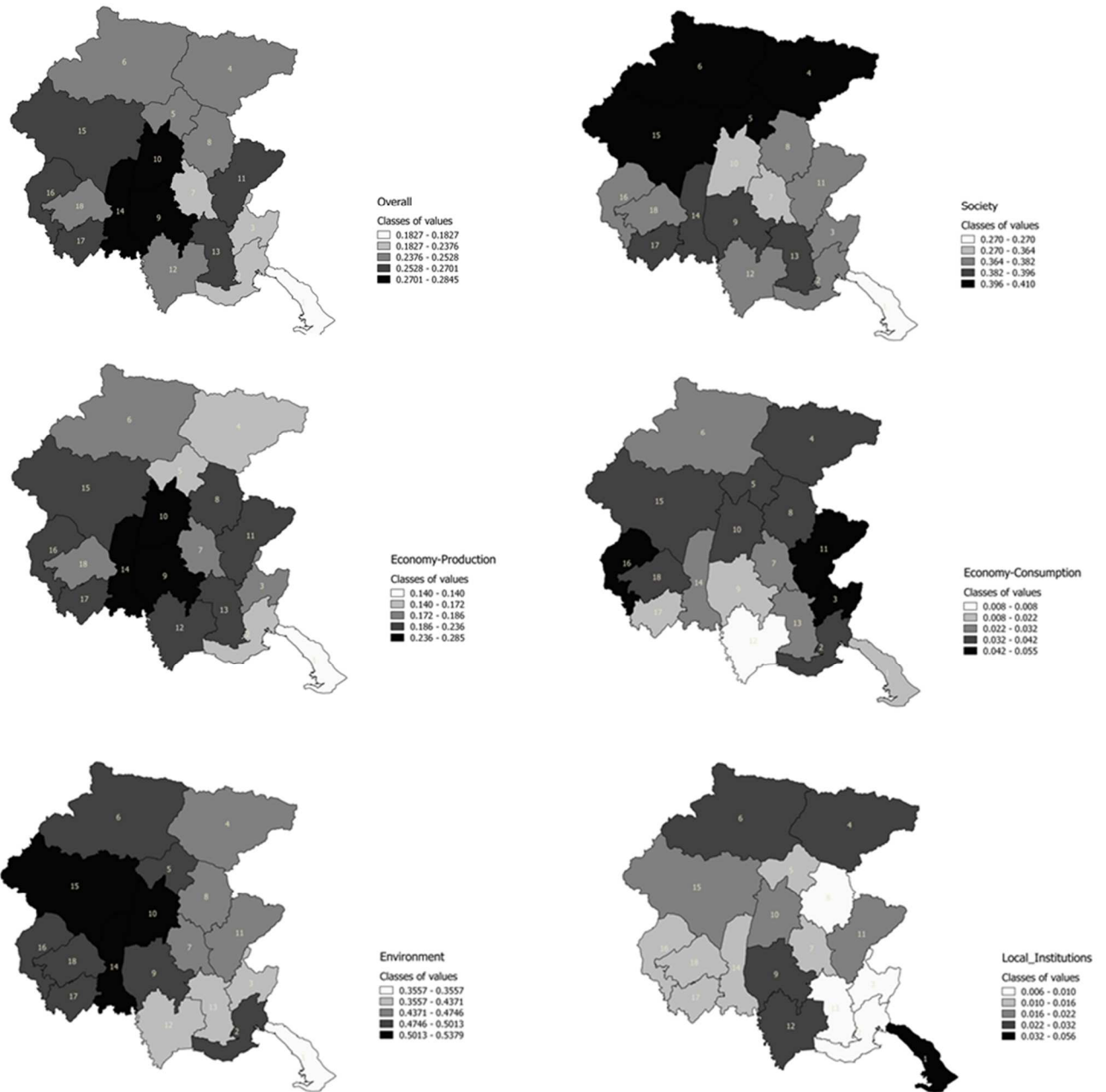
Fig.3 Maps of values for VSE index, overall and by different themes, at TUI level.
Legend: Territorial Union of Municipalities: 1 Giuliana; 2 Basso Isontino; 3 Alto Isontino; 4 Canal del Ferro - Val Canale; 5 Alto Friuli; 6 Carnia; 7 Friuli Centrale; 8 Torre; 9 Medio Friuli; 10 Collinare; 11 Natisone; 12 Bassa Friulana Occidentale; 13 Bassa Friulana Orientale; 14 Destra Tagliamento; 15 Dolomiti Friulane; 16 Livenza; 17 Sile; 18 Noncello.