

An institutional periphery in discussion. Rethinking the inner areas in Italy

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ABSTRACT

Geographic peripheries in Italy are defined by the government in an institutional document as areas affected by increasing depopulation, high rates of demographic ageing, geographic marginality, and various degrees and forms of inequalities in the provision of services and infrastructure. These so-called ‘inner areas’ are identified based on the level of accessibility to three citizenship rights (mobility, education, and health) and characterized by nonuniform socio-economic and infrastructure conditions, a heterogeneity that raises questions about the criteria used for their definition. This paper therefore proposes an alternative approach to describe the features of marginality related to mobility, demographic, and socio-economic conditions in Italy, discussing the institutional classification of the inner areas. Based on the literature review, we select a set of indicators to identify different geographies of marginality. Combining them in a cluster analysis, we identify the most disadvantaged territories in terms of mobility, demographics, and economics, highlighting different forms of marginality that challenge territorial cohesion policies and address more selective and place-based measures.

1. Introduction

Geographic peripheries in Italy were defined in an institutional document—the National Strategies for Inner Areas¹ (SNAI)—as areas affected by increasing depopulation, high rates of demographic ageing, different degrees and forms of inequalities in the provision of services and infrastructure, and geographical marginality. However, this multi-dimensional state was defined in relation to the geographical distance from a centre equipped with services and urban provisions and used as a criterion for describing the condition of peripherality.

The SNAI classification is based on the assumption that accessibility ensures access to basic urban opportunities and rights. Nevertheless, the implementation of the concept has some limits. SNAI classifies areas according to the level of accessibility to three citizenship rights: mobility, education, and health. These rights are proxied by the distance from national railway stations, secondary schools, and hospitals with an emergency room, while the minimum accessibility threshold was established at a 20-min drive from the closest hub. The resulting classification of *inner areas*² further identifies three types of peripheral territories: intermediate, peripheral, and ultra-peripheral areas (Materiali

Uval, 2014). On the contrary, municipalities that may simultaneously provide a full range of services are considered provision centers (poles). This classification is based on contour measures and has drawbacks. First of all, it defines marginal territories only by measuring the distance (not travel time or cost) to the closest “hub” and regardless of the quality and performance of the opportunities that can be reached. Recent research on accessibility instead suggests replacing the measurement of travel time with a measurement of gains in accessibility (Di Ciommo & Shiftan, 2017, p. 140). Second, the selection of the target services considered in accessibility evaluations is not supported by any assessment of either their “essentiality” with respect to the needs of the population or their ability to enhance opportunities, avoiding a democratic process in both the selection of services and the minimum threshold (Pereira, Schwanen, & Banister, 2017, p. 7). Third, this classification combines very different territorial and socio-economic conditions, producing a map that is not effective for orienting territorial cohesion policies; for example, ultra-peripheral areas include both low- and high-income areas.

Identifying peripheral areas for developing policies and addressing resources for marginal areas, as in the case of the SNAI inner areas, has

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¹ Italian National Strategy for Inner Areas is a national policy for territorial development and cohesion developed in the period 2014–2020 by the Department for Programming and Coordination of Economic Policy. Detailed information about the policy can be found in: A Strategy for Inner Areas in Italy: definitions, objectives, Tools and Governance, Materiali Uval, 31, 2014.

² Inner areas include more than 60% of the national territory and 52% of municipalities, encompassing about a quarter of the population (Silva, 2020).

also been a long-standing issue in other European Countries (European Union Committee, 2009; Dax, 2005) where the choice of indicators and the adoption of specific classifications for marginal areas produce different results due to the complexity of the problem. With regard to the European Inner Peripheries Report (Espon, 2017), a different perspective from the SNAI classification emerges from both the drivers used to classify inner peripheries and the scale of analysis³ (Moscarelli, 2020, pp. 26, 27), thereby producing different geographies.

Criteria based on geographical data related to the distance from the main central poles, equipped with services, resources, and activities (Herrschel, 2012; Ferrau & Lopes, 2004), and the level of accessibility regarding access to markets, production factors, and private and public services (Sthör 1982; Allen & Farber, 2019) do not adequately describe the complexity and degrees of marginality. Nor do they account for marginality as a transient condition, rather an intrinsic spatial condition.

This is because peripherality and marginality are not synonymous. As argued by Andreoli (1994), “border regions can be peripheral in terms of geographical location, but their socio-economic situation can be more advanced than central regions. On the other hand, not every marginal region is necessarily peripheral; for instance, regions with underdeveloped socio-spatial relationships can have a more favourable position with respect to the urban or regional centre.”

This condition also emerges in the SNAI classification. Aimed at assessing the level of access to the main opportunities for each citizen to fully exercise his or her own rights regardless of territorial location (Carrosio & Faccini, 2018, p. 54), its outcomes define the geography of marginal areas that are spatially distant (in travel time) from centers offering citizenship services but characterized by very diverse socio-economic situations. Such results highlight the need for a better performing method for their definition (Marucci, Fiorini, Di Dato, & Zullo, 2020).

Geographic distance from major services represents just one condition among many that can help to describe the complex process of spatial marginality. This is because marginality “is not only a state, but mainly a process (the process of marginalization) influenced by socio-economic changes that can affect a particular region either in a positive (mitigation of marginality) or negative way (deepening of marginality)” (Máliková, Farrell, & McDonagh, 2016, p. 94).

This paper rejects a core-periphery model of geographical enquiry and assumes the differences between peripheral and marginal to propose an integrated approach for identifying marginal territories on the national scale in order to address the effects of spatial marginality in its multidimensional, dynamic components.

Based on this, spatial marginality is investigated by focusing on the relationships between mobility as social-spatial-temporal practice and socio-economic variables, analyzing the relation between (im)mobility, transport poverty, and social exclusion (Kenyon, Lyons, & Rafferty, 2002; Lucas, 2012; Martens, 2017; Pereira et al., 2017; Preston & Rajé, 2007; van Wee, 2016).

Through the lens of mobility, we evaluate which conditions—both geographic and socio-economic—represent determining factors for measuring spatial marginality as unfair access to basic needs (Martens, 2017; Pereira et al., 2017; Pucci, Vecchio, 2019), depending on the performance of the transport system and users’ needs (Di Ciommo & Shifan, 2017; Pucci, Vecchio, Bocchimuzzi, & Lanza, 2019).

The emergence of different marginal geographies also highlights a kaleidoscopic condition within inner areas. We therefore introduced the

concept of “fragile territory”, which is a place where more conditions of disadvantage exist, including but not exclusively geographical marginality. A “fragile territory” is more subject to unexpected shocks or events, thus increasing its fragility. In our approach, fragility is conceived as the effect of different interdependent spatial marginalities in their dynamic evolution. This helps to highlight the differential degree of marginality and to recognize different intensities and forms of fragility for supporting targeted territorial policies.

To address these concerns, this paper first outlines the method (Section 2) tested for classifying marginal territories in Italy and then introduces the main indicators that were selected according to three main topics: socio-economics, demographics, and mobility. Indicators also overlapped with the SNAI classification. In Section 3, a cluster analysis using a k-means algorithm is used to study three different dimensions of marginality mentioned above. In Section 4, both classifications are compared to identify different “fragile territories” intended as areas weakened by the overlapping conditions of marginality and mobility-related fragility. In Section 5 we discuss some issues of this approach, presenting possible directions for future research on recognizing the different conditions of accessibility and mobility needs in marginal territories.

2. Research design: identifying marginal population groups and places in Italy

To develop an alternative classification of marginal territories in Italy, our approach adopts the following analytical steps:

1. Selection of indicators to describe the different components of marginality, based on the literature;
2. Comparison of the selected indicators and the six categories identified by SNAI to understand how far the categories overlap other conditions that may describe marginality;
3. Definition of territorial clusters using a k-means classification algorithm according to three main topics: demographics, socio-economics, and mobility;
4. Selection of the most disadvantaged conditions for each set of clusters to identify territories at a higher risk of marginality;
5. Comparing the three clusters to identify fragile territories;
6. Definition of fragile territories due to the lack of accessibility and suggestion of possible solutions to deal with marginality and reduce territorial inequalities.

2.1. Selection of socio-economic, demographic, and mobility indicators

The indicators for defining marginal territories were selected through an extensive literature review. For the purposes of this work, indicators were chosen according to their capacity to underline a correlation between social exclusion and lack of or poorness of a transport system. The review was based on international research that analyses the impact of a poor transport system on increasing social exclusion and territorial marginality. In addition, indicators were also assessed to consider the specifics of conditions in Italy and ongoing related research (Marucci et al., 2020; Cannari, Viesti, & Zanardi, 2019; Moscarelli, 2020), as well as the availability of data.⁴

With regard to demographic indicators, one condition that may contribute to configuring marginal territories is an ageing population.

³ The criteria for classifying inner peripheries are: poor economic potential and poor socio-economic conditions; lack of access to centers and/or services; poor accessibility and poor economic potential/poor socio-economic conditions. The mapping was made considering the NUT 3 level.

⁴ Data availability and comparability were an important issue due to the need to analyse the data on the national and municipality scales. The ISTAT 2011 Italian national census was the main source of information except for demographic indicators, which refer to ISTAT 2019.

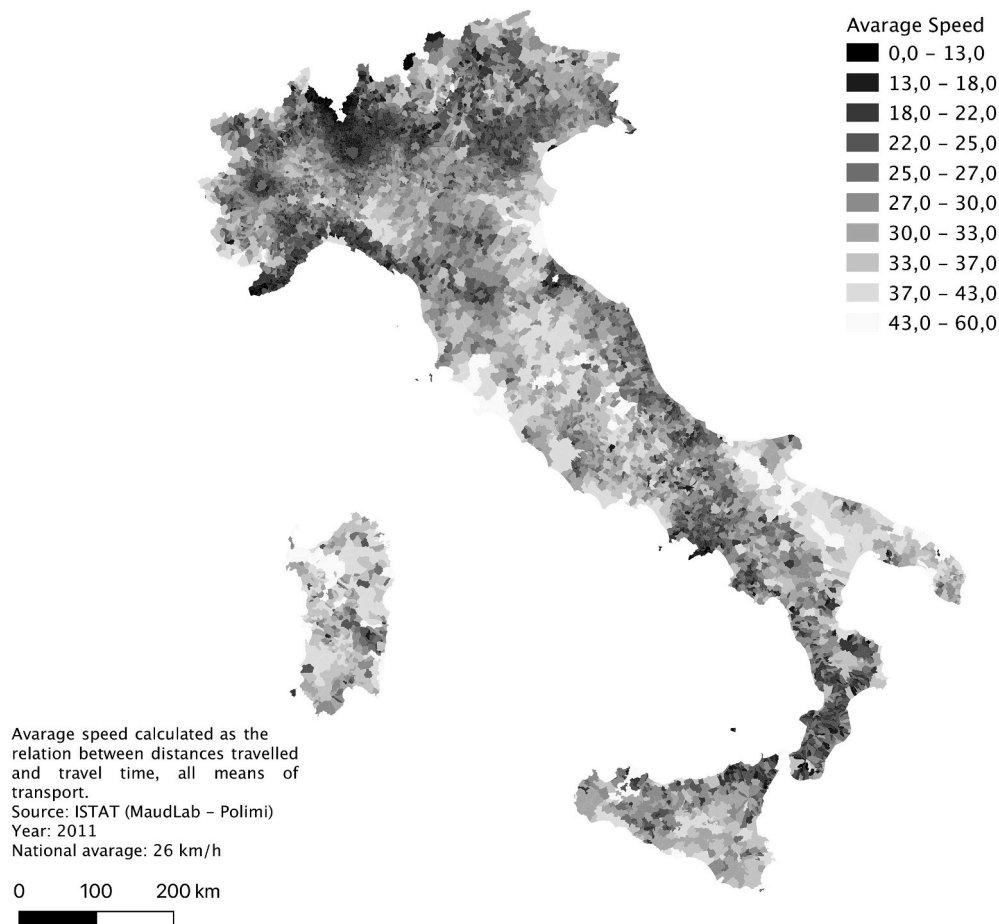


Fig. 1. Mobility indicator: average commuting speed (source: our analysis of 2011 Census data).

Elderly people who are often not able to walk or drive alone lose access to important services if there is a lack of public transport or low levels of accessibility (Stjernborg, Melin Emilsson, & Ståhl, 2014). Likewise, children are generally less autonomous but subject to important home-to-school mobility every day and may need to be accompanied by a caregiver. Therefore, the analysis of age cohorts is an important element for classifying marginalities (Cotella & Vitale Boverone, 2020; Jones, Titheridge, Wixey, & Christodoulou, 2006; Lucas, Bates, Moore and Carrasco, 2016; Macket, Achuthan and Titheridge, 2008; bib Preston and Rajé 2007Preston & Rajé, 2007). We have considered the ageing population in the classification since Italy has a high ageing index.⁵

Another relevant indicator of marginality is population shrinkage (Marucci et al., 2020, p. 4). 74% of Italian municipalities are undergoing demographic contraction and Italy has a very low birth rate (7.2%). Research on demographic shrinkage in the USA has underlined a correlation between population loss, an increase in elderly people, low income, and a general reduction in the provision of services (Franklin, 2019). This correlation is also visible in Italy, where internal migration towards more equipped territories leads to the depopulation of the less served areas (Colucci, 2018). Other demographic dimensions were initially included, such as gender and the percentage of resident aliens, although the spatial distribution of these factors was not found to be

significant for identifying marginal areas on the national scale.⁶

With regard to socio-economic indicators, income level and rates of education⁷ and employment⁸ were considered. These are related to the economic, cultural, and personal ability to be mobile in different ways and access as many opportunities as possible (Farber, Morang, & Widener, 2014; Grengs, 2012; Jones et al., 2006; Lucas, Bates, Moor and Carrasco, 2016; Macket, Achuthan and Titheridge, 2008).

Mobility indicators were selected to describe effective mobility behaviors on a national scale in terms of density of daily work-related displacements, average distance travelled, and average speed of the trips.⁹ The information was collected in a survey on mobile workers available on the national level by ISTAT.¹⁰ The inclusion of trip speed

⁶ In other cases, they were found to be very relevant; see Pojani, Boussaou, and Pojani (2017).

⁷ The educational rate was calculated as the proportion of people with a post-secondary education degree (five-year Master's, Bachelor's, fine arts, or conservatory diploma) over the total population of each municipality.

⁸ The employment rate was calculated as the ratio of number of employees over the total workforce, i.e. the ratio between the number of employed people and the working-age population (which in Italy includes people older than 14).

⁹ Average travel speed is calculated only for displacement between municipalities. This is the ratio of the distance between the centroids of each municipality over the average travel time declared by travellers in 2011 in national mobility surveys with all means of transport.

¹⁰ The ISTAT census (2001–2011) provides data on the municipal level about the flow of commuters for study and work reasons: O/D, modal share, and time of displacement.

⁵ The average age in Italy is 45.2 (2018) while it is 43.1 in Europe.

Table 1
Indicators.

	Indicator	source	Description
Socio-economics	Income	MEF	Average job income calculated (excluding rents and subsidies) for each municipality. Income data 2017
	Degree	ISTAT 2011	The percentage of population in the municipality with a post-secondary degree
Demographics	Employment rate	ISTAT 2011	Employees in the workforce
	Population over 65	ISTAT 2019	Percentage of population in the municipality over 65
Mobility	Population dynamics	ISTAT 2015–2019	Percent loss and gain of the population
	Attractiveness	ISTAT 2011	The ratio of the difference between inflow and outflow to the active population in the municipality
	Distance of displacement	ISTAT 2011	Average Euclidean distance of commuting trips calculated with the O/D matrix for each municipality
	Average Speed	ISTAT 2011	Average speed calculated as the ratio between average time and distance of work-related travel
	Population not commuting for work	ISTAT 2011	Percentage of people over 15 actively looking for a job

(Fig. 1) was inspired by the work of Martens (2017) on the Potential Mobility Index¹¹ (PMI), allowing qualitative information to be acquired about the transport network, infrastructure performance, and mobility practices.

These indicators refer to work-related displacements; we therefore also included the unemployment rate in the set of indicators as a proxy of people who do not move for work reasons, representing, in this sample, immobile population groups.

The sources of data and a description of the indicators classified according to the three main sets are summarized in Table 1.

2.2. From institutional periphery to a multifaceted definition of marginal territories

Preliminary findings on the selected indicators show the variety of Italian geographies, emphasizing the complexity of the condition of marginality in Italy and thus challenging the SNAI classification of Italian municipalities in six categories.¹²

To illustrate the extent to which the indicator of remoteness from services used in the SNAI may match other conditions of marginality, Fig. 2 shows a plot of the average value of each indicator for each SNAI category and the standard deviation of municipalities included in the

¹¹ Martens (2017) defines PMI as the average aerial speed calculated for each zone of departure and states that this indicator offers a more appropriate assessment of the quality of the transport network.

¹² According to the SNAI, Italian municipalities are classified into six categories as follows: 'A – Poles' in the case of municipalities hosting all the selected services (station, secondary school, and hospital), while if those services are located in an agglomeration of different municipalities they are defined 'B – Inter-municipality poles'. 'C – Outlying areas' are within 20 min of poles. 'D – Intermediate Areas' are among 20 and 40 min distance from the poles; 'E – Peripheral areas' are located at a distance of 40–74 min from poles; last, 'F – Ultra-peripheral areas' include territories where inhabitants need more than 75 min to reach a service provision centre (Materiali Uval, 2014).

group.

When bars are similar across the six groups the SNAI classification is unrelated to the indicator. When the standard deviation is large, the group is not homogeneous, and the average is therefore not representative.

Generally speaking, some indicators such as income, education rate, and attractiveness are higher for the poles and lower in inner areas. Population decline is higher in inner areas, but the group is very heterogeneous; people over 64 are distributed uniformly throughout the country, with a slightly higher number in inner areas and fewer in outlying areas. Speed, travel distances, and unemployment are higher in the poles and inner areas and decrease gradually in inter-municipality poles, intermediate and outlying areas. Finally, the employment rate is higher in outlying areas.

The findings show that the remoteness of inner areas is only marginally related to lower incomes and education, with a high rate of population decline, while outlying and intermediate areas have higher employee performance. Nevertheless, the standard deviation for all indicators suggests that distance from major provision centers is not a sufficient criterion for identifying a condition of marginality, as there may be peripheral areas with very high socio-economic and demographic indicators and good mobility conditions, as well as poles with lower performance.

2.3. Clustering method

In order to build a consistent classification of marginal territories in Italy, we propose a cluster analysis that questions the categorization presented by the SNAI, identifying territories where the different components of marginality are predominant.

Clustering is performed using the k-means method (Allen & Farber, 2019) based on the three topics mentioned above: demographics, socio-economics, and mobility. The k-means method is one of the most common algorithms thanks to its computational simplicity, rapidity, and suitability for large samples. However, the method has limits, such as the inability to find some types of clusters (i.e. elongated ones) or the unsuitability to high-dimensional spaces, which is not the case for our sample.

One characteristic of k-means is an inability to choose the number of cluster groups, k , based on the data provided. For this reason, k was initially computed separately by means of the NbClust function in R, since hierarchical methods and dendrograms could not be used due to the size of the sample and an ambiguous scree plot. Indeed, NbClust proposed many different k according to the method and distance metric (Euclidean or Manhattan), and the most frequent response was chosen: $k = 5$ for mobility, and $k = 3$ for socio-economics and demographics.¹³

Once the cluster groups were set, the analysis was performed with open-source software (QGIS) using a plug-in¹⁴ and without weights. The resulting clusters were mapped and the distributions analyzed (see the Figure in the Annex). In one case, the demographic cluster, the $k = 3$ clusters appeared to poorly reflect the Italian geography according to the resulting map. In this case, we therefore decided to consider clustering with $k = 4$.¹⁵

3. Clusters of marginal territories: beyond the institutional classification

The clustering algorithm delivered a complex classification of the Italian territory, as is analyzed in this section. Each cluster was "named"

¹³ According to some algorithms, the optimal clustering was two, but those with more numerous clusters were chosen to avoid triviality.

¹⁴ "Attribute-based clustering" developed by Eduard Kazakov.

¹⁵ Four clusters was not the most frequent response of NbClust but was still the outcome of four methods.

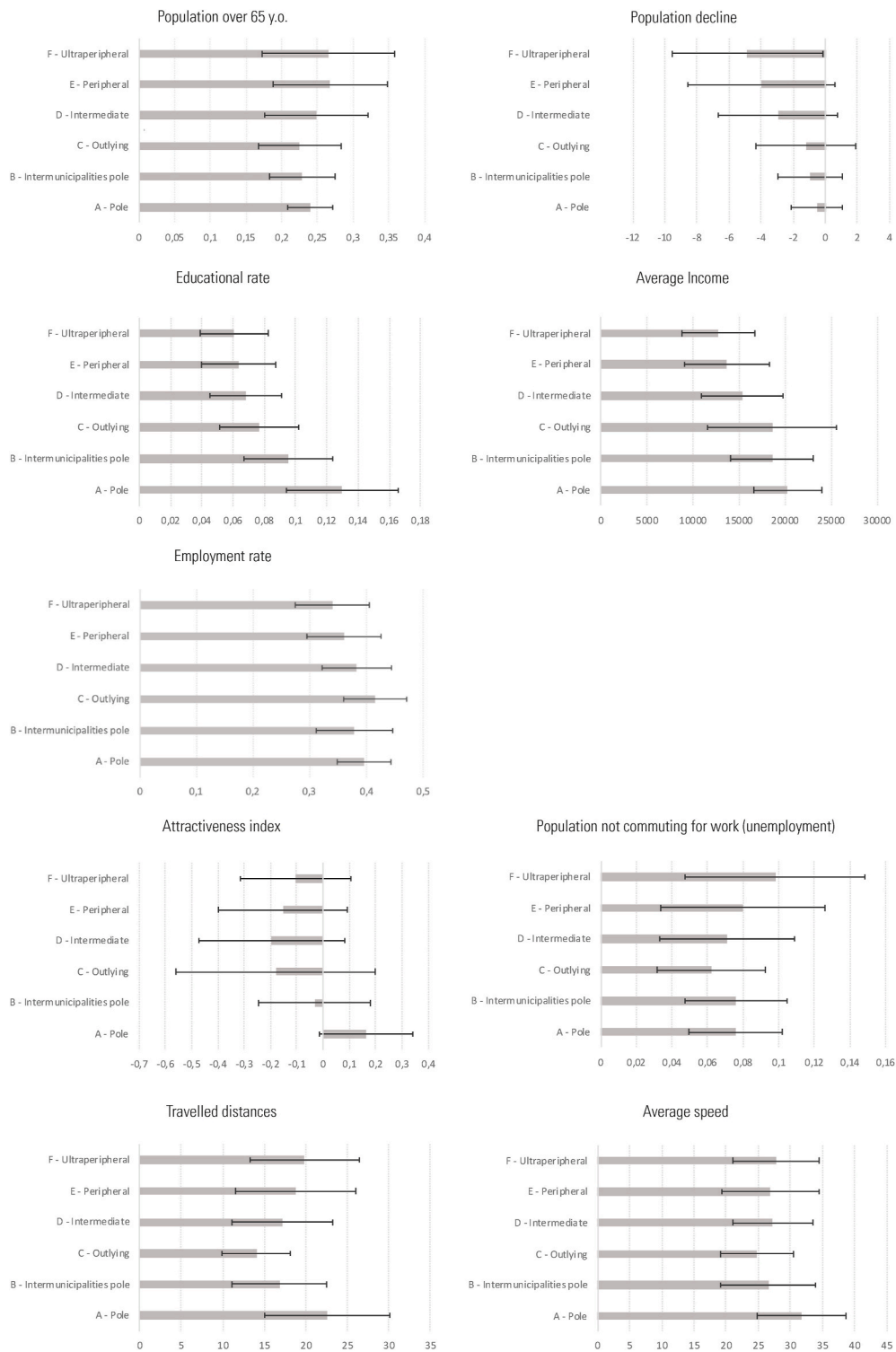


Fig. 2. Diagrams comparing selected indicators and the six SNAI categories with standard deviations.

for its relevant characteristics in terms of marginality, not only to help the reader, but also to give a sense of its character beyond the purely mathematical result.

3.1. Demographic marginality

In the analysis of demographic variables, four clusters were identified based on the impact of elderly people and depopulation trends. These clusters describe different levels of marginality risk:

- Cluster D1) ‘Young’ municipalities are those with a low percentage of ageing and a low rate of population decline. There are very few of these, which are not grouped geographically.
- Cluster D2) ‘Stable’ describes a level of population decline and number of elderly people below the national average.
- Cluster D3) ‘Old’ areas are characterized by a very high percentage of elderly people and a depopulation rate lower than the national average.

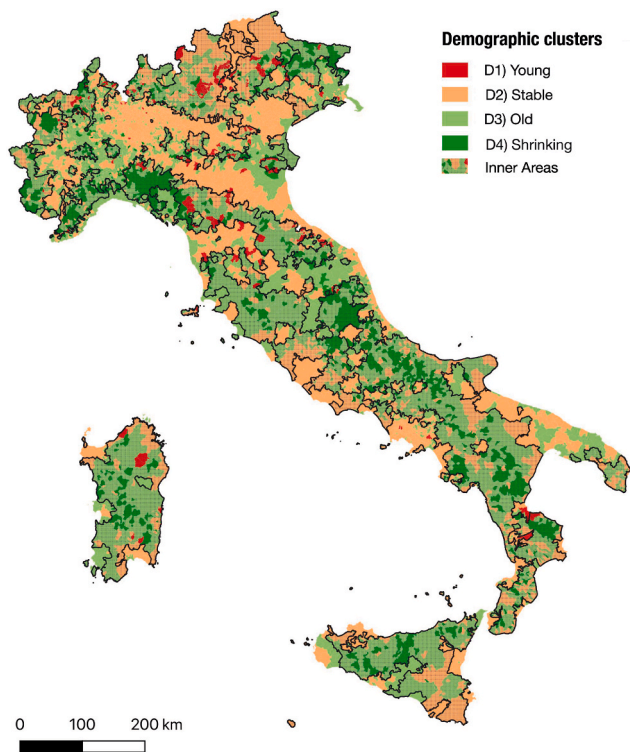


Fig. 3. Demographic clusters.

- Cluster D4) ‘Shrinking’ municipalities are those with an ageing population close to the national average but with high depopulation.

Fig. 3 shows territories with a higher marginality risk from a demographic perspective, namely clusters three and four; these are concentrated on the Apennine ridge, in some Alpine regions, and on the main islands (Sicily and Sardinia). Interestingly, a large fragile demographic cluster is also present in the Po Valley, in the central Piedmont Region.

A comparison among inner areas, as defined by the SNAI, with clusters three and four shows that while almost all shrinking areas (four) are inner areas, some inner areas are not very marginal from a demographic point of view—for example, north-eastern Lombardy and Friuli Venezia Giulia, or even Lazio in the municipalities surrounding Rome and the southern part of the region. In addition, comparing the SNAI with the light shrinking cluster (three), some areas classified as poles by the SNAI appear as marginal for demographic reasons, despite their centrality with respect to service provisions, such as areas in Apulia (southern Italy), Marche and Umbria (central Italy).

3.2. Socio-economic marginality

Socio-economic variables were grouped into three clusters:

- Cluster SE1) Territories of ‘well-being’ are characterized by high income and high rates of employment and education. These areas have a low marginality risk due to very good socio-economic conditions: high income means greater accessibility to different means of transport, while higher education rates increase the possibility of obtaining a well-paid job and improving one’s socio-economic conditions (Grengs, 2012; Lucas, Bates, Moore and Carrasco, 2016; Macket, Achuthan and Titheridge, 2008). Territories of well-being usually include the larger cities throughout the country.
- Cluster SE2) ‘Highly employed’ areas have high income and a high employment rate but a lower education rate. These territories still have a low risk of marginality because of the high employment rate

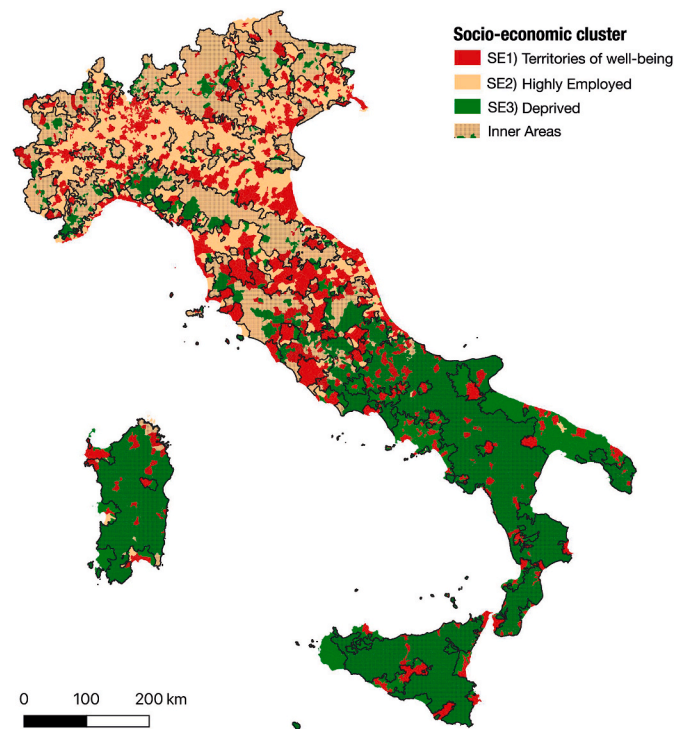


Fig. 4. Socio-economic clusters.

and are located mainly in northern Italy in the areas around the main metropolitan cities.

- Cluster SE3) ‘Deprived’ describes territories where the population has very low income, employment, and education. These areas have a higher marginality risk because of the reduced ability to reach different opportunities, both from an economic and capabilities point of view (Belton Chevallier & Mattioli, 2017; Lucas, van Wee and Maat, 2016, p. 479; Lucas, 2012).

Fig. 4 confirms well-known disparities in terms of socio-economic conditions between the north and south of the country, with a concentration of deprived and unemployed areas in the south and the major islands.

A comparison with inner areas highlights that in the south, inner areas suffer because of low income, employment, and education, while inner areas in central and northern Italy have a lower marginality risk from a socio-economic perspective, except along the Apennine ridge in the Regions of Liguria, Tuscany, and Emilia Romagna. In addition, some areas that are marginal due to socio-economic reasons are considered central by the SNAI due to their convenient access to primary services. This is the case, for example, in some areas in Campania and Apulia, as highlighted in Fig. 3. The inconsistencies between these two classifications show that geographical distance from main services is not a sufficient condition for guaranteeing access to them and avoiding the emergence of forms of marginality due to both economic and attitudinal barriers.

3.3. Marginality and mobility

Finally, the clustering based on current mobility behaviors includes variables such as attractiveness, average speed, travel distance, and non-commuting people, analyzed through the unemployment index. Geographical clustering led to the definition of five clusters:

- Cluster M1) identifies ‘Dynamic’ territories. These are highly attractive areas, with average speed, very short distances, and a low unemployment rate. In these territories, a large part of the

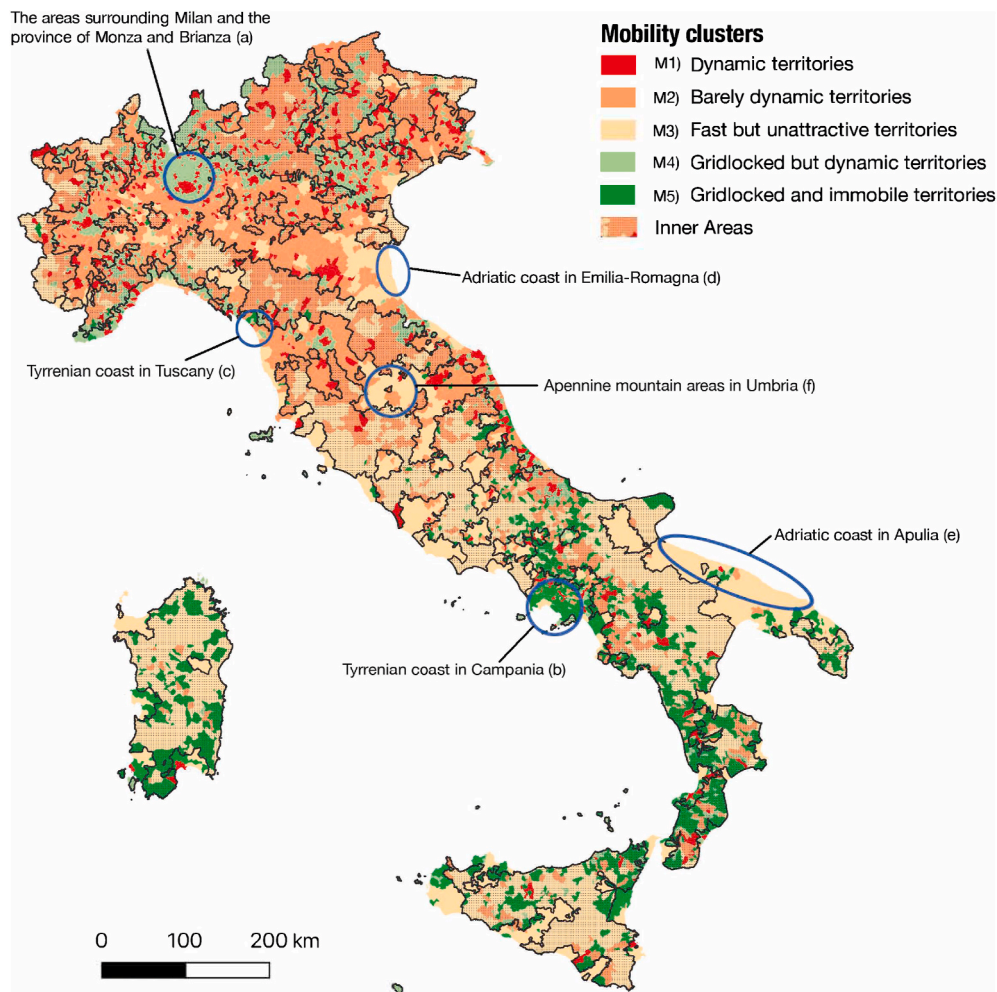


Fig. 5. Mobility clusters.

population is on the move because of work and travels relatively fast thanks to a high-performance network. Cluster 1 is very scattered and includes some important cities, especially in the north and centre of the country, such as Milan, Pavia, Brescia, Turin, Vicenza, Padua, Udine, Trento, Bologna, and Florence.

- Cluster M2) 'Barely dynamic' includes areas with a medium-high travel speed and low unemployment, with distances covered and attractiveness in line with the national average. Compared to cluster M1, these territories are characterized by lower attractiveness and longer distances travelled at a higher speed.

Clusters M3) to M5) identify territories in disadvantaged conditions according to the mobility variables.

- Cluster M3) 'Fast but unattractive' areas are characterized by high speeds and long distances, but low attractiveness and an unemployment rate higher than the national average. While the high unemployment rate may reveal an underestimation of mobility needs, travelling long distances may reflect the need of inhabitants in these areas to make very long journeys to reach their place of work.
- Cluster M4) 'Highly gridlocked but dynamic' areas are characterized by very low commuting speeds and short distances, low unemployment, and average attractiveness. The low speed, together with low unemployment, evinces bad network performance that is insufficient to support the high flows of work-related travel.
- Cluster M5) 'Gridlocked and immobile' territories have a higher risk of marginality for mobility reasons. Speeds and distances in line with

the national average, together with very low attractiveness and high unemployment, show that even though few people move for work reasons, the mobility system does not reach a high level of performance. High unemployment, representing people that are not moving because of work reasons, together with low performance of the network, may suggest that the inhabitants struggle to reach important opportunities and fulfil basic needs.

The distribution of mobility clusters on the map shows a very complex geography where dynamic areas in the north suffer because of inadequate mobility services and transport networks (cluster 4), while some areas around important metropolitan areas in the south are both slow and immobile (cluster 5).

Comparison with the inner areas reinforces this complex analysis. Fig. 5 shows that areas defined as poles by the SNAI, such as the areas surrounding Milan and the Province of Monza and Brianza in Lombardy (a), may instead be considered disadvantaged in terms of mobility because of low-performance networks due to congestion and the layout of the urban road network. Coastal areas defined as central by the SNAI located on the Tyrrhenian (b and c) and Adriatic (d and e) Seas, as well as some Apennine mountain areas (f), instead report low network performance and a high concentration of (im)mobile people.

3.4. Comparing conditions of marginality with the classification of inner areas

A comparison of the fragile territories resulting from clustering of the

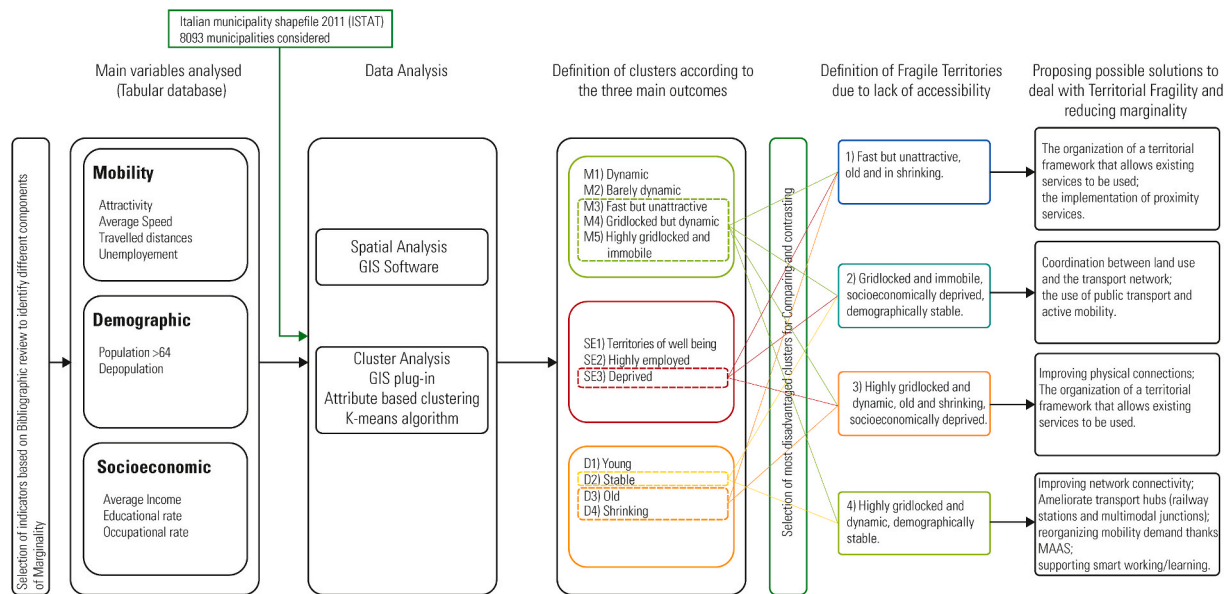


Fig. 6. Flow chart of the method used.

three outcomes with the map of accessibility created by the SNAI highlights some important preliminary findings. First, there are some areas where a low level of accessibility overlaps other disadvantaged conditions such as a poor socio-economic or demographic situation. In contrast, it highlights that some areas defined as ‘central’ by the SNAI instead show low performance in relation to mobility. Furthermore, clustering confirms some hypotheses: travel speed is not an exclusive requisite for defining a ‘pole’ and/or a well-connected territory. Instead, both central and remote areas of the country may achieve a high speed of travel. Nor does distance travelled from secondary schools, hospitals, and stations comprehensively describe marginality, since there are inner areas where distances from those services do not affect the livability of the place and inhabitants can reach many opportunities despite apparently long distances. At the same time, there are central places where low socio-economic conditions prevent effective accessibility to opportunities. In order to define marginal territories, it is clearly necessary to examine the quality and performance of the opportunities to be reached, as well as the effective needs of the population and its ability to access opportunities.

4. Identifying the geography of fragile territories

The analysis introduced in the previous section highlights the multifaceted aspects of marginality and the difficulties in defining unique boundaries for marginal territories in Italy. Clustering allows the most disadvantaged areas to be identified for each component, that is, those reporting the highest concentration of issues concerning the level of accessibility and marginality. Here, we compare those areas to identify regions where the overlap of different concerns produces extremely disadvantaged conditions and may also lead to the presence of territorial fragilities. A flowchart of the method is shown in Fig. 6.

With regard to territorial fragilities,¹⁶ we refer to the multidimensional process of territorial marginalities that may appear in particular geographical areas, creating the conditions for undesirable events to occur.

Comparing the three sets of clusters, we highlight four different conditions of territorial fragility (Fig. 7):

1) Fast, unattractive, old, and shrinking;

These territories are characterized by shrinking processes that also affect the availability of services (public transport, health and educational services, recreational activities), which are strongly lacking and concentrated only in some municipalities. It is not by chance that these areas in most cases correspond to the definition of inner areas. The organization of a territorial framework that allows existing services to be used and the implementation of proximity services may be a solution for improving accessibility in these areas and reducing marginality.

2) Gridlocked and immobile, deprived, and demographically stable;

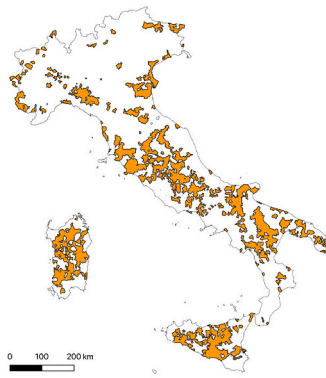
This group includes mainly territories classified “central” by the SNAI but characterized by the inadequacy of the transport network. We have estimated a major risk for areas that are stable demographically, because high densely inhabited areas may be even more affected by congestion. Indeed, very dense territories with a high percentage of younger people in a socio-economically deprived context may represent a disadvantaged condition for access to school and services. Solutions may be found through better coordination between land use and the transport network to increase integration among different travel modes and the use of public transport — possibly strengthened in terms of quality and coverage — and active mobility at the expense of individual cars.

3) Highly gridlocked and dynamic, socio-economically deprived, old, and shrinking; and

4) Highly gridlocked and dynamic, demographically stable.

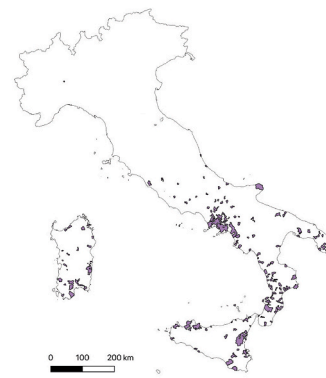
Both clusters belong to the central areas in the SNAI classification, even though they suffer due to the low performance of the transport network. In the first cluster it is possible to imagine that the slowness of movement is due to the particular morphological territorial configuration which also influences demographical and socio-economic performance, while in the second, demographic stability and high socio-economic performance suggest that the low mobility performance is the result of an overloaded transport network. There may be different

¹⁶ Territorial fragilities is a multidisciplinary research project conducted by the Department of Architecture and Urban Studies of the Politecnico di Milano. For more extensive information about the project, please refer to Dezio et al. (2020) Territorial Fragilities in Italy. Defining a Common Lexicon, in *Territorio* 91, 2020.



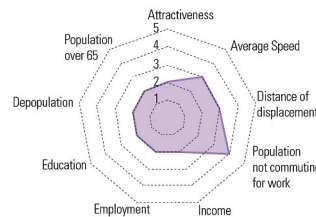
1. Fast but unattractive, old and in shrinking.

Territories characterized by shrinking processes that also affect the availability of services. They correspond, in most case, to the definition of inner areas



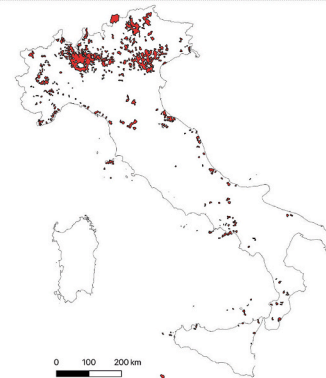
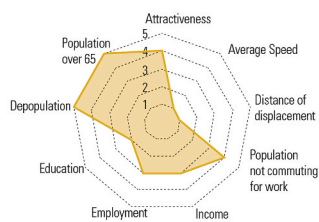
2. Gridlocked and immobile, deprived, demographically stable

Territories characterized by the inadequacy of the transport network with high population density. They are mostly defined "central" by the SNAI.



3. Highly gridlocked and dynamic, deprived, old and shrinking

Territories characterized by low performance of the transport network, low socio-economic performance and very high percentage of elderly people and high depopulation.



4. Highly gridlocked and dynamic, demographically stable

Territories characterized by low performance of the transport network, high socio-economic performance and a level of population decline and number of elderly people below the national average.



Fig. 7. Map of fragile territories due to marginality and lack of accessibility.

solutions for each. For cluster four, interventions could be aimed at improving network connectivity to support a modal shift, in particular creating transport hubs and multimodal junctions in railway stations. Additional solutions could include reorganizing mobility demand thanks to mobility as a service solutions (MAAS) and supporting remote working/learning opportunities. In contrast, for cluster three, interventions aimed at improving physical connections as well as the

organization of a territorial framework that allows existing services to be used may help to improve accessibility.

5. Discussion and further research developments

This paper introduced an experimental method to classify marginal territories in Italy. We began by selecting significant indicators to

describe different conditions of marginality to overcome the drawbacks of the official classification of marginal areas in Italy. Overlapping the most disadvantaged conditions leads to a map of the most fragile territories (Fig. 7).

This classification is based on a multidimensional evaluation. By identifying target populations at risk of marginality and their spatial distribution, we keep in the analysis both individual and geographical dimensions. The relevance of this approach is highlighted by comparing our findings to the SNAI classification. When examined through parameters of physical distance from selected top-down services, marginality produces a weak interpretation that is not suitable for guiding territorial cohesion and rebalancing policies, as was the intention of the SNAI.

The discrepancies between the institutional classification and ours show the underestimation in the SNAI approach of some relevant conditions of fragility, even in central areas with high performance in terms of income and socio-economic conditions (i.e. traffic congestion in central areas). On the other hand, it also shows the inefficacy of physical distance for tracing the decisive factors explaining the features and processes of marginality. Introducing a multidimensional approach to define situations characterized by peculiar forms of fragility allows territorial and mobility policies to be addressed more selectively, providing the opportunity to achieve greater effectiveness in dealing with place-based problems (Barca, McCann, & Rodríguez-Pose, 2012).

Despite these results, the proposed approach says very little about either the characteristics of the services or their relevance as “target supplies” in relation to the basic needs of the population, nor about a minimum accessibility threshold.

With regard to the selection of target services, many authors argue that the identification of basic needs is still “an unresolved challenge in the academic literature” (Pereira et al., 2017). According to Sen (2005), the definition of basic needs is culture-dependent, while Nussbaum (2011) stated that a universal list of central capabilities can be identified. In our opinion, basic needs and the thresholds for ensuring “activity participation” (Lucas, 2012) should be defined according to a participatory process (Martens, 2017) that involves citizens and specially informed people through focus groups and interviews. To lend value to the actor’s point of view and direct knowledge, as in the research by Vecchio (2020) in Bogotá, these approaches pose some relevant methodological questions. The first is the significance of the selected sample and the time needed to obtain a significant number of answers. Second, selecting services and thresholds based on national preferences or the point of view of a few specially informed people may engender a paternalistic approach (Vanoutrive & Cooper, 2019) unable to deal with place-based needs.

In order to address the social dimension of accessibility and find place-based needs for the most disadvantaged populations, the next step of this ongoing research focuses on selected case studies in Italy. Cases will be selected according to the results of the clustering analysis. The investigation will require mixed methods capable of matching quantitative with ethnographic approaches, identifying the essential services capable of guaranteeing inclusiveness, considering the most disadvantaged populations overall. Working with both quantitative and ethnographic analyses (i.e. focus groups and surveys), the ongoing research will apply the findings of the clustering analysis to the selected case studies. For these areas, we will identify population needs and an index of accessibility to basic services, with particular attention given to the performance of services (Pucci et al., 2019), in order to propose policy measures for dealing with site-based marginalities and the related fragilities.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.apgeog.2021.102537>.

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