ESPON EUROPEAN UNION
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1 Lack of critical mass

The notion of critical mass is applied in a diversity of contexts. When dealing with the provision of SGIs, 'critical mass' correspond to thresholds below which the per unit cost of service production increases substantially, typically rendering it unprofitable for private companies to provide such services. A labour market may reach a critical mass when it can offer a sufficiently broad range of employment opportunities to be attractive to local youth, or when it can specialise in diverse sectors so as to limit its vulnerability to external economic shocks. The notion of critical mass may also be considered in relation to that of 'economies of agglomeration', which includes benefits derived by an enterprise from being located close to other economic actors, from accessing common infrastructures (e.g. airports, highways) and from being close to a market of clients.

Different critical mass issues are observed in each category of TGS:

- ***Mountains***: Mountain areas face specific challenges with respect to relations between neighbouring settlements, as communications between valleys may be difficult. However, the linear organisation of settlements in valleys can facilitate economies of scale, e.g. in the organisation of transport. Tourism is often highly dependent on temporary in-migrants due to a lack of local people to work in the sector, though this can be mitigated if other employment possibilities are available in the off-season for tourism. While value chains based on the production and marketing of quality products can provide opportunities for the economic development of mountain areas, a lack of the necessary manpower and expertise due to the loss (through depopulation) or retirement of economically-active people can be a challenge in realising such opportunities.
- ***Islands:*** A lack of critical mass translates itself into limited capacity to exploit economies of scale, scope and diversification, thereby curtailing potential opportunities offered by the European Single Market. However, the extent of critical mass varies across islands with islands that have a relatively high population base such as Sicily, Corsica and Sardinia face less challenges associated with critical mass than islands with lower population bases. Also challenges associated with critical mass are exacerbated in islands facing depopulation and consequent ageing population challenges.
- ***NSPA***: The scattered distribution of small settlements limits the ability for local and regional authorities to develop a cost-efficient system of service provision. This puts a financial strain on these authorities.
- The commodity market being largely international, the small size of the regional domestic market was not traditionally a constraint. However, the low concentration of actors is a challenge for the development of less resource-intensive and knowledge-based economic activities through diversified regional innovation systems.
- ***Other SPAs***: Small villages poorly connected to each other by road infrastructure limit the creation of an integrated local labour market favouring the pooling of action capabilities of these communities.

Cost-efficient provision of SGIs is a challenge in all SPAs.

1.1 Measurement issues

Economic and demographic mass may be assessed within functional regions such as daily commuting or mobility areas or wider areas or corridors delineated on the basis business-to-business relations. The problem with such approaches is that they are heavily influenced by current patterns of mobility and exchange: the critical mass potential hat secondary nodes and rural areas could potentially mobilise within the framework of their development strategies is underestimated, as masses of citizens and economic activities are calculated on the basis of the most important flows and exchanges. These are in most cases structured by major metropolitan regions and cities.

Statistics and maps representing critical mass on the basis of functional regions may therefore raise a series of issues when they are used to design policies:

- As functional regions are mutually exclusive, the underlying hypothesis is that territories compete against each other. For example, the extension of the commuting area around one urban node limits the extension of neighbouring nodes. This is not in line with the principles of polycentric urban development, in which different neighbouring urban nodes seek to capitalise on their shared joint critical mass.
- Results suggest policy options would be limited by past or present flows and exchanges (i.e. those that are observed), and that only dominant flows are relevant. As an alternative, policies may seek to modify the spatial patterns of mobility and exchange. Furthermore, in areas 'in the shadow' of major cities or metropolitan regions, flow and exchange patterns of secondary importance (that are not taken into account when delineating functioning regions) may be the critical ones for their social and economic development.

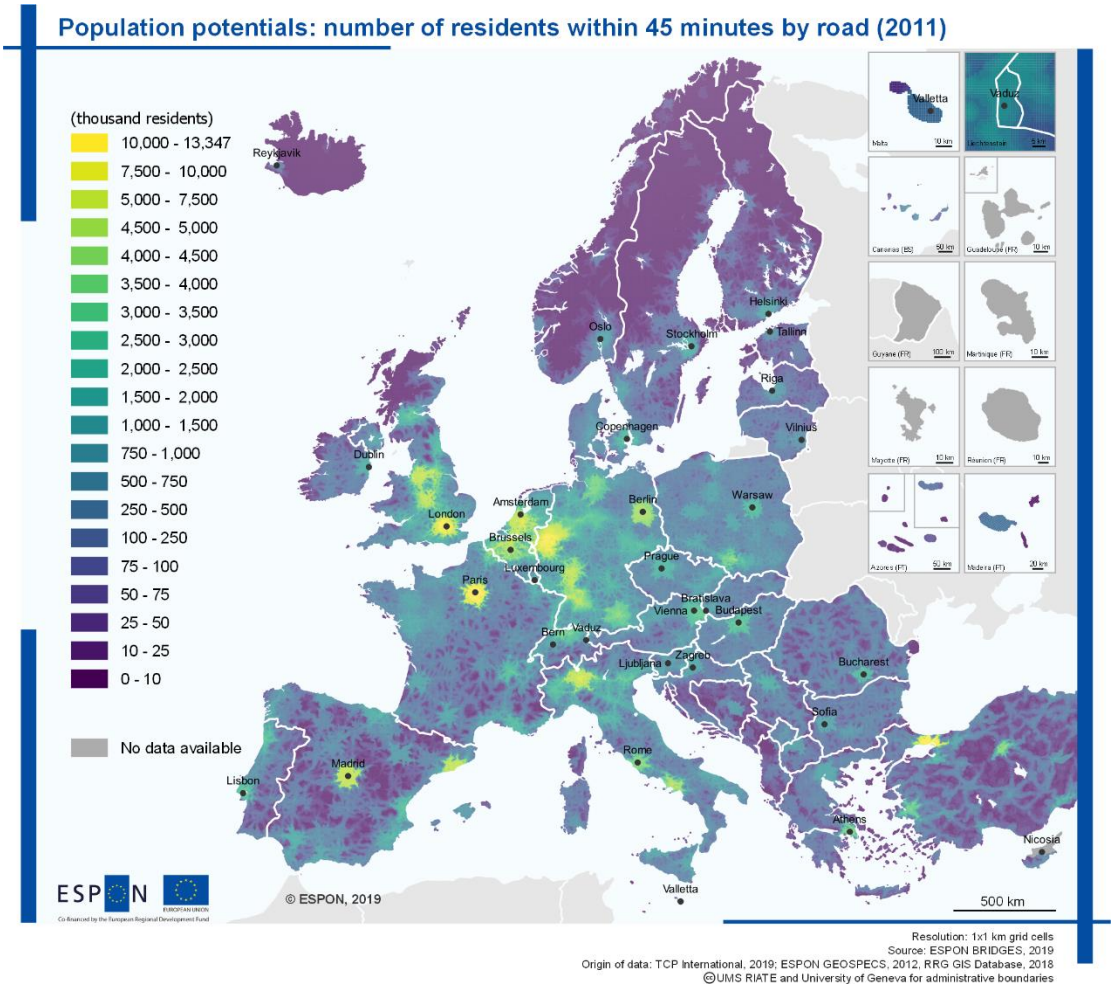
The objective is therefore to build a measurement that focuses on possibilities of interaction in each point of space. This is done by using the notion of population potential, i.e. the total population mass within a given travel time. The approach was previously applied in the ESPON GEOSPECS project, using a 45 minutes travel time which is used as a proxy for a maximum generally accepted daily commuting time. ESPON BRIDGES applies it with a more network-based approach to travel times, using LAU population data available for 2011 and calculating changes in population potential between 2001 and 2011.

1.2 Representations of critical mass

Population potential calculations for the entire Europe have not yet been finalised. As an illustration of the final output, population potentials are shown for Slovenia (2001 and 2011) and France (2001), and population potential change is shown for Slovenia (2001-2011).

Map 1-1: 45-minute road travel time population potentials in Slovenia (2001)

Map 1-2: 45-minute road travel time population potentials in Europe (2011)



1.3 Policy issues

Population potentials may represent population masses on the basis of a mobility hypothesis, i.e. in this case a 45 minutes maximum accepted travel time. This hypothesis may be based on empirical observations (e.g. “few people accept to travel more than 45 minutes one way each day”) or normative consideration (e.g. “daily commuting of more than 45 minutes one way each day should not be encouraged). Critical mass should therefore ideally be explored as part of a dialogue between policy makers and experts.

At the European level, it currently remains impossible to calculate population potentials using public transportation only, even if data availability has recently improved significantly. Exploring such an approach population potentials also requires extensive underlying hypotheses, e.g. in order to determine preconditions for daily mobility in terms frequency, cost, seasonality.

There are no absolute values with respect to ‘critical mass’. The economic and social sustainability of small, remote communities depends on a number of factors. The module on innovation in the provision of services of general interest has described solutions to provide

such services more cost-efficiently in these communities. Ambitious policies regarding the provision of public services to all citizens may also improve perspectives for a sustainable economic and social development. However, below a certain threshold, which will be specific to each community, one tends to observe a self-reinforcing negative spiral of decline. Reduced service provision and limited employment opportunities encourage out-migration, which contributes to reduce the market basis for service provision and the size of the local economy.

Low critical mass is an essential factor of constraint for a number of TGS. Each geographic specificity is associated with a limit to interactions which reduces the critical mass of concerned territories: topography for mountains, bodies of water is islands and coastal areas, long distances in sparsely populated areas. These constraints may in some cases, but not always, be addressed through infrastructure investments. However, soft solutions to improve living conditions and enhance perspectives for sustainable economic and social development can be developed in all TGS. This generally presupposes improved inter-sectoral coordination, as externalities of measures and activities within each sector on the development perspectives of the community need to be factored in. In small and remote communities, it is particularly obvious that most sectoral policies (e.g. in the fields of education, health, justice and transport) are also regional policies.