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Enhancing urban-rural connectivity in non-metropolitan regions: a methodology in support to decision-making

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Abstract: Accessibility to services and opportunities is vital to achieve the EU goals of smart, sustainable and inclusive growth. Some territories are worse equipped than others in this concern, due to their intrinsic peripheral character. Their weak and scattered mobility demand has progressively made traditional public transport subject to efficiency savings and cut to the bone. Such measures contributed to worsen social inequality, as they affect especially those already vulnerable groups who do not have access to a car. In this light, to improve urban-rural connectivity is essential for granting equal access to services and opportunities and, in turn, greater social justice. Demand Responsive Transport (DRT) has been often seen as a panacea for all the circumstances where traditional services are not viable, but a range of barriers (institutional, cultural, technological and economic) suggests that its adoption is more challenging than it may seem. Drawing on the results of the ESPON URRUC project, the paper sheds light on this issue, exploring the variables according to which various DRT solutions may or may not prove viable in a given area. On this basis, the authors propose a transport policy toolkit that may support decision-maker aiming at enhancing urban-rural connectivity across Europe.

Keywords: rural areas; accessibility; policies; on-demand services

Introduction

Accessibility to services and opportunities is vital to achieve the EU goals of smart, sustainable and inclusive growth. Some territories are worse equipped than others in this concern, due to their intrinsic peripheral character. At the same time, the weak and scattered mobility demand that typically characterizes these areas makes traditional public transport inadequate and inefficient. As a consequence, in most of them public transport has been progressively subjected to efficiency savings and cut to the bone. Such measures contributed to worsen social inequality, as they affect especially those already vulnerable groups who do not have access to a car, due to physical, age or economic reasons.

In this light, to improve urban-rural connectivity is essential for granting equal access to services and opportunities and, in turn, greater social justice. Whereas the dematerialization of services and relationships may

help reducing the isolation of peripheral regions, physical accessibility to main centres is still crucial for territorial development, as it contributes to foster local economies and to increase the quality of life for those with inadequate or restricted access to services and opportunities.

Demand Responsive Transport (DRT) has been often seen as a panacea for all the circumstances where traditional services are not viable, but a range of barriers (institutional, cultural, technological and economic) suggests that its adoption is more challenging than it may seem, and that no one-size-fits-all solution exists. Taking stock of the literature on the matter and drawing on the results of the ESPON URRUC project – which addresses issues of urban-rural connectivity in non-metropolitan regions in Europe –, the paper sheds light on this issue, exploring the variables according to which various DRT solutions may or may not prove viable in a given area. On this basis, the authors bring forward a first draft of a transport policy toolkit that may support decision-makers aiming at enhancing urban-rural connectivity across Europe.

Next paragraph briefly presents general accessibility issues of remote areas; the URRUC project is then presented, describing its aims, case studies and related challenges; afterwards, the methodology used to develop the policy toolkit within the URRUC project is presented, and the summary of the results of its application to the case studies is shown. Concluding remarks highlight the preliminary results of the URRUC project, discuss opportunities and limits of the proposed toolkit and propose directions for further research.

Accessibility issues of remote areas

The first approaches to operationalizing the concept of accessibility were elaborated with reference to metropolitan areas in North America at the end of the 1960s (Hansen, 1959). However, in a couple of decades researches and studies acknowledged that accessibility problems were far more challenging in rural and mountain areas, where population density is generally low. This awareness is well summarized in the title of a famous book by Malcom Moseley published in 1979: “Accessibility: The rural challenge”.

When accessibility is dealt with in rural and mountain areas, which are significantly far from services and opportunities aggregated in urban centres, a change of perspective is required. Since the second half of the last century, most of these areas underwent intense processes of de-anthropization, that caused a reduction in the resident population and its progressive ageing. As a result, the number of potential users of basic services (such as education, health, etc.) in these areas fell below the critical minimum threshold of indivisibility; many local facilities had to be closed, and dependence on services concentrated in major cities increased.

At the same time, the low density and the scattered structure of the settlements (which are fragmented into small towns and semi-abandoned villages) make it difficult to activate public transport services. In fact, due to the low number of users and the dispersion of the origins and destinations of their trips, it is hard for these collective transport services to reach a sufficient level of financial and economic sustainability (Farrington and Farrington, 2005). Ownership of a private motorized mean becomes indispensable to access the services in the nearest main city, to the detriment of those who cannot afford or use a car, such as older residents, minors, low income families, etc.

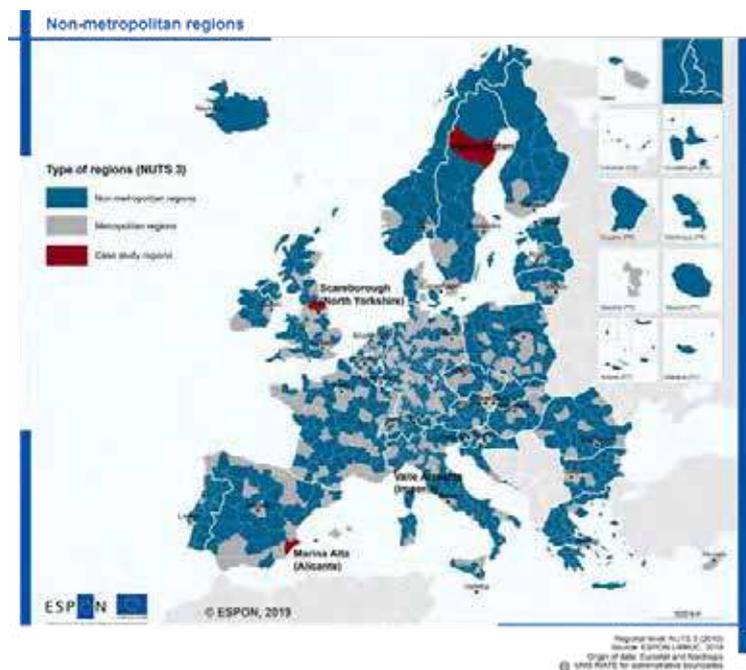
Moreover, physical inaccessibility of rural and mountain areas is often exacerbated by virtual inaccessibility. On the one hand, these territories are generally less covered by broadband infrastructure, which is essential for innovative solutions in providing those services (e.g. telemedicine and distance education) which are not locally available. On the other hand, a reduced digital literacy makes it even more difficult to activate such solutions (Malecki, 2003).

In the end, the issue of accessibility in rural and mountain areas is a vicious circle: reduction in the resident population implies the closure of most local services, which means less opportunities for studying, working, social interacting and so on; this underdeveloped condition increases the risk of further de-anthropization.

Therefore, even more than in urban centres, improving the accessibility of rural and mountain areas means acting on several fronts. It is not sufficient to strengthen transport infrastructures and promote more flexible transport services. It is also necessary to enhance the local territorial capital, bringing (or bringing back) in these areas, services, knowledge, social interactions, etc. (Gray, Shaw and Farrington, 2006; Schwanen et al., 2015).

The URRUC project and the territories at stake

Launched in June 2018 and lasting for one year time, the research project URRUC (Urban-Rural Connectivity in Non-Metropolitan Areas) is funded in the framework of the European Territorial Observatory Network (ESPON). The main objective of the project is to contribute to improving connectivity and accessibility related to urban-rural linkages in four non-metropolitan areas: (i) Scarborough Borough, (United Kingdom); (ii) Marina Alta (Spain); (iii) Regione Liguria, Valle Arroscia and the Province of Imperia (Italy) and (iv) Region Västerbotten (Sweden) (Figure 1).



1. Territories under scrutiny in the URRUC project. Source: ESPON and University of Coventry, forthcoming-a

All four share similar characteristics. They are coastal areas with poor connectivity and access to inner, rural areas. The size and dispersion of their populous makes infrastructural development difficult. Major urban centres are located by the coast and suffer from congestion due to commuting flows at peak hours, also coming from inner areas. This is driven by the needs of rural households to access core services, employment opportunities, education and recreational locations, which are primarily found in the largest urban areas. Investment in transport infrastructures and services is inadequate to meet these demands, as the nature of these territories, with small, dispersed populations, makes transport provision economically difficult and hardly justifies expenditure. Optimising transport solutions is further aggravated by seasonal flows associated with tourism.

More in particular, most of the rural and mountain areas of Marina Alta (some of them being accessible, other more remote) lack of adequate access to services and opportunities, especially as far as those who don't have access to the car are concerned. Although the potential market for public transport is wide, public transport is almost not taken into account when planning a trip. Those who have access to the car use almost only this mean of transport, both because of lack of adequate alternatives and of a poor sustainable mobility culture. Weak

horizontal and vertical coordination, fragmentation of competences and different knowledge and priorities challenge the improvement of accessibility of rural areas, and flexible solutions face a rigid legislative frame and some resistance to change.

Rural areas and suburbs of Scarborough Borough Council currently lack alternatives to private car for connections and accessibility to Services of General Interests. Social objectives prevail in such areas, whereas also economic ones are relevant for Scarborough, so connectivity is crucial and road expansion is seen as a priority by the local stakeholders. Commuters mainly use the car (or the bike where possible) and are satisfied with their mobility; public transport is unreliable and used mainly for leisure, so those who don't have access to the car are very disadvantaged. The specific and general contexts which surrounds operational conditions pose some challenges, especially in terms of fragmentation of competences, competing priorities and limited influence of the local level on upper-tier ones. Economic and commercial criteria strongly prevail on social and place shaping ones, worsening territorial and social inequalities.

The towns and hamlets of Valle Arroscia are dispersed over a wide mountain territory, some of them being far from the main road axis of the valley. Most of trips are made by car, and the current public transport system fails to meet the need of the few who rely on it. Hence, while car users are not in search of alternatives, some user groups suffer from territorial assignment. Public transport is seen as a last resort and at the same time poses serious challenges to those who rely on it to get to main urban nodes. Fragmentation of competences, different priorities, lack of vertical coordination between stakeholders involved in transport planning and operation raise challenges. Furthermore, local stakeholder has scarce influence on upper-tier decisions and the legislation, licensing and operation of public transport pose some limit to the introduction of flexible transport solutions.

Västerbotten territory features rural settlements, most of them being accessible and some very remote. Territorial density is very low and long distances and unfavourable weather strongly affect some user groups (i.e. those who don't have access to the car or inhabitants of remote hamlets in winter). To date, public transport is almost not considered as an option, and there is lack of information of the existing services. Still, public transport is generally seen with some interest, as well as digitalization of services. Vertical and horizontal cooperation is hampered by lack of time and resources, and there seems to be no intention to increase investment in public transport nor to finance potential solutions to improve connectivity in a cost-efficient way.

With the support and direction from stakeholder representatives in all four territories, the project aimed at improving understanding of urban-rural mobility and accessibility challenge in these regions and to provide appropriate tools for improving connectivity and accessibility through knowledge transfer processes. Furthermore, the project it also focused at exploring the actual potentials for transferability of findings by engaging in theory and literature-based activities, in order to provide learnings applicable to other Non-Metropolitan Regions across Europe with similar urban-rural connectivity issues, supplying valuable knowledge and outputs. These outcomes specifically address the six knowledge needs detailed below.

1. How can efficient public and private transport networks and sustainable solutions be advanced to enable access to key services, activities, employment opportunities and commercial possibilities for the population in remote NMRs?
2. What are the potentials, opportunities, and challenges for developing flexible and sustainable urban-rural transport connections and systems in comparable NMRs suffering similar connectivity and accessibility challenges?
3. What innovative solutions can be utilised, such as demand-responsive transport systems? What potential impacts can emerging technologies associated with climate change, such as low emission and electric vehicles, have on modes of travel?
4. What institutional/administrative barriers associated with cross-agency services impede the efficient implementation of transport policy in remote/inaccessible areas?

5. What can be learned from existing practices in Member States in developing and maintaining flexible and sustainable urban-rural transport connectivity in NMRs?
6. How can existing and future transport policy and other relevant policies be further strengthened to support the development of flexible and sustainable transport solutions in non-metropolitan regions, including transport initiatives at EU-level?

In order to provide answers to these questions, the research team developed a specific policy toolkit that could support decision and policy-makers in conceptualizing and implementing solutions for their respective territories. The main characteristics of this toolkit are provided in the section that follows.

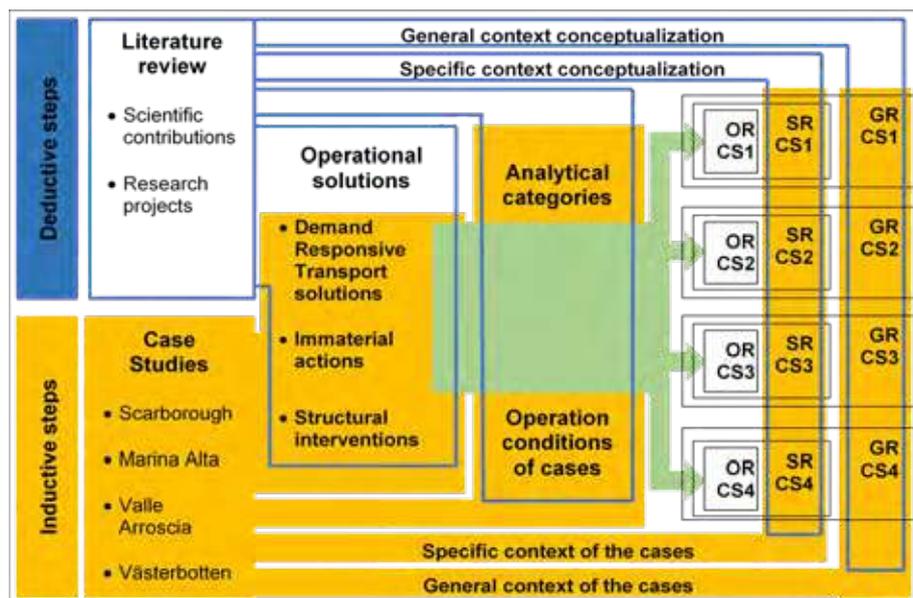
A policy toolkit to support decision-making

One of the main tasks of the URRUC project was to develop “policy recommendations to further strengthening transport policy and systems related to urban-rural connectivity and interaction in non-metropolitan regions”. This task has been pursued through two separate but strongly interrelated research activities:

- Firstly, building on the case studies’ analysis and on a thorough review of the scientific literature and recent research projects, the research team developed four sets of policy recommendations, fitting the operational conditions and meeting the specific and general challenges of the stakeholders’ territories.
- The recommendations were then reflected upon in relation to their potential to fit other non-metropolitan territories in Europe, also on the basis of the NMR typologies identified in the literature and appropriately adjusted as a result of our analysis.

Bearing in mind the challenges and barriers to policy transfer and taking stock of literature on transferability (Dolowitz and Marsh, 1996, 2000; Cotella et al., 2015; Macario and Marques, 2008), a policy toolkit aimed at supporting decision-makers to enhance urban-rural connectivity across Europe is proposed.

More specifically, the methodology adopted to develop guidelines and recommendations for URRUC stakeholder territories and, in general, for European non-metropolitan regions affected by similar accessibility challenges, is composed of a number of complementary inductive and deductive steps, shown in Figure 2.



2. Methodological steps for the identification of policy recommendations (ESPON and Coventry University, forthcoming-b).

Firstly, a thorough literature review, focusing on both academic conceptualizations of the issues at stake and international research projects identifying good practices, led to the identification of a number of possible solutions aiming at improving accessibility and urban-rural connectivity in non-metropolitan regions.

Eleven possible alternatives to the private car were selected (most of them being Demand Responsive Transport solutions). Namely: bus on demand, car clubs, car sharing, feeder, ride-sharing, service delivery, shuttle van, social transport, taxis, shared taxicabs, village minibus. These possible alternatives were assessed against a set of analytical categories identified in the literature analysis (Ambrosino, Nelson, and Romanazzo 2004; Davison et al. 2012, 2014; Hunkin and Krell 2018; Loveless 2000; Mounce et al. 2018; Velaga et al. 2012; D. S. Wright 2013; S. Wright et al. 2014) and complemented by the case studies. These are:

- geographical coverage: what type of area is the service covering? Categories: rural accessible, rural remote, hill/mountain accessible, internal mountain, suburb;
- eligible users: who are the main users? Categories: territorial assigned person, commuter, student, tourist;
- type of use: which kind of use is the service meant for? Categories: single user/small group, collective users;
- booking: how does the users book their journey? Categories: phone (call/SMS), Internet (app/website), other (i.e. infopoint, on vehicle, etc.);
- booking: when is booking required? Categories: On day/real-time, in advance (> one day), repeating (on regular basis);
- timetable: how flexible is the timetable? Categories: on demand, fixed, mixed (i.e. on demand at fixed times);
- route flexibility: how flexible is the route? Categories: Fixed route, fixed route with possible deviations (i.e. within a corridor), fully flexible;
- routing pattern: where are users picked-up/dropped-off? Categories: one to one, one to many/many to one, many to many;
- vehicle size: what size of vehicle should be used? Categories: car, minibus/van, bus;
- price: what is the price for the user? Categories: free/discounted, paid/standard, paid/premium;
- financing: how is the service financed? Categories: subsidized, partly subsidized, commercial;
- performance objectives: what kind of goal is the service meant to achieve? Categories: economic, social, environmental;
- level of demand: what is the expected or measured level of demand (total passenger trips / total vehicle hours x trip length)? Categories: very low/less than 10, low/between 10 and 20, medium/between 20 and 50, high/greater than 50.

Subsequently, the relevance of each of the above-mentioned criteria and category was assessed for each of the four stakeholders' territories. In so doing, conditions were set for a pre-assessment, to check the fit of each solution in relation to the specific operational conditions of each of the stakeholder territories. As far as the operational level is concerned, also the relevance of some non-material and cross-cutting actions (digital platforms, territorial mobility management and dematerialization of services) was assessed for each case study, taking into consideration also the territorial level at which they would best be implemented, and possible criticalities and barriers in terms of resources, digital coverage and know how).



Beside the operational conditions, the analysis had shown that each of the four case study territory presents a set of challenges hampering accessibility and urban-rural connectivity. Building on the framework proposed by Davison et al. (2012, 2014), these challenges were divided in two macro groups (specific and general), each further characterised by sub-themes (market, consumers perceptions, stakeholders, policy and government, economic, sociocultural and technological features). Building on this conceptualization, the identification of the specific and general challenges that characterise the four territories at stake has allowed for the identification, for each of them, of two additional sets recommendations. Specific and general recommendations are meant to reduce the barriers that currently hamper the implementation of measures to improve accessibility and urban-rural connectivity.

Such recommendations were then further discussed with the stakeholders, in order to assess their actual priority and complexity in the respective territories. Combining the priority and the complexity of each recommendation, their deliverability was assessed on a scale of four (high, medium-high, medium-low, low).

Finally, each case study was provided with both detailed descriptions and summary tables showing the operational conditions, specific and general challenges which feature its territory, as well as operational, specific and general recommendations.

To fulfil the project’s goal of providing recommendations for EU non-metropolitan regions, a comparative synoptic evaluation of the recommendations for the case studies was made, and the operational features of each of the identified transport actions, as well as the actual transferability of the suggestions aimed at solving the identified specific and general challenges were presented.

This policy toolkit supported the process of co-definition of recommendations for the case studies, and will serve not only to guide the action of local stakeholders, but also to set the ground for a proactive dialogue with the upper-tier administrations who are responsible for planning and providing the transport offer.

Application to the URRUC case-studies

Recommendations for each of the case studies were structured according to the structure described in the previous paragraph. The following subparagraphs summarize the selected operational specific and general recommendations for each case study, showing for each recommendation the priority, complexity and rate of deliverability.

CREAMA - Consortium for the Economic Recovery of Marina Alta

Table 1. Marina Alta. Synthesis of operational, specific and general recommendations

	Recommendation	Priority	Complexity	Deliverability
OPERATIONAL	Village minibus (mixed use)			
	Social transport			
	Bus on demand			
	Ride sharing			
	Service delivery			
	Railway			
SPECIFIC	Careful analysis of the real users’ needs			
	Win the trust of commuters			
	On time, regular and accessible PT			
	Strengthen a PT friendly culture			

	Flexibility in transport and service provision			
GENERAL	More compact urban development model			
	More incisive and concertized planning			
	More flexible legislation			
	Horizontal and vertical cooperation			
	More funding			
	Better access to public transport			
LEGEND				
Priority	High	Medium-high	Medium-low	Low
Complexity	Low	Medium-low	Medium-high	High
Deliverability	High	Medium-high	Medium-low	Low

Scarborough Borough Council

Table 2. Scarborough. Synthesis of operational, specific and general recommendations

	Recommendation	Priority	Complexity	Deliverability
OPERATIONAL	Village minibus			
	Social transport			
	Shuttle van			
	Feeder			
	Digital platforms			
	Territorial mobility management			
	Dematerialisation of services			
	Structural improvements (road expansion)			
	Cycle paths			
SPECIFIC	Education travel for tertiary level users			
	Recognition of value of tourism for transport			
	Increase resource capacity for transport			
	Devolve local taxation			
GEN.	More streamlined planning processes			
	Continue support to business and education			
LEGEND				
Priority	High	Medium-high	Medium-low	Low
Complexity	Low	Medium-low	Medium-high	High
Deliverability	High	Medium-high	Medium-low	Low

Valle Arroschia

Table 3. Valle Arroschia. Synthesis of operational, specific and general recommendations

	Recommendation	Priority	Complexity	Deliverability
OPERATIONAL	Feeder			
	Bus on demand			
	Car and ride sharing			
	Service delivery			
	Smart ticketing / digital platforms			
	Territorial mobility management			
	Dematerialisation of services			
	Intermodal passenger transport			
SPECIFIC	Moderate degree of flexibility			
	Target policies to various users			
	Transport services for tourism			
	Transport consortium			
GENERAL	Legislative framework			
	Interaction among layers and sectors			
	Reverse marginalisation processes			
	Bridge the digital divide			
LEGEND				
Priority	High	Medium-high	Medium-low	Low
Complexity	Low	Medium-low	Medium-high	High
Deliverability	High	Medium-high	Medium-low	Low

Västerbotten

Table 4. Västerbotten. Synthesis of operational, specific and general recommendations

	Recommendation	Priority	Complexity	Deliverability
OPERATIONAL	Transport on demand (bus or car)			
	Redesigning the bus layout			
	Intermodal parking facilities			
	Dematerialisation of services			
SPECIFIC	Combining service and good delivery with passenger transport			
	More funds for pilot transport projects			
	Workplaces as strategic partners			
GEN. SPECIFIC	More support for rural areas			
	Beyond administrative borders			
LEGEND				
Priority	High	Medium-high	Medium-low	Low
Complexity	Low	Medium-low	Medium-high	High
Deliverability	High	Medium-high	Medium-low	Low

Comparative analysis and recommendations for EU non-metropolitan regions

As mentioned in the previous paragraphs, one of the goals of the URRUC project was to provide recommendations non only for the case studies, but also for those EU non-metropolitan regions with similar characteristics and challenges to the four stakeholders' territories.

To this aim, the challenges and recommendations for the four case studies were compared and clustered into a smaller set of recommendations, based on the affinity among recommendations made by different case studies. Table 5 is a synoptic representation of the recommendations made for the case studies, highlighting their priority for each case. It sets the ground for the definition of recommendations for EU non-metropolitan regions, as a result of the inductive-deductive approach described above.

As far as alternatives to the private car are concerned, recommended alternatives were picked among the 11 possible solutions that were previously defined¹. Similarly, the non-material and digital solutions that were recommended refer to three common clusters that are the same for all the case studies (digital platforms, mobility management and dematerialization of services). For such recommendations the synoptic representation shows the recurrence and priority in each of the case studies. A more varied frame emerged from the structural interventions (which are very context-dependent and differ in each case study) and specific and general recommendations. Hence, such recommendations were clustered: the 16 specific recommendations that emerged from the case studies were reduced to 7 clusters, and the 14 general recommendations were reduced to 5 (Table 5).

Table 5. Synoptic representation of the recommendations for the case studies

	Recommendation	Marina Alta	Scarborough	V. Arroschia	Västerbotten
OPERATIONAL	Bus on demand / call cars				
	Village minibus				
	Feeder				
	Shuttle van				
	Car and ride sharing				
	Social transport				
	Service delivery				
	Digital platforms				
	Mobility management				
	Dematerialisation of services				
	Structural interventions				
SPECIFIC	Careful analysis of users' needs				
	Targeted policies (various users)				
	Strengthen PT-friendly culture				
	Mixed use of transport services				
	Strengthen local skills and roles				
	More funds for transport				

¹ Namely: bus on demand, car clubs, car sharing, feeder, ride-sharing, service delivery, shuttle van, social transport, taxis and shared taxicabs, village minibus.

	projects				
	More importance to tourism				
GENERAL	Governance (horizontal, vertical)				
	Flexibility (rules and processes)				
	Compact urban development				
	Reverse marginalisation				
	Bridge the digital divide				
LEGEND					
Priority		High	Medium-high	Medium-low	Low

Recommendations listed in Table 5, which are fully described in Annex VIII of the final report of the URRUC project (ESPON and Coventry University, forthcoming-c), provide an insight on similarities and peculiarities of the four case studies, as well as a list of suggestions for EU non-metropolitan regions facing issues of urban-rural connectivity.

Conclusion

The proposed contribution presented the results of the project ESPON URRUC, aiming at developing recommendations towards better accessibility and connectivity in four non-metropolitan regions in Europe and, more in general, in all territories, sharing similar characteristics to those under scrutiny in the project.

It did so by explaining the methodology adopted by the project to develop these guidelines and recommendations, i.e. a preliminary policy toolkit that should help local public authorities in formulating decisions on the matter. Rather than resembling quantitative decision support systems and models, the proposed toolkit focuses on the interaction between stakeholders and on the joint identification of operational conditions and specific and general challenges and frame, and often constrain, urban-rural connectivity issues. On this basis, it guides stakeholders in the process of “weighting” the various potential solutions vis-à-vis the identified conditions and challenges, in so doing allowing them to assess their priority and complexity, and eventually their deliverability.

Whereas the proposed list of suggestions deriving from the application of the toolkit to a territory is far from being exhaustive, its objective is to stimulate policy and decision makers in EU non-metropolitan regions to think in innovative terms about transport and connectivity challenges and potentials that characterise their territories.

The toolkit helped stakeholders to realize that before designing operational solutions, it is necessary to act on the underlying preconditions for improving accessibility of rural areas. Issues of governance, legislation and sociocultural aspects revealed to be strong barriers, that would thwart any attempt to provide alternative services. Hence, before trying to provide alternative services it is necessary to reflect on such preconditions.

As mentioned above, the policy toolkit presented in this paper is to be considered as a preliminary work, which has been tested only in the four case-study areas. Dialogue with the stakeholders helped to identify possible improvements, and more research is needed, i.e. to consolidate the weight assignment system, to test the toolbox in other territorial contexts and to refine the methodology accordingly.

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