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The cover image shows the Irpinia hills at sunset, highlighting the enhancement of two renewable energy sources: sun and wind.
The photo was taken by Giuseppe Mazzeo in August 2022, in S. Andrea di Conza, Avellino, Italy.

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Resilient marginal cities by encouraging intermodality strategies

Analysis of the Campanian marginal cities with criteria for intermodal business model

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Abstract
While metropolitan areas are evolving, funds and investments are investing in megacities, an overwhelming part of the population lives in peripheral and decentralized areas. Starting from an international view, the paper intends to offer a spatial cluster analysis on the main business models that can be reproduced in marginal areas. The literature points out that there is much study of inland areas but no spatial analysis of transportation for a particular band of areas, which includes marginal cities. A focus will be made on the marginal cities of Campania, starting from the strategies of internal areas. Encouraging intermodality with alternative and ICT-connected transport systems is a way to provide a mode of transport to cities in crisis. After an analysis of the territory, we will proceed with the identification of models of business for the decentralized areas of Campania. The main objective is to provide a set of criteria to identify the most suitable mobility services in main territorial contexts, from the point of view of population density, travel time from the nearest hub and use of ICT. This study should be seen as an initial approach to identifying strategies to develop the inland territories for first and last mile connection.

Keywords
Marginal cities; Intermodality; Sustainable mobility; Urban space; Business model.

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1. Introduction

The changes we are now experiencing in recent years, highlighted mainly by two major events such as climate change and the pandemic are likely to have a permanent status. Above all, these events have shown the weaknesses in our lives, which have become marked during the recent decades. In detail, starting from emerging trends aforementioned, this paper is intended to analyse the physical limit of the cities in which we live that are less suitable to offer sufficient levels of quality of life, pursuing cities more fitted for human scale. The methodological proposal is made to encourage marginal areas that are in danger of being pushed further away (Hoggart & Buller, 2016; Gallent et al., 2015). The outcome of this research is to build a cluster analysis, starting from the identification of marginal cities in Campania, based on similar cities analysing the existing business models of mobility services deriving from best practices of European projects and real cases of successful peripheral and remote mobility applied in Italy. Marginality is still the source of interpretations and perceptions, so defining it with a single concept is still the focus of discussion. The scientific literature offers valuable support, despite this, there is no clear consensus that has emerged on its single meaning (Bradley & Pretes, 2000). Thus, the objective of the article is a cross-sectional analysis of the main case studies in the literature and in the international context concerning transportation networks and sprawl cities, reinforcing the concept of social revolution as 'new contemporary humanism', with a shift in the perspective of communities from the city to urban hinge contexts (Beauregard, 2018). The proposed study is an approach that looks at both the territorial side, taking into account the urban aspects of the city, and the transport side, increasing the efficiency of the transport network. With regard to mobility, it is a matter of operating both on supply models and on the use of digitalization, so as to involve aspects such as frequency, regulation, safety, accessibility and system integration in a single vision. There has been a significant capitalization of metropolitan areas in terms of financial and planning commitment, although these opportunities have not affected the decentralized areas of the suburbs. The lack of strategic and intermodal alignment between mobility and urban planning is straightforward in many cities, and is most affected in marginal areas that are 'hinge cities' between medium-sized cities and metropolitan areas (Borrelli, 2007; Leimgruber & Chang, 2019). The pursuing of resilient cities can also be extended to decentralized areas, to encourage their connection with the territory. Frequently, a form of inequality lies behind marginal cities, resulting in a lack of accessibility to services, often caused between low-income neighborhoods and employment opportunities (Blumenberg & Manville, 2004).

The impossibility of moving easily has been an effect of both inadequate planning that today does not seek to create the physical spaces necessary to optimize transportation infrastructure and connections, and to pursue the minimum accessibility goals promoted by national and European regulations. While metropolitan areas are seeing an increase in mobility services, including electric services, marginal areas, being excluded from innovation and major economic and social processes, are unable to increase Local Public Transport as road and rail (Déry et al., 2012; Pelc, 2006). Along these lines, it is necessary to act by identifying concrete actions for sustainable mobility along the hinge between highly populated areas and decentralized cities, overcoming the concept of the classic city to imagine a territorial and functional connection between areas with different characteristics of urban density. Reinforcing the point about a change in urban design is the experience of the pandemic, which caused a massive shift of users from metropolitan cities to urban centres. A city is a set of functions, located in several points of the territory (Mela, 2020), remarkably complex, such as to drive the necessity to rethink a new concept of city itself (Amin, 2002). In its continuous nature, the urban texture exhibits the weakness of a network that has not distributed the required functions in each of its nodes of network. Concerning the medium-sized cities and regional metropolises emerges the awareness (Mascarucci, 2020) of how the traditional city has now transformed itself into a "continuous city", moving from a system of 'compact city' to a system of 'diffuse city', with a series of scattered parts throughout the territory.

During the pandemic was observed a return to the suburbs for work purposes. The practice of smart working has already highlighted the potential of suburban areas, but it is essential to provide adequate mobility with

high level of intermodality in the first, middle and last mile. Cities are still the focus of studies and researches (D'Ascanio et al., 2016) as attractors and enablers of resources, powers and knowledge (Barbera & De Rossi, 2021). The patchwork of urban functions is constantly composing and decomposing, interrupting that pattern of continuity in growth that has been the characteristic of the twentieth century. The complexity of the research lies in the difficulty of perceiving these new mechanisms, strongly influenced by unpredictable external factors, highlighting that urban planning projects have the task of looking at local resources, being able to offer a concrete response. In the last 30 years, the population has begun to settle close to cities, giving rise to suburbs defined as places "diffuse", "exploded", causing the loss of three important indicators proposed by Archibugi (Archibugi, 1995), such as human "sociality", sense of "identity", and environmental "sustainability". In the search for new solutions and mitigation modes for the new city, a mixed approach is required on the new identity of territories (Di Ruocco et al., 2019; Sicignano et al., 2019) and on the legitimate nature of mobility, which occurs in the relationship between space and accessibility. New experiments become opportunities to rethink needs and necessities between demand and supply based on economic developments, with the possibility of transport revitalization inspired by MaaS systems and the strengthening of ICTs (EU Smart Cities Information System, 2017; EU, 2020). Thus, the transition between metropolitan and marginal cities is a complex of interactions between governance and value creation with stakeholder participation (Cocchia, 2014). Thinking about the resilient city also means studying marginal cities that can become and promote themselves as smart cities. In the city of tomorrow, the focus should be shifted from the metropolitan city, whose challenge is to try to maintain a high quality of life, to the medium city and inner areas, and its connection with the big city. The current research focuses on spatial marginality analysed according to socio-financial indicators, mobility, territorial geography, ICTs, identifying the potential of accessibility as one of key factors to overcome marginality. Marginal cities gravitate to the medium cities but without benefiting from the investments that are attracted by the metropolitan areas, are unable to capture capital and losing competitiveness, becoming increasingly weak to propose high value-added activities. The definition provided by the Ministry of Social Cohesion covers only one aspect of marginality, understood spatially, but does not take into account other factors (Vendemmia et al., 2022).

Funds	**€**		**Topic**	**Key Actor**
Recovery Fund	300 M	2021-2026	Inland areas for the improvement of accessibility and safety of roads	UPI (unions of Italian districts)
Fund to support economic activities in internal areas Prime Ministerial Decree on internal areas (FSC)	210 M	2020- 2022	Economic activities, crafts and trade	Agency for Territorial Cohesion - ANCI, UPI
Development and Cohesion Fund	50 B	2021-2027	Italian government funding for underutilized areas of the country	European Structural Funds
European Funds (ESF-ERDF)	373 B	2021-2027	Investments in areas lagging behind in development	European Structural Funds
Recovery Plan – M3C1/C2	28.30 + 3.68 B	2021-2026	Innovation, digitalisation, road/infrastructure/intermodality	Recovery Fund, Supplementary Fund

Tab.1 Funds for inner areas in Italy

A preliminary analysis starts from understanding the resources financed for the development of inner areas, in which marginal areas are included. Inland areas, identified in a study by the Minister for the South and Social Cohesion known as SNAI strategy (Inner areas national strategy) is supported both by European funds (Agency for Cohesion, 2014), for the co-financing of local development projects, and by national resources, allocated by the Stability Laws 2014, 2015, 2016 and the Budget Law for 2018 (Regione Campania, 2020).
In addition to Tab.1 are the funds made available by the Recovery Plan "PNRR" for infrastructure and mobility and intermodality, which can be identified in the objectives of Mission 3 – "Infrastructure for sustainable

mobility" e M3C2 – "Intermodality and integrated logistics". In detail, in M3C1, whose policy area of interest is "National rail and road mobility" promotes the goal of increasing territorial connectivity and cohesion by reducing travel times; the digitalization of transport networks (Ministero delle infrastrutture e della mobilità sostenibili – Recovery Plan, 2019). The three actions aim to achieve cities more connected, safe and environmentally sustainable, increasing the national rail and road transport network, as well as the competitiveness of businesses, territories and cities (Recovery Plan, 2019). The total investment concerning the mission M3C1 is € 28.30 B, resources allocated to "Railway works for the mobility and the fast connection in the country, whose € 0.7 B are addressed to the railways of the South Italy[1].It is clear and obvious that, in the practical context, many marginal cities are unconnected and remote from medium city or urban centre, both for the scarcity of resources and policies. As will be highlighted in the next chapters, it is required to focus on lack of mobility for basic needs (mobility to work, to school, health purposes). A study that connects spatial marginality with accessibility, making an integrated analysis between socio-demographic marginality conditions and mobility practices at the national scale is provided by Vendemmia et al. (2022).

Overcoming isolation is at the heart of the issue of intermodality, which must be pursued by acting primarily on two indicators: cost of travel and type of vehicle. The home-work travel must be strengthened, especially for cities that are more than an hour away from work or from the first infrastructural node such as stations or health centres, etc. One of the goals of the 'city of tomorrow' is the total decrease of cars, by reinforcing the system of offer-demand in transportation on both medium and long distances of travel. First and foremost, it is necessary to act both on the decline of decentralized areas and on the regaining of the safe perception in travelling by using Local Public Transport "LPT", dropped by -45% during the pandemic, while the pedestrian mode only decrease of -5%, as observed in "Survey of Citizens' Mobility and Gentle Push Actions" from Transport Regulatory Authority (A.R.T., 2021). The reduction in the rate of LPT is marked for the regions of Central Italy (-56% against the national average of -48%) according to Isfort "Audimob" Observatory on the mobility behaviours of Italians (Isfort, 2020). On one side, the perception of travel between pre and post covid-19 conditions (Beck & Hensher, 2020; Politis et al., 2021) highlights a growth for some modes of transport such as bicycles (92%), car-sharing (300%), rented motor scooters (250%), high speed trains (170%) (A.R.T., 2021). On the other side, results on the use of regional train (17%) and LPT and metro dropped (23% for LPT and 24% for metro). The new mobility preferences suggest that the new way of seeing the city is characterized by a continuous connection, not fragmented (Mascarucci, 2020). Marginal cities lack infrastructure for movement, such as bus stops, bike or micro-mobility lanes, hub interchanges, bike parking, lack of "zones 30". The role of urban architecture must be exercised for the more peripheral and less concentrated forms of settlement, aiming to make them usable and habitable again. The relaunch strategies lies in the analysis of past decisions process proposed for the revitalization of the marginal territories. Recognizing the limited role of redevelopment planning, the crisis of the city is the occasion for the reconfiguration of settlements by creating new relationships between centres and margins zones. The actions suggested concern the digital, management and physical sector, in order to allow cities autonomy and meeting the needs of users. Thus, making smart cities means proposing an inclusive model of participation in mobility. Several adaptive solutions are proposed as measures for the built environment aiming at developing infrastructure and enable strategic mobility. These solutions exposed below are suggested at governmental level are identified with the following list:

- rehabilitation and revaluation of existing infrastructure assets (regeneration of soft and hard infrastructure);
- network of intermodal connections (including first and last mile);
- parking lots, interchange nodes (close to user collection areas);

[1] https://www.mit.gov.it

- strategic fares planning to increase competitiveness with private mobility system;
- incentives to intermodal collective systems (DRT sharing, Door2Door) for different age groups;
- application of MaaS (Mobility-as-a-systems) for smart use of transport (i.e. e-ticketing).

The difficulties for mobility and infrastructure lies in rigid built environment often characterised by important heritage of historical center. The current model of development is not balanced and is very fragile: the Italian geography has certainly focused attention on medium-sized cities but the main problem of urban space still remains (Corrado, 2021). The demand for mobility is implemented with the recognition of the new services necessary for the design of the new city (De Luca et al., 2020; De Luca & Lanzani, 2020). The environmental crisis and then pandemic have highlighted that the definition of the new city goes towards the search for development as a "word-value" (Pearce et al., 1989) that refers precisely to the quality of life, the health of the population, social welfare. Thinking about resilient cities and revitalizing marginal areas is not only a purely urban issue but an economic question, since many economic activities are located in cities, where infrastructure must be reconsidered in terms of value inclusion. Inclusion is one of the goals of sustainable mobility (Hidayati et al., 2021), which seeks to counter transport disadvantage (Denmark, 1998; Delbosc & Currie, 2011a; 2011c), other transport-related social exclusion weaknesses (Church et al., 2000; Kenyon et al., 2002), increase transport justice (Martens, 2012, 2017; Hidayati et al., 2021), redesign of distribution of resources (Verlinghieri & Schwanen, 2020). An analysis of the development of intermodality in marginal areas is to understand its potential in terms of technology and accessibility. Starting from ISTAT surveys, a first territorial analysis is proposed, whose focus for this case study is the Campania Region and marginal areas in relation to the metropolitan area of Naples. The proposed survey methodology proceeds first with spatial study, selecting some indicators to describe the state of marginal cities in relation to density, territorial attraction, intermodal impedance, propensity to use ICTs, travel time. Subsequently, the areas will be analysed according to territorial characteristics and cross-referenced with a set of national and international best practices selected by cluster approach (land similarity, population density, etc.) and compared by the mobility services of selected case studies (best practices, ongoing projects, existing mobility services. As suggested in Campisi et al. (2021), it is possible to locate 25 DRT flexible services in Italy (counted to 2021). The objective is to identify a set of criteria to build a 'Business Model' system appropriate to the areas of marginality analysed and to propose criteria for areas with higher risk of marginality.

2. Methodology

The paper focused on first a descriptive analysis of the characteristics of average cities, analysing their aspect of mobility and use of digital services (degree and level of connection to a mobile network), in detail:

- first identification of the baseline characteristics (socio-economic characteristics, travel time, infrastructure geomorphological features, etc.) of the areas analysed;
- assessment of the type of services;
- functional assessment of services and definition of Business Model.

In the first identification, socio-economic characteristics, travel time, transportation infrastructure (station or bus stop), and geomorphological characteristics (Campisi et al., 2021) of the areas analysed (Park & Goldberg, 2021; Vendemmia et al., 2022) in relation to the definition of SNAI and inland areas (Ministry for the South and Social Cohesion) are taken into account in order to classify services according to settlement-housing type, to assess which mobility pattern is more developed in some territorial contexts rather than others.

The transition between metropolitan and marginal areas takes up the concept of harmonization provided by the OECD (OECD, 2012), considering them as 'Larger Urban Zones' (LUZ), as delimit areas characterized by high rates of commuting to and from the city. According to this classification, the Larger Urban Zone provides a classification of urban areas (including metropolitan areas) in relation to the urbanization processes (Eea,

2016). The classification of municipalities also takes place according to three degrees of high, medium and low urbanization, using tools such as population density and number of inhabitants (Eurostat, 2011). Turning to the Italian and Campania case study, marginal areas are a category of inner areas, being fragile territories, far from major centres, occupying 60% of the Italian surface and 57% of the Campania territory (Campania Region, 2020). The internal areas identified by SNAI are 72, involving 1,077 municipalities and about 2,072,718 inhabitants (SNAI, 2014; ISTAT, 2021). The main categories proposed by the SNAI strategy (Minister for the South and Social Cohesion), highlighted by the new mapping, carried out by the Department for Cohesion Policies and ISTAT, based on distance (expressed in minute to reach the nearest hub) are: A - Hubs, B - Inter-municipal hubs, C- Belt areas (t<28'), D - Intermediate areas (28'<t<41'), E - Peripheral areas (41'<t<67'), F - Ultra-peripheral areas (t>67'). (SNAI, 2014). Based on the SNAI (Social Cohesion Agency, 2014), the study concerns on areas characterised by the average about 50 minutes away from the nearest pole (i.e. medium city), a distance that reaches, in some cases, even 60 minutes (from Naples city). Focusing on the typology of cities reworked on SNAI, in the definition of smart cities and big cities, it is necessary to redefine the travel time, chosen as a variable of infrastructure accessibility (Park & Goldber, 2021). Beyond the boundaries of the metropolitan city, the poles at a distance greater than 60 minutes were considered "edge cities". The tab.2 shows the two times evaluated for the case study.

City	Travel time (min)
Suburbs	40<t<65.9
Remote	t>65.9

Tab.2 Selection areas on SNAI strategies

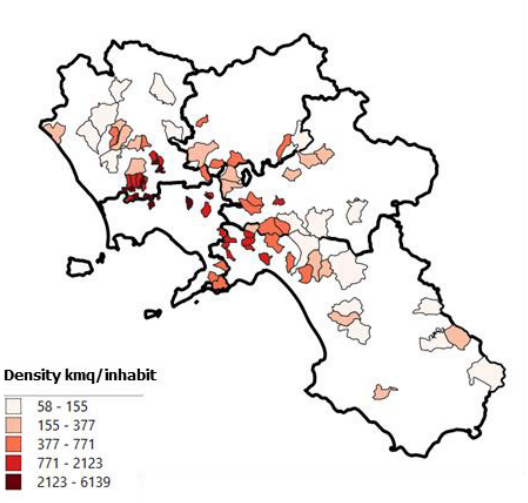


Fig.1 Density kmq/inhabit.

The marginal areas in Campania are selected on the basis of geographical criteria: 1. distance from the hub (hub as metropolitan city), 2. Absence or lack of LPT rail offer, 3. city with population between 5,000-20,000 inhabitants, 4. travel time t>60 minutes. In the following figure is exposed the result of criteria 3 (Fig.1).
Territorial density also affects the type of activity, in fact it is not unknown that low density is linked to few productive resources, encouraging distance from the metropolitan city that holds more capital wealth (Pearce et al., 1989), while the peripheral city loses social and economic wealth. Looking for an intersection between these two qualities in both fields should be the incentive to radically rethink the concept of the city, in the two extremes of its declination. Improving environmental quality is an improvement for development (Pearce et al., 1989). The disconnection is also caused by the new form of globalization of relationships and habits, emphasizing a declination of the city of proximity.

The form of mobility on the territory is reconfirmed as a necessity of the metropolitan area (Borja & Castells, 2002; Bauman, 2001) and the resulting lifestyles have shown the fragility of the different socio-territorial urban and metropolitan systems, losing connections with adjacent areas, causing an impoverishing of the social and urban texture of the neighbourhood (Amin & Thrift, 2005). A new declination of proximity and integrated mobility, particularly related to service delivery and lifestyles, is a recovery of the "15-minute city" (Moreno, 2020), in which the aim is to promote intermodality and the last mile for the marginal city.
The connection between marginal city and metropolitan area is a multiple system of the 15-minute city that aims to reactivate sustainable transport measures, addressing the issue of living in proximity that, in the declination of 15 minutes, aims to better reorganize the location of services, facilities for active mobility (Tesauro et al., 2017).
From the inner areas identified by the SNAI are 345 cities with resident population between 5,000 and 20,000 inhabitants (cities and towns with a population of less than 5,000 inhabitants were excluded). Among these, proximity cities close to metropolitan areas and medium-sized cities (classified as belt cities) were discarded, forming a final sample of 88 cities. Only 10 cities out of 88 have rail transportation (presence of a station or proximity to a train station as state railway RFI or EAV railway). From the 88 cities analysed, it appears that more than 80% are in non-flat areas (Fig. 2).

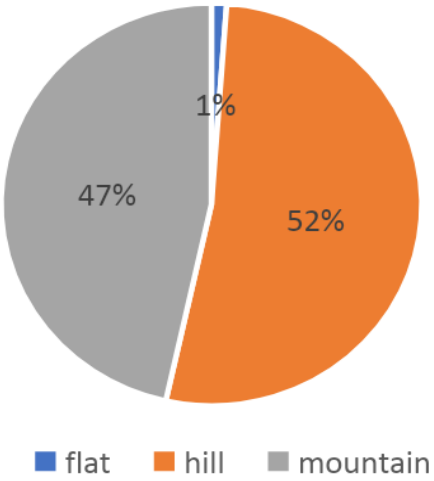


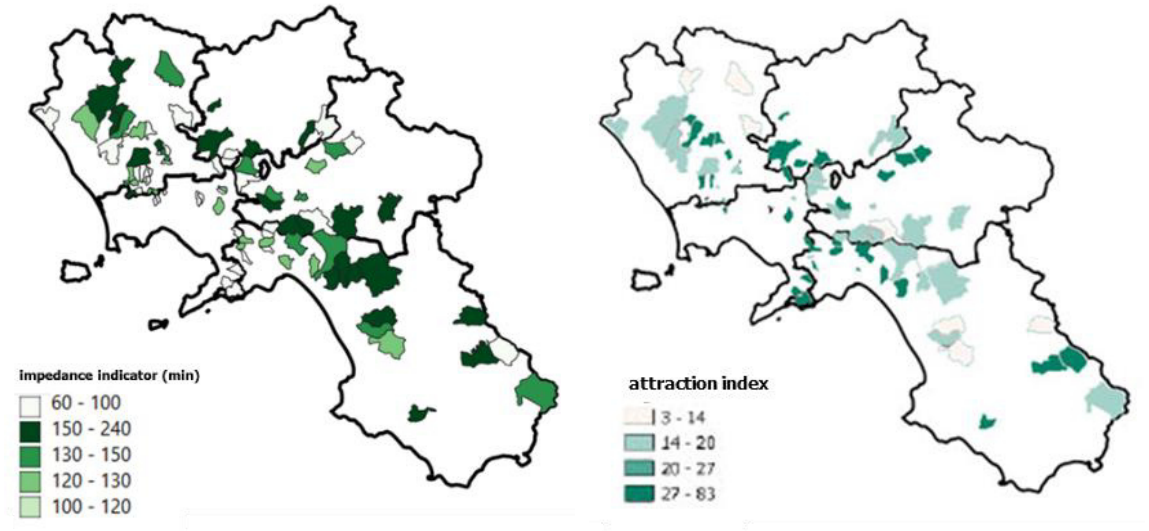
Fig.2. Kind of settlement

According to the Inner Areas strategies, a sub-sample has been created based on time of travel time toward Naples city as the metropolitan area of Campania Region. Cities from inner areas has been selected based on the criterion of distance from the hub in terms of rail transportation (Tab.3), since travel time by car is not of interest of this research, for the reduction of car use, and by wanting to focus on encouraging rail or LPT travel.
The analysis here only reports travel times for the metropolitan area. Travel times to the nearest average city (Salerno, Benevento, Caserta, Avellino) have been considered during the study in parallel with travel times towards metropolitan area of Naples. The first result of the travel time calculation (average travel time on a weekday during soft hours) shows that many cities have a travel time within 100 minutes, about 50 cities have a time above 100 minutes (Tab.3) , moreover it has been observed that for the same distance (invariant distance), the travel time between car and train is about double.
Cities with travel times greater than 200 minutes are located in mountainous areas of Campania or do not have a direct connection to Naples, being forced to make changes at other minor stations. Whether on the 100-minute or 200-minute trip, the lack of intermodality is evident. Moreover, not all users have access to the station as it is far from the center or located in a different city.

N. of cities	Travel time (min)
8	t<60
30	60<t<100
29	100<t<200
15	200<t<400
6	t>400

Tab.3 Travel time in marginal cities

In detail, low or insufficient intermodality is evidenced in many cities with the same distance from the metropolitan area have two different travel times showing that when *time travel car* is <30' for the car mode, *time travel railway* is 60'; when time travel car is t>60, time travel railway is about 120<t<200. Only in few case time trave railway is major than 200 minute (15 up to 400 minutes and only 6 cities over 400'). The value of the trip discourages the use of the LPT and increases the use of the car for short distances, while for long distances it seems impossible to use the train. In addition, the travel time does not allow commuting to home-school/work, to which must be added the movement from/to the station from the station to users' home. Thus, the study propose and evaluation of 'impedance indicator', as shown in the following figures, used for the calculation of potential accessibility, based on the travel time from the centre of the municipality considered to the centre of the metropolitan area (Fig.3a). Therefore, a general observation of the attraction on the basis of employees, population, income is essential (Statistical Atlas of Municipalities, 2019), highlighting the phenomena of mobility of the territory (Fig.3b).



(a) (b)

Fig.3 (a) Impedance indicator and (b) attraction index

3. Applications

The preceding results highlight an aspect of the Campania Region that is still far from offering adequate services to its citizens. The 57% of the cities analysed have a fairly low population density but are located in an area that is not flat and are characterized by severe transportation constraints towards medium-sized cities, except when considering the medium cities (Benevento, Salerno, Avellino), but there is still no balanced cross-selection between travel times between marginal cities in inner areas. Numerous negative aspects are also observed for cities close to the metropolitan city of Naples, where the comparison between car and train is still weak, with prevailing gains for the car. Thus, accessibility must aim to offer sustainable and safe mobility to all users, and to connect the city. Intermodality is no longer just a function of the possibility of changing

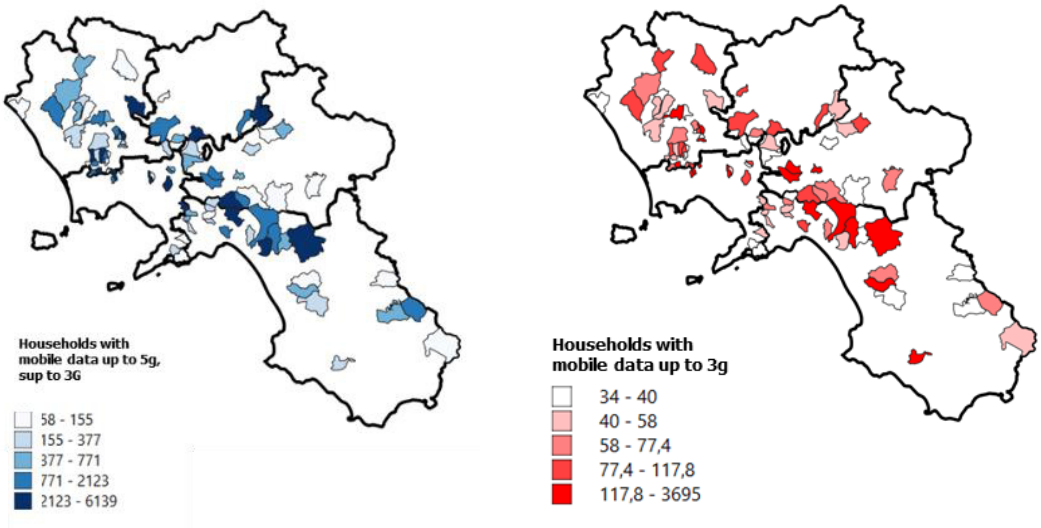
means of transport but is also in the adaptation of the urban form to shared forms of mobility. Increasing intermodality is a first contribution towards improving air quality by reducing congestion and increasing travel quality. Responding to the European needs to incentivize transport and railways provided by the funds provided by MIMS (Ministry of infrastructure and sustainable mobility, 2022) is declined both in the encouragement of existing railways, but especially in the items of developing transport between suburbs and promoting green vehicles. The transformation of marginal cities into smart cities requires a major challenge in finding resources and concrete actions. One of the points to build smart cities is the encouragement of ICTs in transport as a point of union between mobility and the city. In this perspective, similar to the concepts of the 'city-15-minute-walk', we proceed to develop a functional city in which transport connects the internal territory and maintains extra-zonal movements. What is clear from aforementioned results is that many cities still have poor technology available (26% of the cities in Campania analysed in mountains and hills settlement do not have a fast connection, of which 13 cities in mountain areas have less of 50% of connection percentage).At glance, national and international practices[2] Campisi et al. (2021) highlight strong aspects of integration between urban space and mobility such as the function of accessibility of the territories. 68 best practices, whose 45 from Central Europe, Ireland, UK have been considered relevant, 25 are Italian cases, related to flexible system (most of them DRT) services (mostly located in the North of Italy (64%), then in the central regions (32%) and finally only 4% in the regions of Southern Italy as reported in Campisi et al. (2021), and ongoing projects[3] with the objective of developing mobility in remote and marginal areas, promoting active citizenship and the introduction of ICTs systems to perform the mobility service[4]. The mobility services analysed have as main objective the intermodal development through green services with three different functions:

i) full mobility system;
ii) integration mobility system;
iii) additional mobility system.

(i) is a launch of a total mobility service in the total absence of LPT (rail, road) meeting the whole demand; (ii) is an integration of services especially for first/middle/last mile junction, often supplementing the same route, with a new schedule or different pathway; (iii) is a hybrid service that comes into play when the service is absent in some areas or trips becoming supplementary for that service offered. Both (2) and (3) include mobility services that are significantly different from existing LPT. The services indicated (1), (2), (3) can turn out to be either flexible services (FTS) (Brake et al., 2004) or rigid services. Flexible services turned out to be suitable for weak or economically disadvantaged areas, or used for a certain category of weak and vulnerable users (as best practices analysed in the UK will show (Campisi et al. 2021; Cervero, 1997; Maltintiet al. 2020). Based on this reflection, it is understood that the mobility system for a resilient city is composed of both the strengthening of intermodality and the improvement of accessibility. From European experiences (Horizon 2020, Horizon 2021-2027, INTERREG CE) it is now recognized that increasing mobility does not always result in increased accessibility. On the one hand, diversification in urban shapes and cause-effect of pandemic have witnessed unprecedented changes in metropolitan/regional accessibility, mainly based on increasing use of car instead of green mobility solutions. On the other hand, it is also clear the disappearance of local activities (public and private) and continued urban sprawl and consequently the loss of neighbourhood level accessibility. All the international practices fall in very disadvantaged areas, as sprawled villages, mountainous, hilly, where the use of the car is strong preferred to LPT (80% private car). Some of these services offer mobility service type (1) in marginal areas close to cities with remarkable results for transport (Switzerland, Germany, Italy, Ireland, UK, France, Spain).

[2] www.cordis.eu
[3] https://trimis.ec.europa.eu
[4] https://projects2014-2020.interregeurope.eu, https://www.interregeurope.eu

The marginal areas analysed from SNAI above were cross-referenced with the 43 mobility services of decentralized, peripheral areas of national and international projects. In identifying strategies to reshape activities in the new urban space, it is necessary to think of different mobility geographies in which it is possible to insert in the shorter distances the activities that require more congestion and thus reduce pollution, so as to recalibrate the attractiveness of the areas or to increase their connectivity. Processes of synergies between stakeholders and co-creating solutions for smart cities is based on the extension of governance by cities (Pereira et al., 2017). Stakeholder involvement already proven decisive in the decision of works and infrastructures (Pagliara & Di Ruocco, 2018), while it is also becoming so in the implementation of ICTs in transport systems. It is interesting to note that cases in Germany, Switzerland, Ireland, UK are based on strong synergies of stakeholders to which it is possible to consider replication in the Campania areas to start launching inclusive mobility services (e.g. Carpooling) that can cover the gap of the last mile. Thinking about mobility to encourage intermodality and thinking about medium-sized cities means re-adapting transportation services to new user needs, urban conditions, and economic conditions. Previous transportation services have been criticized for high operating and maintenance costs, and lack of flexibility in travel service (route planning, schedules) (Campisi et al., 2021). Service characteristics have been changed based on demand, and have changed demand, especially for medium-sized cities, it is about affecting user preferences, and the mobility service is not purely the launch of a service but the adaptation of the service with the behavioral preferences of demand. The potential of the flexible system is still evident today (Campisi et al., 2021), which through the additional use of technologies, can be used to overcome the limitations of the previous planning mode (Campisi et al., 2021; Mageean & Nelson, 2003). The paper offers an analysis of the ICTs initiatives for smart cities in order to make more collaborative the relationship between governance and citizens' engagement, empowering the new concept of smart collaboration between Public Actors and smart cities (Meijer & Bolívar, 2016). The integration of transport systems is based on the reduction of travel time, in which it is necessary to act on both the supply and the ICT propensity of households in marginal areas, both as a capacity of use of internet connection, use of 5G data and use of data at least 3G (Fig.4a, Fig.4b).



(a) (b)

Fig.4 (a) Households with mobile data up to 5g and (b) Households with mobile data up to 3g

With the analysis of 45 relevant Italian and European best practices in the field of mobility offering services for a group of 2,000 to 20,000 inhabitants, with the same territorial classification and for population density, low local public transport use or lack of LPT offer, we follow a simultaneous profiling of common characteristics.

These are pilot cases[5] or transport services launched in areas with the same orography and population density as marginal cities (mountainous, hilly, flat orography) gravitating around large cities, offering supplementary or full intermodal services, for an O-D pair (with D bus station, train, work centres, etc.). From the survey of the state of the art of mobility projects launched in Europe and in Italy, here are listed the main characteristics that emerged from the Best practices analysis:

- low use of digitization;
- absence of infrastructure connections;
- absence of commuter connections;
- existing DRT offer in small areas (for O-D connection) to service hubs (train stations, buses, medical centres);
- flexible fare;
- transition to digital systems, reservation via APP to be implemented, few experiments.

Similarly, the analysis of Campania's cities shows us that:

- transportation offers are absent in area of study;
- 30% of the cities have no rail offer of transport system;
- only 10 out of 86 cities have a railway station in the nearest town;
- only 10 out of 86 have a LPT line;
- 8 cities have poor connections with the nearest station, forcing people to travel the last mile by private car;
- high use of private car for all journeys (short and long distances).

The process is a methodological proposal applied in the Campania territories, to be extended to the marginal areas analysed, excluding from this type of analysis the ultra-peripheral areas for different structural components (revitalization funds, population, density, activities, etc.). The analysis of the LPT offer for the marginal areas of Campania was carried out on the current offer and on the potential offer, taking into consideration the main business models by type of timetable/route, passing from fixed services (LPT, rail) to flexible services (carpooling, carsharing, e-van, etc.).

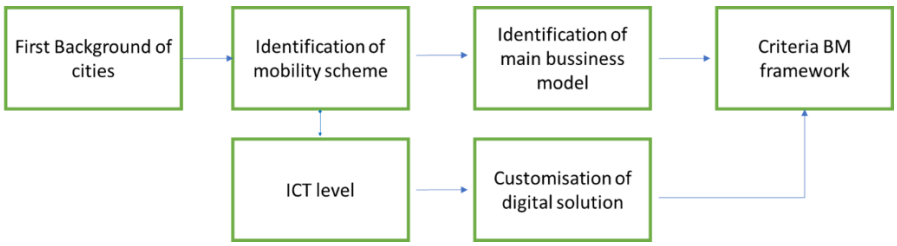


Fig.5 Workflow process

This study reviewed business model development frameworks and developed a practical tool to help remote/sprawled cities assess business models by adapting components of Business Model "BM" for cities and adding new ones that operationalize the smart city dimensions. Remembering that making a smart and resilient do not concern integrating new infrastructure, but instead involves enhancing ones existing with new technology in support. From the BMs developed for cities, criteria are identified for the analysed cities and a selection criterion is proposed to provide integrative support to rural areas. The intermodal integration between marginal cities and metropolitan areas investigated is in the adoption of Business Models that are adapted to the characteristics of marginal cities. Central to the argument of BM identification is the different trend between metropolitan cities and marginal areas (UN DESA, 2018).There is a necessity to move further from the idea of

[5] www.cordi.europa.eu

burdening metropolitan cities with too much pressure, but to start focusing on a part of the territory left behind by progress. In response to these trends, cities are aiming to offer high-quality services with the use of ICT. The proposed study starts with a question about the components that a smart city should have and what criteria it should apply, before making a feasibility study the resources should be included. The first step was a literature search on city trends and best practices in offering mobility solutions to identify the most suitable business model for decentralized cities. The construction of the BM for the identified cities, was performed by identifying the graph "*Service models*" (Fig.6) that collects the service models (y-axis time schedule in rigid and flexible, x-axis type of service) according the main characteristics of the service as suggested in Campisi et al. (2021) such as the characterisation of users, the definition of the service (timetable, route planning, type of stops). The timetable and route are placed on an incremental scale of flexibility, moving from rigid and fixed services (TPL as bus, metro line) to increasingly flexible services (DRT, On-demand). Having analysed suburban areas, the medium-sized cities focused on do not have metro systems, but only railway stations (belonging to the same operator RFI or EAV "Ente Autonomo Volturno" for some cities). Although in the literature the flexible system includes DRT, on-demand service or individual systems (i.e. taxis) (Torrisi et al., 2021; Campisi et al., 2020; Caggiani et al., 2018) the taxi mode was not considered as a separate service. Finally, the graph (Fig.6) is compared with both population and landscape features resulting in a diagram to indicate suitable services for marginal cities toward smart and resilient cities (Fig.8).

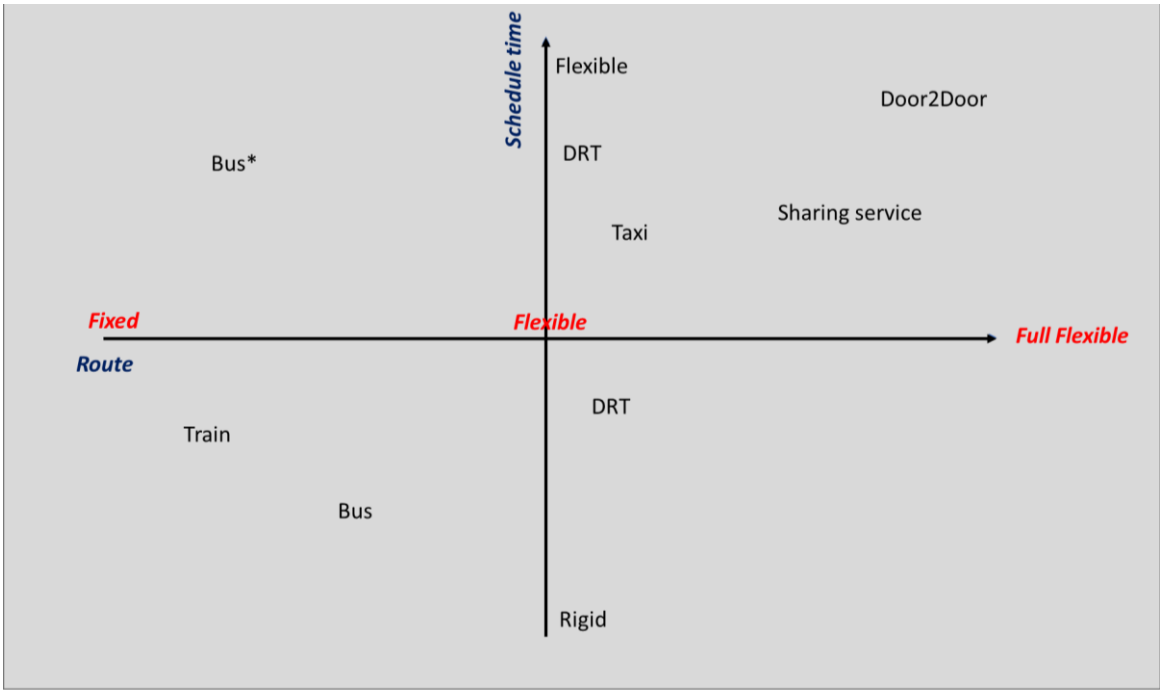


Fig.6 Graph of mobility system

Based on population and land settlement, 22 cities belong to full flexible services,19 for fixed schemes, and the rest of 45 for flexible (Fig.7), despite the 25 recent best practices (Campisi et al., 2021) none is related to Southern Italy, or in detail Campania. The 86 cities, by territorial characteristics, correspond to three mobility schemes such as Full-Flexible (on-demand service such as door2door), rigid services (rail, bus) and flexible (Carsharing, DRT, ridesharing, Blablacar). Fig.8 shows a greater adaptation result with the semi-flexible system, as the DRT service is characterised by a specific or modifiable point collection, compared to the fixed system, and a more elastic time window (Campisi et al., 2021).

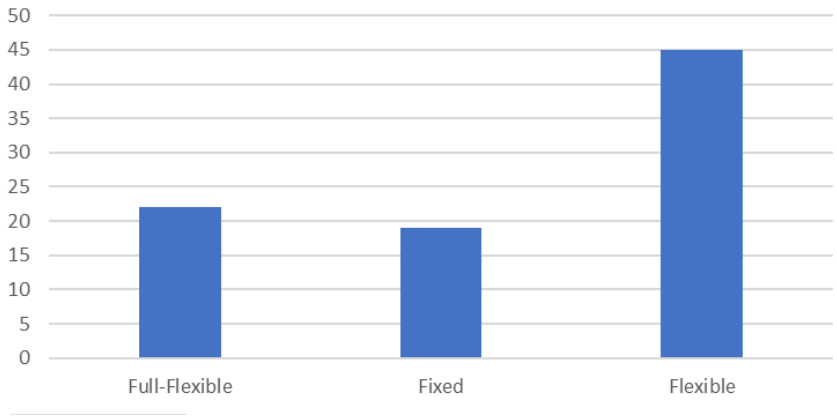


Fig.7 Business model for marginal cities

Fig.8 summarises the optimal configuration of services by type of city and territory. Services located in remote/sprawled settlements have a low use of ICTs, as fixed scheme do not offer on-board ticketing (not e-ticketing), furthermore, the collection points are represented by the standard stops. The groups of flexible services are present for types of territories such as suburbs and hilly areas, while for flat cities, the spread of flexible (on-demand) services is more extensive. The on-demand services are the most flexible in terms of booking and travel, with the possibility of choosing pick-up points near one's home and booking within a couple of hours before the trip. As result of the comparison, it can be concluded that for the same population density, for mountainous areas a transportation service with flexible service model is suggested, also confirmed by the introduction of MaaS mobility literature.

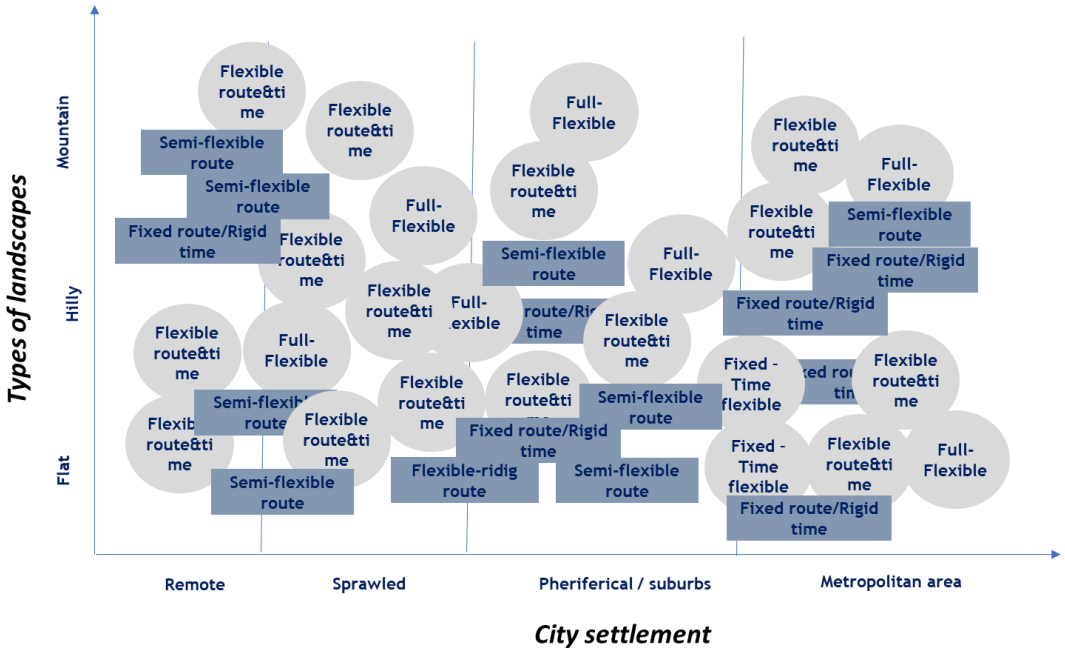


Fig.8 Matching of Business Model

In all cases analysed, the proposed BMs were developed on local characteristics. The main BMs proposed take into account operating costs, financial aspects for maintaining the service in complex areas, and the involvement of stakeholders and citizens. Therefore, three macro-guidelines emerge for the identification of BMs to promote intermodality:

- high stakeholder involvement, through volunteer-promoted mobility services;
- ICT use for ride trip management;
- semi-flexible services (change of flexibility in days, times depending on demand).

Therefore, the implementation of smart city solutions depends on what kind of BM can be adopted on them. The lack of literature collection and practical cases still makes it difficult to understand how to manage the study of sustainable mobility forms.

Hilly and mountainous areas show a majority of "B1" BM characterized by semi-flexible scheme service with:

- user collection at pre-determined pick-up-customer points but variable route and flexible schedules, or fixed route and flexible schedules;
- flexible service at particular times of day (not peak hour) or for certain days.

In the transition between the metropolitan area and the marginal area (Sprawled), the fixed scheme is left in favour of a flexible service based on trip booking.

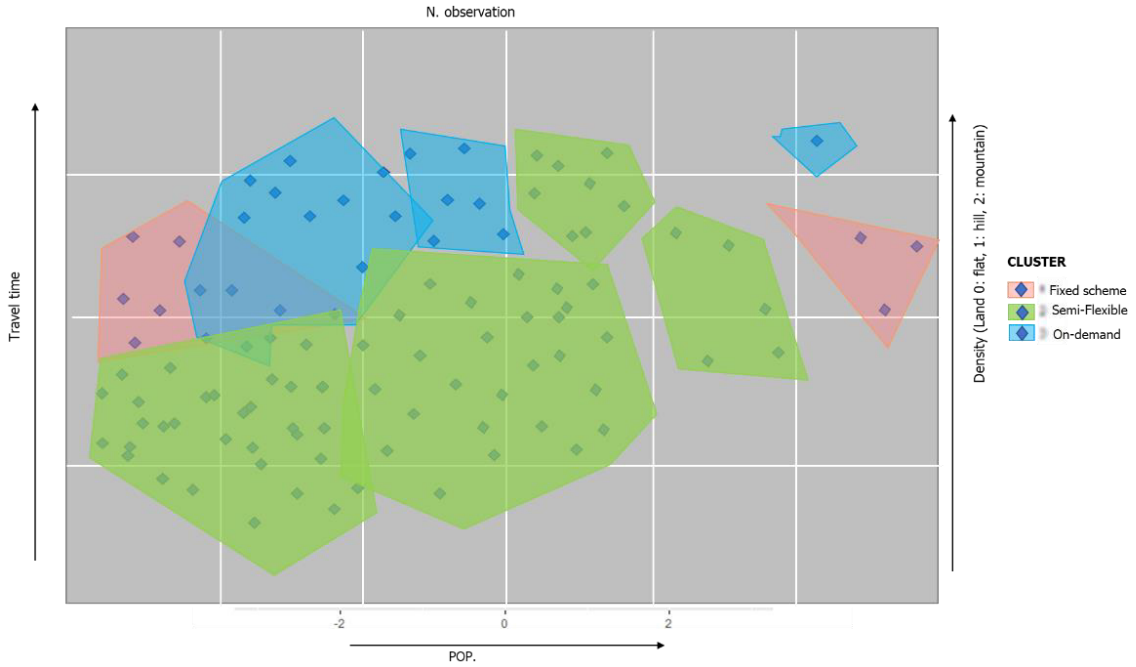


Fig.9 Cluster analysis of Business Model "BM"

Although it seems intuitive that for longer distances and travel times the door2door service seems the most appropriate, the distribution of the data connection index shows that many marginal cities are served by semi-flexible services.

The cluster analysis proposed create three classes of clusters of service scheme by grouping together different cities with similar input data (i.e. socio-economic characteristics, ICTs use, land settlement) (Fig.9). Fig.9 shows that for the two variables (time travel and density), flexible services are more prevalent at the territorial level, making them a recommendable solution for the areas analysed. This result, it is interesting to compare it with economic criteria (not covered in this work).

Variable	Obs	Mean	Std. Dev.	Min	Max
POP	86	9108.581	3292.005	5065	19305
TravelTime~n	57	100.7719	63.5343	30	480
Traveltime~r	84	58.79762	25.76155	25	140
Typeofsett~t	86	1.465116	.5017071	1	2
Typeofserv~e	86	2.034884	.6936294	1	3
Households~s	55	5163.079	933.4553	3712.645	7186.332
Fixedormob~e	55	112.7002	20.37556	81.04	156.864
Fixedbroad~g	55	3676.845	664.7526	2643.93	5117.688
Mobilebroa~a	55	2303.311	416.4255	1656.255	3205.908
Fixedbroad~r	55	5085.597	919.4471	3656.93	7078.488
Numberoftr~e	86	7.837209	8.301468	0	30

(a)

Variable	Obs	Mean	Std. Dev.	Min	Max
TravelTime	68	11.67647	5.053272	3	20
Density0fl~t	68	.9705882	.8972693	0	3
Service1Fi~3	68	1.75	.7604987	1	3

(b)

Fig.10 Descriptive statistics Medium city – intermodality and (b) descriptive statistics – Best Practices

Fig.10 shows descriptive statistics for the part of the cities analysed for the study on intermodality in Campania. Fig.10, on the other hand, similarly gathers travel time, type of service, and territory, for the case studies cited in the paper (68 examples, including the 25 brought by Campisi et al. (2021).
Thus, many hilly cities with small populations are similar to cities with high populations in mountainous areas (door2door or on-demand class), while for hilly type and travel time t>100' semi-flexible services are the most appropriate to implement. Few are the cases of fixed-scheme, in that case, it is a matter of strengthening the existing TPL.

4. Conclusion

The proposed research considers a multi-sectoral approach. Focusing on the urban form, cities are changing and the new challenges is to convert the existing urban layout and encouraging intermodality. Metropolitan cities are undergoing a major explosion, so rethinking marginal territories is a key step in creating resilient cities. This work, in line with recent themes on sustainable (environmental and economic) solutions for mobility (Angiello, 2022; Franco, 2022), although many evidences focuses on urban mobility regarding the accessibility of urban areas and few on inner areas (Passarelli et al., 2016; Pirlone et al., 2016), aims to enrich the mobility analysis also for marginal areas by studying the relation between intermodality and inner areas.
Inner territories have their own identity, but they need capital and immaterial investments to change the capitalist paradigm of the metropolitan city as a place of relationships and production of things. Intermodal connectivity, which has been of European interest for years, is at the heart of achieving sustainable mobility in marginal areas. As a first analysis, the paper has shown strong potential for investment of mobility services in the selected marginal cities, based on funds from the Agency for Cohesion, Recovery Plan and MIMS (Sustainable Infrastructure and Mobility Ministry), there is the right attention to marginal areas and their revitalization, reconnecting with the need to discuss the access-oriented network investment of suburban areas (Lahoorpoor et al., 2022) and interest in analysing the investments offered by Recovery Plan the for urban areas (Sgambati, 2022). Inner areas, being a very complex system, have territorial and accessibility peculiarities for which the development is composed on two levels: physical measures rethinking the urban space of the cities from sidewalks, stations, shelters, etc. or implementing the offer of mobility. Identifying the fundamental intermodal characteristics is the first action required to identify the mobility services needed to relaunch the marginal areas. The analysis of accessibility proposed in the manuscript, starting with a GIS-based approach, relates to the importance of accessibility for reaching stations, as highlighted in recent literature (D'Orso & Migliore, 2018; Shinoda, 2019; Levinson & Wu, 2020) but focuses on the role of intermodality and the competitiveness of means of transport (car and rail), however the proposed topic intends to extend the analysis by bringing last-mile accessibility focused on soft mobility. The matching to evaluate the business models has also opened interesting reflections that lead us consider that sustainable mobility is not only based only on the offer of the service, but is close to the orography, includes a share of digitalization to reduce operating costs, and has a large component of governance process. The proposed methodological approach is based on main social and transport characteristics, which offers a first insight to the problem of marginal cities and their connection in transportation system, reinforcing last-mile and involving social mobility inclusion. Based on the cities analysed, a predominance of semi-flexible services are evident, characterized by fixed stops (may coincide with existing LPT stops), which can add a route to/from the station or stop. The slow mobile connection present in many cities still makes difficult the complete digital transformation of mobility booking by phone, so more innovative services like door2door are to be thought in a next step. Transport accessibility is to be sought by offering basic services to citizens. The cluster analysis proposed, in

line with further evidence from the literature as proposed by Padon & Iamtrakul (2021), is the final result resulting from the service matrix methodology. The cluster analysis can be resumed and reproposed for other territorial realities in Campania and elsewhere, based on the similarity of social and territorial differences. About the case study, it was preferred to put as constraints the territorial and connection characteristics, thinking in a MaaS perspective of real-time connection of transport, reinforcing the importance of ICT in urban areas, as a means of reducing externalities, and supporting economic and technological dynamics, increasing competitiveness between territorial locations (Delponte, 2021). Intermodality consists in providing both a transport interchange, which can implement semi-flexible services, and technologies (ICTs), making it possible to book the journey in absence of infrastructure in cities, at stations, reducing cost of services. In addition, some business models offer last-mile reduction, which is one of the main challenges of intermodality, as semi-flexibile or D2D service. Precisely, the last-mile connection is a constraint that still causes the use of the car. The criteria outlined in this manuscript and the proposal to improve the connection between the medium and marginal cities, is not implementable in the short term but in the long-term. The experiences analysed show us a great participation between private and public (e.g. bus companies, cabs, volunteers) to encourage the movement and make up for the lack of infrastructure (e.g. bus lines or rail). The flexible system can be supported by the costs of company and public, being realized also with electric vehicles impacting less on the environment, and offering movement for the last mile (home-station journey). It is equally interesting to see how the analysis of the territory and habits, as well as technological characteristics can lead to evaluate which is the best mobility service to be launched in the territory. It seems intuitive to use a door2door service, but based on the criteria outlined, it is more appropriate to implement a different service for mountain and hill areas. The proposed methodology, based on territorial criteria, digital technologies, travel time, present connections (rail, bus) offers a vision of how to build a model of mobility service more suitable according to the present characteristics of the territory. Clustering brings together cities with different characteristics that can use the same mobility service. Remote cities (population less than 5,000 inhab.) were excluded as the origin of different processes and habits. Therefore, this study is not intended to be limited and binding, but it is referred to further stages of analysis for these more remote realities.

The result is consistent with the existing literature. The flexible service is still the most widely used means for small and medium-sized cities, analysing what was reported in Campisi et al. (2020, 2021), the coverage of the DRT detected is only 28% for small and metropolitan cities, while a majority is present for large cities (100,001-200,000 inhabitants) not analysed in this case study. Concerning the use of DRT, a greater extension can be supported by the implementation of mobility system technologies. Findings suggest that marginality is still existing but underrated in social science. Future research could be aimed at improving the analysis of accessibility in term of last and middle mile, both under the intermodaility point of view, both under the users' perceptions. Further fundings will focus on support measures for planning at regional level, strengthen with the implementation of decision support tools.

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References

Agenzia per la coesione territoriale. (2014). Strategia Nazionale per le Aree Interne (SNAI). Retrieved from: https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne

Angiello, G. (2022). Planning for sustainable urban mobility in Southern Europe: insights from Rome and Madrid. *TeMA - Journal of Land Use, Mobility and Environment, 15*(2), 335-340 https://doi.org/10.6093/1970-9870/9321

Amin A., Thrift N. (2005). *Città. Ripensare la dimensione urbana*. Il Mulino.

Archibugi, F. (1995). La centralità ottimale, come idea guida della strategia urbana. In Urban Utopias. *New Tools for the Renaissance of the City in Europe, European Conference*.

Amin, A. (2002). Spatialities of globalisation. In *Environment and Planning* A, 34, 385-399.

Barbera, F., De Rossi, A. (edited by). (2020). *Metromontagna. Un progetto per riabitare l'Italia*. Donzelli editore.

Bauman, Z. (2001). *Dentro la globalizzazione. Le conseguenze per le persone*. Roma-Bari: Laterza.

Beauregard, R. A. (2018). *Cities in the Urban Age: A Dissent*. The University of Chicago Press Chicago and London.

Beck, M. J., Hensher, D. A. (2022). Insights into the impact of COVID-19 on household travel and activities in Australia-The early days under restrictions. *Transp. Policy* 96, 76–93.

Blumenberg, E., Manville, M. (2004). Beyond the Spatial Mismatch: Welfare Recipients and Transportation Policy. *Journal of Planning Literature*, 19, 182-205.

Brake, J., Nelson, J.D., Wright, S. (2004). Demand responsive transport: towards the emergence of a new market segment. *J. Transp. Geogr.* 12, 323–337.

Borja, J., Castells M. (2002). *La città globale.* Milano: De Agostini.

Borrelli, G. (2007). Capitali del Nord-Ovest la politica economica delle città italiane. Franco Angeli.

Caggiani, L., Camporeale, R., Ottomanelli, M., Szeto, W.Y. (2018). A modeling framework for the dynamic management of free-floating bike-sharing systems. Transp. Res. Part C: *Emerg. Technol*. 87, 159–182.

Campisi, T., Ignaccolo, M., Inturri, G., Tesoriere, G., Torrisi, V. (2020). The growing urban accessibility: a model to measure the car sharing effectiveness based on parking distances. In: Gervasi, O., et al. (eds.) *Computational Science and Its Applications – ICCSA 2020*, pp. 629–644. Springer, Cham.

Campisi, T., Torrisi, V., Ignaccolo, M., Inturri, G., Tesoriere, G. (2020). University propensity assessment to car sharing services using mixed survey data: the Italian case study of Enna city. *Transp. Res. Procedia* 47, 433–440.

Campisi, T., Canale, A., Ticali, D., Tesoriere, G. (2021). Innovative solutions for sustainable mobility in areas of weak demand. Some factors influencing the implementation of the DRT system in Enna (Italy). In: *AIP Conference Proceedings, vol. 2343*, no. 1, p. 090005. AIP Publishing LLC.

Cervero, R. (1997). *Paratransit in America Praeger Westport*, Connecticut.

Church, A., M. Frost, and K. Sullivan. (2000). "Transport and Social Exclusion in London." *Transport Policy 7* (3): 195–205.

Cocchia, A. (2014). *Smart and Digital City: A Systematic Literature Review*. Springer.

Corrado, F. (2021). *Urbano Montano. Verso Nuove Configurazioni E Progetti Di Territorio*. Franco Angeli.

Cullen, B. T., & Pretes, M. (2000).The meaning of marginality: Interpretations and perceptions in social science. *The Social Science Journal*, 37:2, 215-229, https://doi.org/10.1016/S0362-3319(00)00056-2

D'Ascanio F, Di Ludovico D., Di Lodovico L. (2016) – Design and urban shape for a resilient city, 2nd international symposium "new metropolitan perspectives" – Strategic planning, spatial planning, economic programs and decision support tools, through the implementation of Horizon/Europe2020, Reggio Calabria (Italy) 18-20 Maggio 2016

D'Orso, G., Migliore, M. (2018). A GIS-based method to assess the pedestrian accessibility to the railway stations. *International Conference on Computational Science and Its Applications*, 19–30

De Luca, S., Di Dio, D., Mochi Sismondi, C. (edited by). (2020). Se la Pa non è pronta. Forum Disuguaglianze Diversità, Forum Pa, Movimenta

De Luca, S. Lanzani, A. (edited by). (2000). Liberiamo il potenziale di tutti i territori. Forum Disuguaglianze Diversità, luglio

Delbosc, A., G. Currie. (2011a). Exploring the Relative Influences of Transport Disadvantage and Social Exclusion on Well-being. *Transport Policy* 18:555–62

Delbosc, A., G. Currie. (2011c). Transport Problems that Matter— Social and Psychological Links to Transport Disadvantage. Journal of Transport Geography 19:170–78

Delponte I. (2021). Trasporti, ICT e la città. Perché alla città interessano le ICT?. *TeMA - Journal of Land Use, Mobility and Environment, 5*(3), 33-45. https://doi.org/10.6092/1970-9870/1215

Denmark, D. (1998). The Outsiders: Planning and Transport Disadvantage. *Journal of Planning Education and Research* 17: 231–45

Déry, S., Leimgruber, W., Zsilincsar W., (2012). Understanding Marginality: Recent Insights from a Geographical Perspective. In Hrvatski geografski glasnik. Vol. 74. No. 1

Di Ruocco, G., Grimaldi, C., Di Ruocco, I., Passannanti, M. (2019). Le greenways come opportunità per il turismo a bassa emissione di carbonio: la Via Silente nel Parco Nazionale del Cilento, il Vallo di Diano e i Monti Alburni. In Conference: STC 2019 - *International Conference University of Salerno*, 19-20 September 2019

Eea. (2016). Urban sprawl in Europe Joint EEA-FOEN report. Retrieved from: https://www.eea.europa.eu

Eurostat. (2011). Degree of urbanisation classification - 2011 revision. Retrieved from: https://ec.europa.eu/

EU Smart Cities Information System. (2017). The making of a smart city: replication and scale-up of innovation in Europe. Retrieved from: https://smartcities-infosystem.eu

Franco S. (2022). Sustainable cities and communities: the road towards SDG 11. *TeMA - Journal of Land Use, Mobility and Environment, 15*(2), 341-344. https://doi.org/10.6093/1970-9870/9316

Gallent, N., Juntti, M., Kidd, S., Shaw, D. (2015). Introduction to Rural Planning. Taylor & Francis.

Hidayati, I., Tan, W., Yamu, C. (2021). Conceptualizing mobility inequality: Mobility and accessibility for the marginalized. *Journal of Planning Literature, 36*(4), 492-507

Hoggart, K., Buller, H. (2016). *Rural Development: A Geographical Perspective*. New York: Routledge

Isfort, Observatory "Audimob". (2020). The impact of lockdown on the mobility behaviors of Italians. Retrieved from: https://www.isfort.it

Kenyon, S., G. Lyons, and J. Rafferty. (2002). Transport and Social Exclusion: Investigating the Possibility of Promoting Inclusion through Virtual Mobility. *Journal of Transport Geography* 10: 207–19

Lahoorpoor B., Wu H., Rayaprolu H., Levinson D. (2022). Prioritizing active transport network investment using locational accessibility. *TeMA - Journal of Land Use, Mobility and Environment, 15*(2), 179-192 https://doi.org/10.6093/1970-9870/9174

Leimgruber, W., Chang, C. D. (2019). *Rural Areas Between Regional Needs and Global Challenges: Transformation in Rural Space.* Switerzland: Springer Nature Switzerland AG 2019

Mageean, J., Nelson, J.D. (2003). The evaluation of demand responsive transport services in *Europe. J. Transp. Geogr. 11*(4), 255–270

Maltinti F., et al. (2020). Vulnerable users and public transport service: analysis on expected and perceived quality data. In: Gervasi, O., et al. (eds.) *Computational Science and Its Applications – ICCSA 2020*, pp. 673–689. Springer, Cham

Martens, K. (2012). "Justice in Transport as Justice in Accessibility: Applying Walzer's 'Spheres of Justice' to the Transport Sector. *Transportation 39* (6): 1035–53

Martens, K. (2017). Transport Justice: Designing Fair Transportation Systems. Oxon, UK: Routledge.

Mascarucci, R. (2020). *Città medie e metropoli regionali*. Roma: INU Edizioni

Meijer, A., Pedro, M., Bolívar., R. (2016). Governing the smart city: a review of the literature on smart urban governance. In *Big data, public policy & public administration*, Volume: 82 issue: 2, page(s): 392-408. https://doi.org/10.1177/0020852314564308

Mela, A. (2020). *Le città contemporanee. Prospettive sociologiche.* Roma: Carocci editore.

MIMS. (2021). Ministry of infrastructure and sustainable mobility - Investments in infrastructure and sustainable mobility for the South in the National Recovery and Resilience Plan and the Complementary National Plan

Moreno, C. (2020). *Vita urbana e prossimità ai tempi del Covid-19*. Editions de l'Observatoire

OECD. (2012). Redefining "urban": A new way to measure metropolitan areas. OECD Publishing 2012

Padon, A., Iamtrakul, P. (2021). Land Use and Transport Integration to Promote Pedestrian Accessibility in the Proximity of Mass Transit Stations. In *Urban Rail Transit* (185–206). Springer

Pelc, S. (2006). Geographical marginality in Slovenia from the point of demographical indicators. In Revija za geografijo, letnik 1, številka 2, str. 121-131

Park, J., Goldberg, D. W. (2021). A review of recent spatial accessibility studies that benefitted from advanced geospatial information: multimodal transportation and spatiotemporal disaggregation. ISPRS *International Journal of Geo-Information, 10*(8), 532

Pearce, D. W., Markandya, A., Barbier E., Cardani, M. (1989). *Progetto per un'economia verde*. Il Mulino

Pereira, G. V., Cunha, M. A., Lampoltshammer, T. J., Parycek, P., Testa M. G. (2017). Increasing collaboration and participation in smart city governance: a cross-case analysis of smart city initiatives. In *Information Technology for Development*, 23:3, 526-553, DOI: 10.1080/02681102.2017.1353946

Pagliara, F., Di Ruocco, I. (2018). How public participation could improve public decisions on rail investments? *Regional Science Policy and Practice, 10* (4), 383–403. https://doi.org/10.1111/rsp3.12143

Politis, I., Georgiadis, G., Nikolaidou, A. et al. (2021). Mapping travel behavior changes during the COVID-19 lock-down: a socioeconomic analysis in Greece. *Eur. Transp. Res. Rev*. 13, 21. https://doi.org/10.1186/s12544-021-00481-7

Regione Campania. (2020). La Strategia Nazionale delle Aree Interne in Campania. Retrieved from: http://www.regione.campania.it/

Sgambati, S. (2022). The interventions of the Italian Recovery and Resilience Plan: Energy efficiency in urban areas. *TeMA - Journal of Land Use, Mobility and Environment, 15*(2), 345-351. https://doi.org/10.6093/1970-9870/9322

Sicignano, E., Di Ruocco, G., Di Ruocco, I. (2019). Itinerari pluritematici: dai siti archeologici di Pompei ed Ercolano ai presidi protoindustriali del Ducato Amalfitano In Conference: STC 2019 - International Conference University of Salerno. 19-20 September 2019

Shinoda, B. (2019). Pedestrian Activity Model for prioritizing investment–A case study of sidewalk snow clearing in the City of Waterloo [Master's Thesis]. University of Waterloo

Tesauro, C., Iacobucci, D., Ferlaino, F. (2017). *Quali confini? Territori tra identità e integrazione internazionale*. Franco Angeli

Torrisi, V., Ignaccolo, M., Inturri, G., Tesoriere, G., Campisi, T. (2021). Exploring the factors affecting bike-sharing demand: evidence from student perceptions, usage patterns and adoption barriers. *Transp. Res. Procedia* 52, 573–580

Transport Regulatory Authority "A.R.T". (2021). Survey of Citizens' Mobility and Gentle Push Actions. Retrieved from: https://www.autorita-trasporti.it

Vendemmia, B., Pucci, P., Beria, P. (2022). Per una geografia delle aree marginali in Italia. Una riflessione critica sulla classificazione delle aree interne. *Archivio di Studi Urbani e Regionali*, 133, 29-55

Verlinghieri, E., Schwanen, T. (2020). Transport and Mobility Justice: Evolving Discussions. Journal of Transport Geography 87:102798. https://doi.org/10.1016/j.jtrangeo.2020.102798

United Nations. (2015). Make cities and human settlements inclusive, safe, resilient and sustainable. Retrieved from: https://sdgs.un.org /goals/goal11

UN DESA. (2018). Revision of World Urbanization Prospects produced by the Population Division of the UN Department of Economic and Social Affairs. Retrieved from: https://www.un.org

Sitography

Istat- Istituto Nazionale di Statistica. Retrieved from: www.istat.it

Ministro per il Sud e la Coesione sociale. Retrieved from: https://www.ministroperilsud.gov.it/it/approfondimenti/aree-interne/cosa-sono/, visited on 24/06/2022

Ministro per il Sud e la Coesione sociale. Available on https://www.ministroperilsud.gov.it/it/approfondimenti/aree-interne/strategia-nazionale-aree-interne/, visited on 24/06/2022.

Ministero delle infrastrutture e della mobilità sostenibili. Retrieved from: www.mit.gov.it, visited on 24/06/2022.

PNRR, Ministero delle infrastrutture e della mobilità sostenibili. Retrieved from:

- https://www.assolombarda.it/pnrr/missioni/infrastrutture-per-una-mobilita-sostenibile
- https://www.ice.it/en/sites/default/files/banner_files/italian-recovery-and-resilience-plan.pdf
- https://www.unicatt.it/amministrazione-M3%20-%20Infrastrutture%20per%20una%20mobilit%C3%A0%20sostenibile.pdf, visited on 24/06/2022

PNRR NEXT Generation Italia. Retrieved from: https://www.mef.gov.it/en/focus/documents/PNRR-NEXT-GENERATION-ITALIA_ENG_09022021.pdf, visited on 24/06/2022

INTERREG EUROPE. Retrieved from: https://projects2014-2020.interregeurope.eu, visited on 24/06/2022

INTERREG EUROPE. Retrieved from: https://www.interregeurope.eu/good-practices/local-link-rural-transport-programme, visited on 24/06/2022

Image Sources

Fig.1-10: all images have been elaborated by the author.

Author's profile

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Irina Di Ruocco, transport engineer graduated at Federico II of Naples in transport engineering and hydraulic systems, is PhD student in Methods and Models for Economic Decisions (MMED) at University of Insubria. She deals with transport and sustainable mobility, evaluation and assessment analysis of infrastructure projects, economic analysis and European planning (EU projects) in the field of transportation and mobility. Her professional background includes the mobility and transportation projects, urban planning (PUMS, PUC, etc.) and relative sustainable projects on waterfront and ports regeneration, cycleways, carsharing. The work experience is in transportation and infrastructure field, she is the author of several scientific contributions and speaker in many conferences.