Services for citizens in peripheral areas: a hierarchy of centrality based on their availability and accessibility

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KEYWORDS: Services; Accessibility; Peripheral region; Liveability; Centrality index; Switzerland (Canton of Ticino)

ABSTRACT

The liveability of a region depends directly on the residents' ability to access a variety of services that support materially the human settlement and daily life. In the case of peripheral areas, the presence of services and their accessibility play a fundamental role – a centrality – to hinder demographic decline and, specifically in the case of the Alps, to safeguard the mountainous territory.

The indicator of centrality proposed in this article aims to identify the "central places" of a peripheral/marginal region. More precisely, it ranks places, within a particular territory, on the basis of their centrality, which is defined according to two conditions: the availability and the accessibility of private and public services. Our method was evaluated for the case of Ticino, a mountainous territory in Southern Switzerland. The indicator combines several variables that were geo-processed in a geographic information system (GIS). It made use of four geo-datasets to model, quantitatively and qualitatively, the supply of local services (thirty types of private and public services were taken into account and classified in five categories), the proximity of the population to services (mean linear distance), the availability of public transport (quality of stops) and the potential connectivity of residential buildings to the Internet (quality of the Internet connection). The indicator of centrality here proposed is built on parameters that make it useful to point out the potentials of peripheral/marginal areas in terms of services development.

INTRODUCTION

Services are crucial to support materially human settlement and to carry out daily life. In order to be liveable, a territory should provide some basic conditions for an adequate quality of life (de Haan et al., 2013). Both the availability of services (in qualitative and quantitative terms) and their proximity to residents have a marked influence on the citizens' everyday life. Services are heterogeneous and various: they can be public or private and encompass, among others, retail stores, post offices, clinics, schools, hospitals, bars, restaurants, hotels, transport services, senior care homes, gyms, etc. In this paper, "service" means the place of delivery, use or consumption of a particular benefit or good (cf. Antognelli & Vizzari, 2017). Nowadays, issues regarding the availability and accessibility of services are popular in the political debate because of their clear impact on citizens' lives. The paper reports the case of Ticino, the Italian-speaking Swiss State (Canton), situated between the mountain ridge of the Central Alps and the Italian border (Figure 1). It counts about 340,000 residents (2012), nearly 90% of which live in urban areas. More than 50% of the population lives in the South of the Canton, in the urban agglomerations of Lugano and Chiasso-Mendrisio; in terms of functional relations, they are part of Milan's northern metropolitan area. Today in Ticino, issues regarding services' offer and accessibility are frequently discussed in the public sphere. In 2012, two Cantonal constitutional initiatives were launched to improve their availability and accessibility especially in peripheral areas or isolated, marginal, mountainous regions[1].

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[1] Cf. "Avanti con le nuove città di Locarno e Bellinzona" and "Uno per tutti, tutti per uno - Solidarietà nel finanziamento della scuola dell'obbligo e delle istituzioni sociosanitarie fondamentali per la popolazione ticinese".
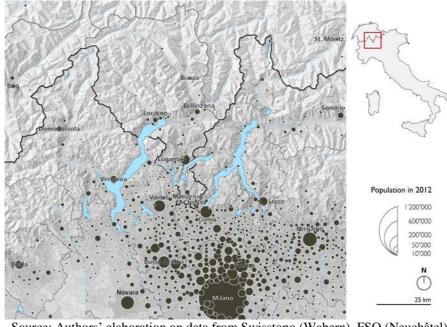
Figure 1 – Geographical situation of Ticino Canton

Source: Authors' elaboration on data from Swisstopo (Wabern), FSO (Neuchâtel)
and ISTAT (Roma).

On the one hand, these political actions aim to increase the
availability of some public services (such as schools, kindergarten,
home assistance services, etc.), on the other hand, they promote the
processes of municipal aggregation in order to establish fewer and
better coordinated public institutions to improve the effectiveness and
the efficiency of current services. In fact, the presence of services is a
key factor and plays a fundamental role – a centrality – for the
territorial development of peripheral areas. Specifically for the case
of the Alps and Ticino, services preservation and promotion can
further the safeguard of mountainous areas that, like other
peripheral/marginal areas, are subjected to demographic decline. In
fact, these ones are confronted with a continuous decreasing of
population: residents tend to move to more urban and well equipped

valley floors (cf. Torricelli & Garlandini, 2010). The pace of this process accelerated in the last past years and this trend is likely to be further strengthened during the next years, particularly in Ticino. In this regard, two infrastructural projects are going to reshape mobility in this region: first the opening of the Gotthard Base Tunnel in 2016 and second, the construction of the Ceneri Base Tunnel[2]. Both are railway projects targeting to reduce the travel distance among urban agglomerations, the former in an international perspective and the latter in a more internal one. In parallel, the inhabitants of Ticino's marginal areas, especially those located in the northern part of the Canton, are probably going to be confronted with a degradation of the services' offer and accessibility. Actually, the more urban and central areas of the Canton will likely be preferred as destinations for services' localizations.

A policy for peripheral areas in Switzerland

In Europe, the peripheral/marginal areas are usually subjected to a constant negative flow of population (mainly young people) and the progressive ageing of the residents. Since the '90s, increasing trends of socio-economic impoverishment have been observed in the rural and mountainous areas of Switzerland and in the rest of the Alpine Arc as well: peripheral areas and even more marginal ones (generally mountainous isolated regions) located close to relatively dynamic small cities typically show high levels of commuters (Torricelli, 2001) and/or negative demographic and economic trends (low potential regions, cf. Kopainsky *et al.*, 2008; Thévoz *et al.*, 2009).

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[2] The main objective of these project is to facilitate the transport of goods through the Alps. The transport of passengers is going to be indirectly improved by the new configuration of the railway network.

In Switzerland, the regional development policy law named "*Legge sugli investimenti nelle regioni di montagna (LIM)*" constituted the main legislative framework of public intervention in peripheral and mountainous areas during the '80s and the '90s. The "*New Regional Policy*" (NRP) recently[3] replaced the LIM, providing a change in the conceptual framework of intervention that switched from a Keynesian model to a neoliberal one. Thus, the Federal Council (central national executive council) established the policy for rural and mountain areas through long term objectives such as the creation and maintenance of attractive conditions, the sustainable exploitation of natural resources, the strengthening of regional competitiveness and the promotion of cultural diversity (ARE, 2014; Consiglio Federale, 2015). In fact, NRP aims to promote innovation and to improve the competitiveness of Swiss marginal territories by involving municipalities and other private and public socio-economic actors more directly in the territorial investment process. However, it is up to the Cantons, which have the constitutional powers, to apply principles of federal directives and implement specific policies for spatial development and local economic growth. In Ticino, this strategy was put into effect in 2009 through the "*Legge di applicazione della Legge federale sulla politica regionale*" that encompasses the paradigms of the NRP and marks the transition towards a model of economic development promoting networking activities and entrepreneurial spirit (Cantone Ticino, 2016). Moreover, within these initial conditions, four Regional development agencies were established to promote and coordinate the financial support for the implementation of local projects, and to match the spatial development along with the economical one.

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[3] NRP was ratified by the Swiss federal parliament in 2006.

CENTRALITY AND LOCATION OF SERVICES

The notion of centrality refers to the importance of a place in relation to a distinctive characteristic. For instance, it can be assumed that the geographical distribution of activities, goods or services can delineate spatial relations among i.e. places, regions or nations in terms of centrality (cf. Bavoux & Chapelon, 2014, pp. 87-89). Walter Christaller's (1933 / tr. it. 1980) theory of central place arose from the observation that services are not situated randomly in the geographical space; instead they tend to be located in a few places, usually situated near the population and other economic activities. He noticed that the more a service is "rare", the more residents are willing to travel in length for the fulfilment of their needs. These two observations organize geographical locations into a hierarchy based on the rarity of a particular service and the proximity to residents: the more a place contains "rare" services that attract distant residents, the more it will be situated in the high levels of the consequent urban hierarchy.

Briefly, Christaller defined the central places of the hierarchy as the centres of goods and services' supply. Moreover, he considered also the distance between the service and the consumer (Christaller tr. it. 1980, p. 48) taking into account, among other things: A) that the cost of a service consists of its market price plus the cost of transport (considered as a linear function of the distance); and B) that the delivery capacity of a central service – the supply area – is defined by the maximum distance that a consumer is willing to travel to reach this service (ibid., pp. 51-52; see also Conti, 1997, pp. 41-50). Christaller's central place theory is a longstanding spatial economic model to study the distribution of services that provides a definition of centrality from two points of view: the local offer (quantitative and qualitative presence of services) and the accessibility (distance or time of access from place of residence to service). The former imply

that the Cantons have to ensure a basic offer of services[4], even in peripheral/marginal or remote areas of the territory, and besides, the latter indicate that the citizen/user/consumer has to be able to access services traveling along a relatively short/cheap distance. Several studies report GIS (Geographic Information System) computation models of this double-sided definition of services' centrality (among many others it can be considered Borruso & Schoier, 2004; Langford *et al.*, 2008; Neumeier, 2014).

Definition of centrality and research questions

The methodology presented in this paper aims to build a straightforward hierarchy of central places modelling the strengths and the weaknesses of an area of interest in terms of services' offer and accessibility. It is relatively easy to replicate and allows the identification of potential improvements within a peripheral region from a strategic planning perspective with a regional scale. A study area can be compared, objectively, with other situations or with a hypothetical ideal case (for instance the supply of basic services determined a priori). Services (parameters of the model) that could/should be improved to increase the centrality, attractiveness and vitality of an area can then be easily pointed out.

As previously discussed, this study addresses the concept of "location centrality" according to two measurable characteristics: A) the local offer (quantitative and qualitative) of services and B) the "reachability" (average linear resident-to-service distance) of services. The centrality of a place is then determined through an

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[4] In Switzerland there is not a universally valid definition of "basic offer". The Confederation (federal level) provide a general "public service" that imply the supply of a public transport system, postal services and telecommunications.

index that takes comprehensive consideration of both the local offer and demand of services. As a result, the more a place is well equipped with services (in terms of quantitative and qualitative offer) and the residents are situated close to them (short distance resident-service), the more a place is central.

The research questions can then be stated: Which type of places' hierarchy draws the aforementioned concept of centrality (in the case of Ticino)? Is this model useful to discover and locate service's centres in peripheral/marginal areas and/or remote, mountainous and sparsely populated areas?

GEODATA, METHOD OF ANALYSIS AND PROCEDURE

The study combines four official geodatabases released by the Swiss Federal Administration. The Population and Household Statistics (STATPOP) and the Structural Business Statistics (STATENT), both available at the Swiss Federal Statistical Office (FSO). The former fully geocodes the residents and the latter does the same for the businesses with a meter-precision. Both the geodatabases are based on full count information. Moreover, STATENT classifies companies according to their economic activity and size in terms of employees. For the implementation of the centrality index, two additional geodatabases were considered: the public transport quality categories (meter precision) made available by the Federal Office for Spatial Development (ARE) and the Internet availability via the fixed network by the Federal Office of Communications (OFCOM, geodata with a resolution of a grid 250x250 meters). The former geodatabase categorizes public transportation stops as a function of the quality of the service based on the frequency and the coverage of public transport network; the latter allows to determine the potential Internet connection speed of the residential buildings.

The case study area, Canton of Ticino, was subdivided according to the administrative sections of the municipalities (255 items, provided by the Cantonal Administration) representing a relatively detailed spatial division that can be compared to city sectors.

These sets of geodata consider and inspect the centrality of a location according to services' availability and proximity. These components were taken into account in the model through four features that represent the variables of the centrality index. (1) The qualitative/quantitative offer of services (see below Figure 3 and Table 2 in the Appendix), (2) the average residents/individual-to-services distance of access (for the categories of services S1 to S5; see Table 2 in the Appendix and Figure 4 below), (3) the quality of connection to the public transportation network (Figure 5, below) (4) the local potential Internet connection (Figure 6, below). The first two elements define directly the centrality of the location and the other two represent rather an incentive or a constraint on the potential fruition and accessibility of services. The construction and the operating principles of the centrality index are fully described in the next paragraphs.
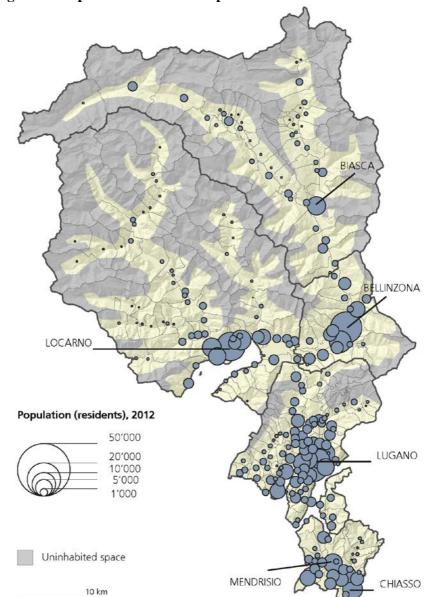
Figure 2 – Population in the municipalities' sections of Ticino Canton

Source: Authors' elaboration on data STATPOP 2012 from FSO.

The qualitative offer of services

We grouped a wide range of economic activities (30 in total), distributed in the geographical space, into five categories of services (namely, S1, S2, S3, S4 and S5; see Table 2) making use of the previously mentioned STATENT dataset that incorporate the General Classification of Economic Activities (NOGA)[5]. This categorization was built specifically for the purpose of this study, but it recalls those adopted by Schuler et al. (1999) that utilized a similar logic to sort out services' distribution.

The first category (S1) contains "banal" services, which are the most popular and needed on a daily basis. Usually S1 services benefit from a widespread distribution. The second category (S2) comprehends special regular services, which are also used on a daily basis but are specialized and relatively concentrated in central areas. The third category (S3) includes specialized occasional services that are used on a weekly or monthly basis and target very specific customers. The fourth category (S4), the irregular specialized services, are relatively rare services mainly concentrated in cities. Finally, the fifth category (S5) includes "public services" (see Table 2 in the Appendix).

Each municipal section were assessed through their offer of services, determining the presence or the absence of the 30 economic activities that compose the five categories of services. The best score is obtained when all categories of services are fully available (all the 30 services are present within the municipal section).

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[5] Equivalent to the ATECO classification of the Italian Statistical Office (ISTAT).

The average resident/individual-to-services distance

All resident/individual-to-services distances were calculated starting
from the location of each inhabitant: the smallest linear distance (in
meters) to each types of services (among each of the 30 different
economic activities that define the service offer) was calculated; then,
the results were aggregated (average of distances) into the five main
categories of services (S1 to S5). Finally, the values were attributed to
the municipal sections, the geographical subdivision of the study. The
distances for the category "total services" have been computed
through the aggregation (average) of the five categories of services
(calculated for each individual).

The quality of the connection to the public transportation network

A minimum standard offer of public transport was considered to
compare urban and marginal areas that show usually significant
degree of connections. As suggested by the Federal Office of Spatial
Development (ARE, 2011), the centrality index incorporates the
quality of the accessibility to public transport from people's
residences, resulting in four categories A, B, C and D (see Table 1).

Table 1 – Quality of public transportation service

Level	Train frequency	Bus frequency	Influence range in m.
	< 5 min		1'000 / 750 / 500
A	5 – 10 min	< 5 min	1'000 / 750 / 500 / 250
B	10 – 20 min	5 – 10 min	750 / 500 / 250
C	20 – 40 min	10 – 20 min	500 / 250
D	40 – 60 min	20 – 60 min	250
-	> 60 min	> 60 min	-

Source: ARE (2011).

The public transport's stops are thus ranked in a way that considers simultaneously the carrier type (train, bus, boat, etc.), the frequency of service and its spatial influence commensurate with the importance of the stops (those with an high frequency have a more widespread spatial influence than those with a low frequency). The results were mapped for each municipal section.

The Internet connection potential

The Federal Office of Communications (OFCOM) defines for each residential building the type of connection to telecommunications (cf. www.broadbandmap.ch). Thus, the potential connection of residential buildings to the Internet was calculated to inspect the coverage of the Internet offer (the resolution of the original geodatabase provided by OFCOM is a grid of 250x250m). The Internet connection with a download speed of 10 Mb/s was defined as a minimum standard offer. The telecommunication potential was attributed to the municipal sections like the other variables. It seemed important to us to take this indicator into account because several services are available/accessible directly through Internet (for instance postal, financial or entertainment services).

A HIERARCHY OF CENTRALITY BASED ON OFFER AND ACCESS TO SERVICES IN TICINO

The aim of the project is to classify geographical entities according to their local service offer and their proximity to residents. An index was therefore developed to outline a hierarchy ranking different municipal sections according to their centrality (in terms of services availability and accessibility). The index is based on a "standard/minimum" palette of services significant for a conventional daily life and an adequate safeguard of marginal territories (in

Switzerland these are frequently located in mountainous areas). The objective is then to highlight the central and peripheral sections in terms of services delineating therefore local issues related to the availability and accessibility of services[6]. The centrality index is defined as follows:

$$\textbf{Centrality Index (CI)} = Oq_{100} + 1 / Dm_{100} + Qtp_{100} + Qtel_{100}$$
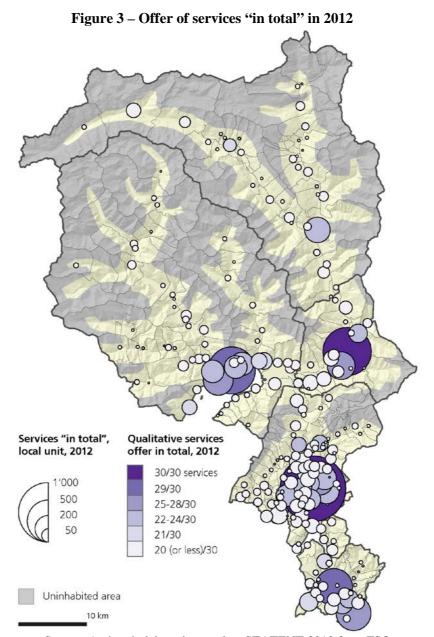
Oq – qualitative offer of services;
Dm – average residents-to-service (in total) distance of access;
Qtp – quality of connection to the public transportation network;
Qtel – potential Internet connection.

A recent study conducted in collaboration with the local office of spatial development (cf. Torricelli & Garlandini, 2016), allowed us to evaluate this index for Ticino. In the early stages, we considered to introduce the size of the services (number of employees) as a variable of the index. This proposition was discarded because of the complexity of the index construction, in particular the identification of the correct weight to attribute to each category of services. It should also be noted that the FSO presented a similar study (cf. Jeanneret & Altwegg, 2016) using a comparable but slightly different method. The following maps (Figures 3-6) depict the four components of the centrality index, individually. Figure 7 shows the centrality index (aggregation of the four components) by municipal section.

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[6] In Switzerland, all the inhabited areas are going to be provided, in the near future, with a good Internet connection. The variable "download speed of at least 10 Mb/s" will then not be very significant anymore for the configuration of this index.

Figure 3 – Offer of services "in total" in 2012

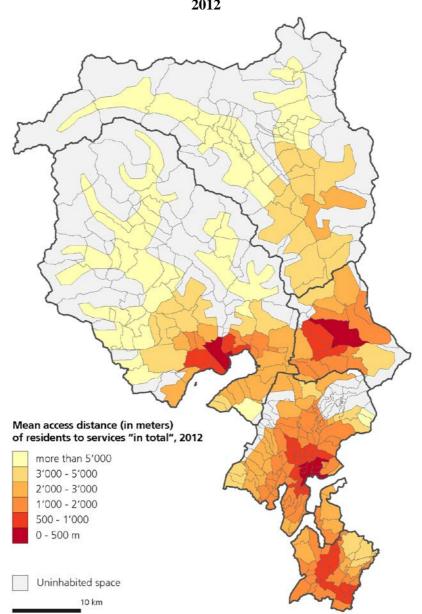Source: Authors' elaboration on data STATENT 2012 from FSO.

Figure 4 – Access distance (average, meters) of services "in total" in 2012

Source: Authors' elaboration on data STATPOP 2012 and STATENT 2012 from FSO.
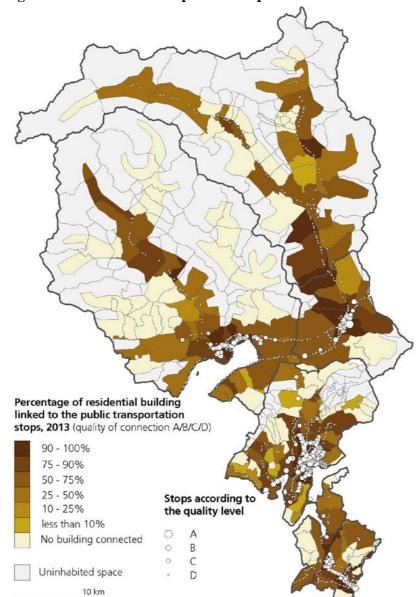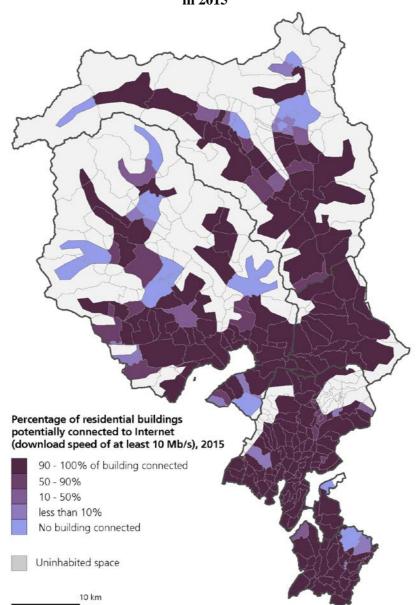
Figure 5 – Potential offer of public transportation service in 2013

Source: Authors' elaboration on data STATPOP 2012, STATENT 2012 from FSO
and quality of public transportation stops 2013 from ARE.

Figure 6 – Potential offer Internet connection of residential buildings in 2015

Percentage of residential buildings potentially connected to Internet (download speed of at least 10 Mb/s), 2015

- 90 - 100% of building connected
- 50 - 90%
- 10 - 50%
- less than 10%
- No building connected

Uninhabited space

10 km

Source: Authors' elaboration on data Internet availability - Download ≥ 10Mb/s in 2015 from OFCOM.
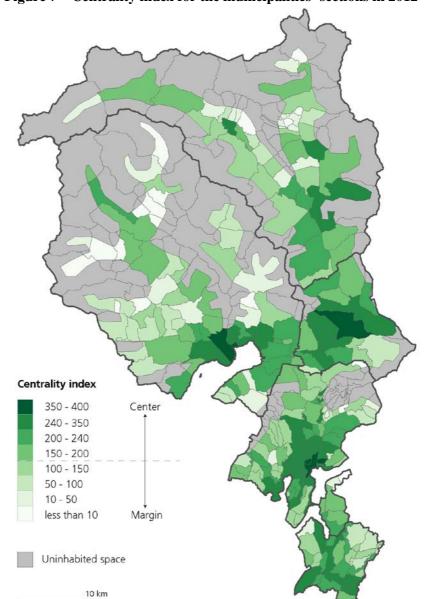
Figure 7 – Centrality index for the municipalities' sections in 2012

Source: Authors' elaboration on data STATPOP 2012, STATENT 2012, quality of
public transportation stops 2013 and Internet availability - Download ≥ 10Mb/s in
2015 from FSO, ARE and OFCOM.

Results of the centrality index

The four components were indexed (index 100) on the basis of the value of the Lugano section, the main cantonal centre for all the considered services. The resulting hierarchy of locations highlights not only the sections with a satisfactory or broad offer of services and an acceptable accessibility (urban centres), but as well those areas with a significantly lower allocation of services and longer distances of access (features that characterize peripheral or marginal areas). The estimation of the centrality index for Ticino is shown in Figure 7. How to interpret the centrality index (CI)? First we tried to explain its evolution through a simple statistical test: two multiple regressions were calculated to find the predictor variables. The first multiple regression considers equally the four underlying components of CI: all the four series are, of course, significant, however, there is a clear predominance for the potential connection to Internet (download speed at least 10 Mb/s) and for the connection to public transport (quality categories A/B/C/D), followed by the qualitative offer of services and the average distance of access to the "total services". The quality of Internet connection (and, with a lesser relevance, the quality of public transportation) proved to be a key factor to identify central places. The second multiple regression considers instead the average distances of access to services and the qualitative offer (subdivided in categories, S1 to S5: 10 variables); here the variables that have the most influence on the CI are the average distance to daily services (S1) and the local supply of "public" services (S5). These are variables related to groups of services relatively widespread in the geographical space, and should encompass the most "essential" offer/typology of services: their absence compromises residents' quality of life (especially in peripheral regions).

Now let's see the evolution of the index, starting with the lowest values. In the class with less than 10 points, there are 14 sections with

a population of generally less than 100 inhabitants (overall 840 residents, 0.2% of the cantonal total). These are the sections that, besides having the highest average distances of access and a very low offer of services, are also deprived of public transport and standard Internet connection.

We find 23 cases in the class with scores between 10 and 50, generally small mountain locations, with a population from 50 to 500 inhabitants (3,945 in total, 1.2% of the cantonal total), with a local supply of services slightly higher (S1 essentially) and, in 8 cases, the Internet connection is optimal, but public transportation is still inadequate.

In the class with scores between 50 and 100, there are 28 cases (with a population between 100 and 500 inhabitants, 4,659 in total, 1.4% of the cantonal total), still located in mountainous regions and hinterland space that benefit from good Internet connection and, in some cases, short access distances to services.

In the class of 100 to 150 we find 48 cases (for a population of 17,196 inhabitants, 5% of the cantonal population): small locations (under 100 inhabitants) situated still in mountainous regions or hinterland spaces, and sections (500-800 inhabitants) close to cities with better accessibility to services. In all the cases accessibility to the Internet is adequate.

In the class with scores between 150 and 200, the sections are distributed within peri-urban, hinterland and mountain zones, with a population varying from 300 to about 2,000 inhabitants (36,144 in total, 10.6% of the total cantonal) which benefit from an adequate offer and accessibility of services. In all the cases accessibility to the Internet is adequate.

In the class with scores between 200 and 240, there are various residential locations situated in the urban agglomerations, primarily in peri-urban (37 cases for a total population of 43,333 inhabitants,

12.7% of the cantonal total), with excellent connection to the Internet and to the public transportation, and an adequate supply of services.

In the class with scores between 240 and 350, there are only urban localities (57 cases in total, with population generally oscillating between 1,500 and 9,000). It is the most important class, with 165,971 residents (48.6% of cantonal population), comprising regional centres, that benefit from an offer and accessibility of services that range from good to very good.

Finally, in the highest class we find the most central locations counting more than 350 points (69,564 inhabitants, 20.4% of the cantonal total), with the best equipment both in the supply and accessibility of services.

It should be noted that the centrality index scores were classified according to their frequency distribution. This was an arbitrary choice but it allowed to point out not only the distinctions between central and marginal territories but also the differences within these spatial entities. For instance Figure 7 shows clearly four main central/urban areas of the Canton and the marginal, mountainous regions situated in the northern part of the Canton. Within these peripheral regions, it is still possible to differentiate the more disadvantaged municipalities' sections (in terms of services) from those providing a higher level of service offer and accessibility.

STRENGTHS AND WEAKNESSES OF THE METHOD AND FURTHER WORK

This paper presented a central place hierarchy model based on the presence of services and their proximity to residents. A centrality index was developed to depict the situation in peripheral/marginal areas and it allowed to identify, not only the areas with an adequate presence of services but also those, while being populated, that still have a services shortage. In the NRP's perspective, this is valuable

because it potentially suggests where to direct support. This method can be used of course in other contexts, such as the Italian inner mountainous areas affected by the policy named "*Strategia Nazionale per le Aree interne*". Indeed, it is highly customizable: the considered services' palette can be selected and modelled according to the objectives of a particular territorial development policy.

What can be also learned from this experiment? The result is a hierarchy of localities that can be represented spatially, by cartographic means. This allows the obtainment of an overview of the problematic: how services structure the geographical space and how central and marginal locations are distributed.

In addition, the results show that the indicator is sensitive to the presence/absence of services not only in the case of peripheral/marginal areas, but also in urban areas. This result is partially unexpected and suggests that the method is flexible and could be applied in other contexts such as metropolitan areas, small and medium centres, or residential peripheries. Moreover, it is also possible for this model to take into account a minimum level of services (for instance a basic services' supply) needed in an area or region to be considered "liveable". If such a threshold were introduced, it would be possible to recognize which areas do not meet the minimum service requirements and hence to identify the most problematic component of the index in specific localities. This was not implemented here because Switzerland does not have, for the moment, any specific directive establishing the "ideal" minimum offer of services for municipal sections.

In addition, the proposed methodology seems to be flexible in terms of databases. For instance, if there is a lack of datasets, geodata can be easily produced in the GIS environment in the form of a points feature class. Finally, the sets (basic categories) of services can be adapted to the needs of the project, for example they can be extended or reduced. However, we have to emphasise that this methodology is

sensitive to the initial conditions, such as, the composition of the categories of services, the variables used and the method of calculation of the distances. About the latter, in this paper distances were calculated through straight lines connecting the positions of the different services and the resident (point-to-point); certainly, it would have been more accurate to use the road network mainly for two reasons: to include travel times and to consider the morphology of the area. This is going to be included in a next version of this model.

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APPENDIX

Table 2 – Categories of services (NOGA code in brackets)

S1 – Daily services	1. Retail stores (471104 + 471105)
	2. Restaurants (561001 + 561002 + 561003) and bars (563001)
	3. Post offices (531000)
	4. Hairdressing salons (960201)
	5. Maintenance and repair of motor vehicles (452001) and retail sale of fuel (473000)
S2 – Special regular services	1. Supermarkets and hypermarkets (471101 + 471102 + 471103)
	2. Specialized retail stores (from 472100 to 472902)

	3. Retail sale of textiles (475100 + 477101 + 477102 + 477105) 4. Retail stores of household equipment (474300 + 475400 + 476300) 5. Financial service activities (from 641902 to 641906 + 641910) 6. Saunas (960401), fitness facilities (931300) and other physical well-being activities (960402)
S3 – Specialized occasional services	1. Pharmacies (477300 + 477400) 2. Retail sale of furniture (475902) 3. Retail sale of books (476100) 4. Hotels, inns and guesthouses (551001 + 551003 + 552002 + 552003 + 553001) 5. General medical practice activities (862100) and other human health activities (from 869001 to 869007)
S4 – Irregular specialized services	1. Retail sale of babies' and children's clothing (477103) and Retail sale of furs (477104) 2. Retail sale of musical instruments (475901) 3. Taxi operation (493200) 4. Specialists medical practice activities (862200), Dental practice activities (862300), Veterinary activities (750000) 5. Motion picture projection activities (591400) 6. Washing of textiles (960101 + 960102) 7. Beauty salons (960202) 8. Funeral and related activities (960300)
S5 – "Public services"	1. Crèches and day nurseries (889100) 2. Pre-primary and primary schools (851000 + 852001) 3. Secondary schools (853101) 4. General care hospitals and special clinics (861001 + 861002) 5. Retirement homes and residential nursing care activities (871000 + 872001 + 872002 + 873001 + 873002) 6. Nursing (869003)

Source: Authors' elaboration on General Classification of Economic Activities (NOGA) from FSO.

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