Smart accessibility patterns and shrinking cities: The added value of urban design

Keywords / urban design-rural areas-accessibility-smart city-smart mobility

Marco Negri
PhD researcher / Ferrara University

Abstract
During these last decades, the shrinkage of cities has become a major urban issue, a process caused by many factors but one that will generally increase during the next years. This is mainly because of the trend of urbanization: in 2016 the UN estimated that 54.5% of people live in urban settlements, and that by 2030 it will become 60%. The non-urban areas impacted by depopulation, will face several issues in terms of land maintenance, heritage preservation, and conservation of local traditions.
This dynamic is strongly related to the notion of accessibility, which, here, stands for the possibility of people to access places, spaces, items, and services. This approach tries to include different points of view such as the notion of accessibility seen in transportation terms, based on its efficiency and multimodality, or the issue of accessibility concerning people with disabilities.
The ongoing digital revolution has further impacted the issue of accessibility. The pervasive transition from analogue to digital processes and the development of Information and Communication Technologies has provided new opportunities to supply information, infrastructures, and public services to people. With our smartphones, citizens can access and produce data, which can then be used by them to increase their awareness about urban opportunities and optimize urban projects and policies. Worldwide internet connection has blurred the relation between a place and its use, deepening reuse strategies for buildings and neighbourhoods. The development of shared and circular economy and new health standards in cities has led to the innovation of public services both in an evolutionary way (e.g. water supply and management, waste management) and in a disruptive way (e.g. transportation design, urban hybrid services). Smart Cities projects try to catch most of these opportunities, focusing on innovative urban solutions able to exploit this potential.
This article aims to contribute to this debate, reviewing some of the main definitions of urban accessibility and showing the possible added value given by innovative urban strategies open to ICT solutions. To better understand this approach these notions will be related to Gjirokastra, one of the most important cities in southern Albania. Its distinctive combination in terms of heritage, strategic position and business opportunities are facing urban shrinkage, with the consequent loss of city population, lack of maintenance of its renowned heritage and a declining economy. Then a design proposal that uses the notion of accessibility to analyse and indicate strategic accessibility patterns to challenge shrinkage will be outlined. These actions will be referenced to pilot projects and case studies to prove how innovative urban design can add new value to urban accessibility patterns. The conclusions will resume the role of urban design dealing with these issues, indicating constraints and potentials of this approach.

The shrinking phenomena

Urban design in the near future will deal even more with the shrinking phenomena - a complex issue that is defined above all by the declining numbers of inhabitants (Grasland et al., 2008). The increase of world population (from 8.3 to 10.9 billion estimated in 2050, currently 7.7 billion) will impact mostly the developing countries and urban areas: by 2050 African and

Asian countries will host 85% of the future population growth and urban areas, which cover just 2.8% of the global land area and will accommodate 65% of people (currently almost 50%). These data (UN, 2016; EEA, 2015) show, like carbon paper, the future paths of shrinkage. Depopulation in rural lands will continue as a worldwide trend, continuing to be the new normal (ESPON, 2017), and even in urban areas there will be different scenarios from less to more developed countries.

Besides depopulation, other issues contribute to the definition of urban shrinkage processes (Rink et al, 2010). Its main causes are found in the economic system, often declined and weak in these regions; to socio-demographic trends, such as ageing and migration; settlement system development that often presents a sprawl urban expansion. Even natural disasters or political events can be part of this list. These contribute to a shrinking process by generating a vicious circle for cities' life (Oswalt, 2005). In this depopulation process the workforce migrates and the remaining population ages, increasing the supply for social services and causing social cohesion issues. The decline of population and local market reduce the municipal budget causing a lack of public services and maintenance. Therefore, the economic system weakens, continuing these negative effects in a self-perpetuated process termed as "complex shrinkage" (EPSON 2020, Martinez-Fernandez et al., 2012).

In Europe, the scientific literature on this field has currently shifted from the study of cities to rural areas. This change in perspective happened because of the size of the issue, with a continuous depopulation trend in wide European regions, and the evidence that rural shrinking can be seen as one of the first marks to an extended population decline for the country (ESPON, 2017). In this context, with an increasing amount of areas affected by depopulation and marginalization, urban planning and urban design can be drivers for innovation and the improvement of quality of life.

Common approaches to accessibility

Analyzing this issue in terms of urban accessibility can open up new perspectives in urban design for shrinking regions. Below is a brief literature review about some of the most common paradigms on urban accessibility. The first and most shared one is related to the promotion of equal opportunities for people with a disability: "Accessibility refers to the provision of 'flexibility' to accommodate each user's needs and preferences" (Valdes, 1998). This concept promotes equality and social inclusion and generates several improvements in urban design. Public spaces, buildings, objects now have to be conceived to avoid any kind of barrier or exclusion for people: using ramps instead of stairs in public spaces or multilingual signage are just a few examples of this improvement. The second paradigm of accessibility refers to "the ability to reach destinations using a given transport mode" (ITF, 2019), providing an essential key to measure economic growth, appeal and quality of life of cities and regions

(Geurs and Wee, 2004). In time, the literature has created several indexes on this field to analyse and compare the performance of transportation systems in different countries. An effective and up-to-date index is given by ITF which defines accessibility as "the product of the proximity of valued destinations (the result of land-use policies and private investments) and the performance of the transport system (the result of transport policies and investments in infrastructure)" (ITF, 2019). This definition shows the evolution of this approach to urban accessibility, considering not just the issues of transport or land use but also social inclusion, by matching transport performance and communities and quality of life, by using different values for more or less desirable destinations. Then in 2015 UN states adopted the 2030 Agenda for Sustainable Development, which contains Sustainable Development Goals (SDGs), a series of strategic issues, carved to direct and support actions for a long-lasting wealth. While transportation-based accessibility indexes are focused on the quality of mobility networks, SDGs widened the perspective from the research for best access to the definition of which elements should be regarded as accessible, referring to accessibility as an operative device to reach fundamental needs.

This brief literature review about accessibility shows how shrinkage can be analysed as a reduction of accessibility, a process in which rural/urban land lose people, appeal, GDP and people lose access to places, spaces, networks, services. Community-based design and future-proof solutions are useful design tools to start community empowerment strategies.

Digital revolution and accessibility

The ongoing digital revolution has a relevant impact on accessibility issues. The pervasive transition from analogue to digital and the development of Information and Communication Technologies has finally changed our system of knowledge, trade and live. As argued by Boorsma (Boorsma, 2018) this radical change in perspective can be explained by the shift from centred networks to distributed networks (Baran, 1964). Centred networks can be defined as system organizations, characterized by the will to standardize the single components of the network and by the presence of a central element of supervision. Public health program, big-scale industries and earliest telecommunication systems are just some examples of this organization model. Inspired by neuronal activities, the distributed network creates redundant links from each network knot and diffuse intelligence in each one of them - a radical innovation, one of the first to combine computer technologies and communication networks. Initially designed to increase data transmission speed and the resilience of communication networks, in time it contributed to the birth of the Internet.

This model can be used to explain innovations brought by current digital revolution: multiple nodes/users, even more links, countless interactions between them, and high resilience. Currently, almost all human fields tend to structure themselves as a distributed network maintaining their efficiency and benefit from network effects such as Metcalfe's law. Amazon, Google, Airbnb are just a few examples about how we use digital technology in everyday life, and AI and machine learning are ready to use sooner than we can imagine.The idea of urban accessibility has therefore changed, as stated by several authors. "During the last few decades, advances in electronic and online communications (e.g., internet or mobile-based banking) have transformed social services […]. Nevertheless, such gains cannot fully offset the disadvantages posed by persistent inequalities in physical access to resources and opportunities that are primarily concentrated in urban centres. […] [these services cannot] be fully addressed by technological advances alone. As such, understanding where the largest gaps in accessibility remain both globally and locally is of critical importance to a broad range of policymakers, investors, and development partners" (Weiss et al., 2018). From this state of the art review, we can argue why an up-to-date accessibility approach has to consider both physical and digital access, in particular digital services and innovation networks.

Regarding the first point, the approach is to leverage opportunities given by ICT technologies and community engagement combining digital services with adaptive reuse strategies at different scales. While abandoned or underused buildings can be refurbished into innovation parks or co-working spaces, incomplete public utilities can be reinforced with small scale supplies. This approach has been proposed and tested in several case studies. The first one is the EU project COWOCAT_RURAL (2014-2021) which aims to tackle worker outmigration and attract skilled professionals in rural

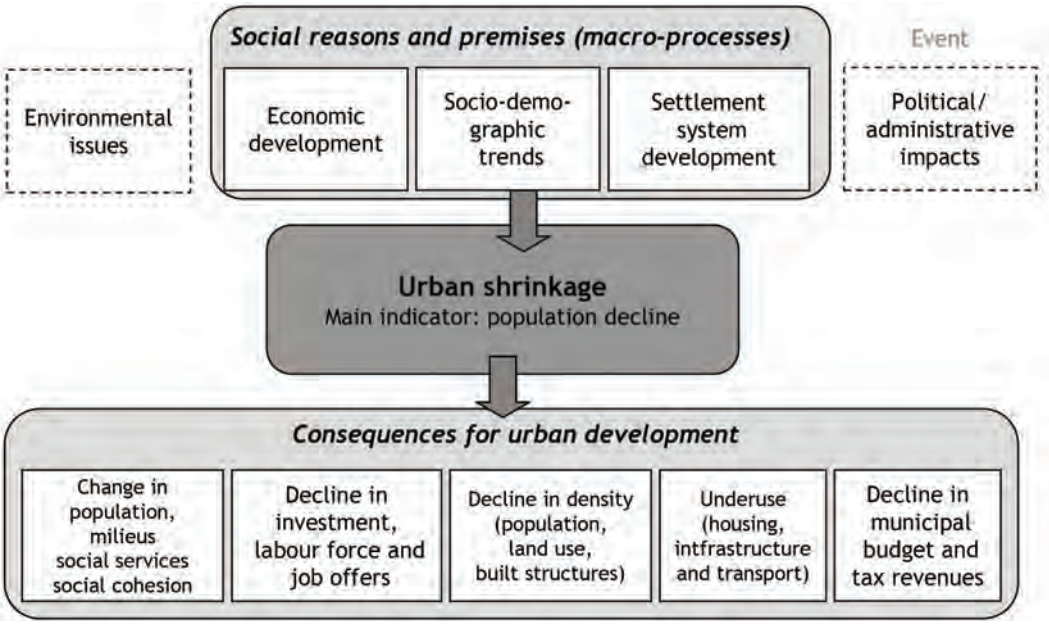

Fig. 1 / The Shrink Smart conceptual model of urban shrinkage, 2009. Source / Grossmann, Haase, Rink and Bernt).

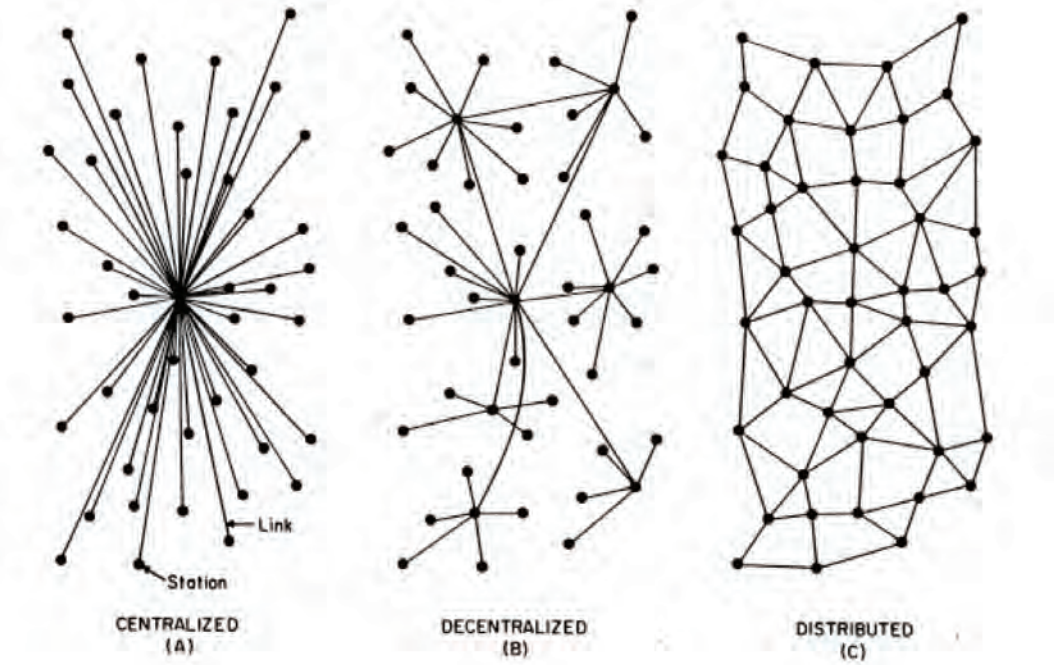

Fig. 2 / Types of networks by Paul Baran, 1964. Source / Internet bit.ly/2QGCNnJ).

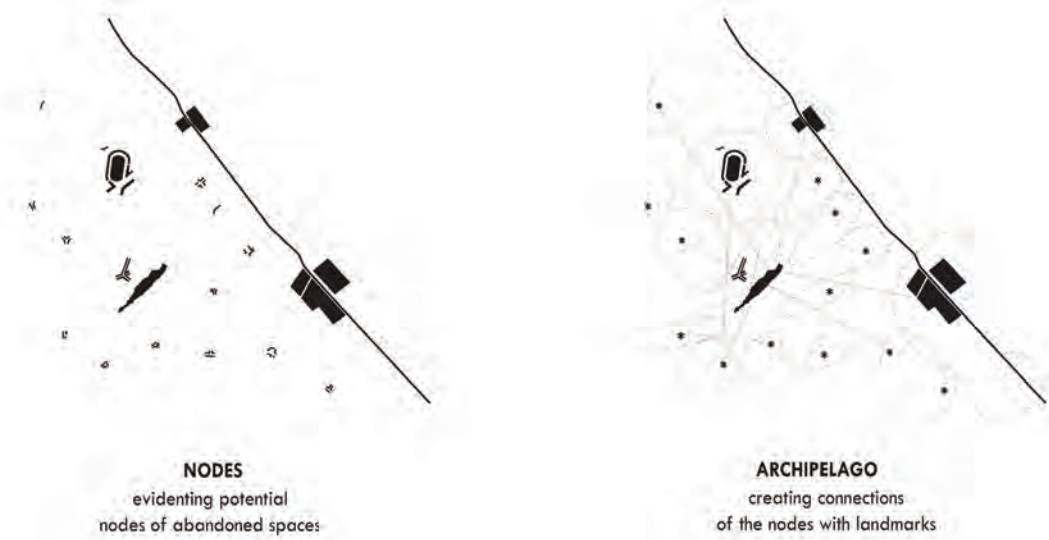

Fig. 3 / Gjirokastër urban proposal. The accessible distributed network. Source / the author

areas by transferring in these regions the experience of coworking, digital business services and networking platforms. One of the most interesting services is Rural&Go, which combines workplaces for short smart working sessions in outstanding rural landscapes. An innovative combination of tourism and work can be tested in Gjirokastër. Another case study which matches adaptive reuse strategy to stimulate work opportunities is the Campus of Generations - an intergenerational learning school created in the shrinking area of Brandeburg to update workers' qualifications and promoting re-employment (URBACT, 2013). Continuing this approach basic public utilities can be improved using small-scale distribution systems (Saladin, 2003) which can be less expensive and more tailored to the context.

Shrinking and accessibility issues in Gjirokastra.

The above-mentioned considerations regarding shrinking dynamics and accessibility patterns can be used to approach some of the main issues of Gjirokastra, one of the most important cities in southern Albania. Like many of the rural prefectures in Albania, Gjirokastër has faced a significant loss in population starting from a massive migration in the '90s. The shrinking dynamics has also affected the city with a significant decrease in population, while the demographic projections to 2030 continue this trend. On the other hand, the city of Gjirokastër has one of the most renowned urban heritage, with the historic centre sanctioned by UNESCO since 2005. The main landmarks of the city are the castle and the bazaar, recalling its former role as the main trade centre of the region. Despite the relevance of its heritage, Gjirokastër's historical buildings are now poorly maintained, especially the ones in the margins of the area delimited by UNESCO. The state of conservation of heritage fabric, ground infrastructures and inappropriate new developments in the historic centre and its buffer zone is an increasing concern of UNESCO (UNESCO 2020).

According to the notions of accessibility as previously defined, these issues can be addressed as complex phenomena that produce a loss of accessibility for local communities and city users. As other decentralized approaches, this one aims to solve the problems as close to the household level as possible in order to encourage bottom-up engagement and propose high-impact policies and actions. In Gjirokastër, the shrinking process reduces work opportunities, economic development and basic services. Nevertheless, the declining state of conservation of the historic centre tends to loosen the ties between communities and local heritage, resulting in dangerous decaying buildings with altered cultural values. These phenomena deal with the image and identity of Gjirokastër, a border town between Albania and Greece. Its strategic position in an important commercial route along the valley and its characteristic cobblestone streets point to the bounded link between the city's identity and infrastructures (Dalakoglou, 2017), and indicate the potential of accessibility networks to lead spatial re-significations.

Smart accessibility patterns: a possible approach and case studies

As remarked in the previous chapter, the accessibility issues in Gjirokastra involve several dimensions of urban life. This is the starting point of the design proposal "Accessing Gjirokastra" by Endri Duro, Xhoana Kristo and Marco Negri within the international PhD workshop "Rethinking Gjirokastra" organized by POLIS University and Ferrara University. The design proposal is characterized by the identification of smart accessibility patterns, developing a distributed urban network made up existing and potential urban poles and multi-layered connections based on visual connections, transport network and complementary functional needs. To define this network three main elements have been taken into account: workplaces and basic services, heritage and mobility networks.

Regarding the first point, the approach is to leverage opportunities given by ICT technologies and community engagement combining digital services with adaptive reuse strategies at different scales. While abandoned or underused buildings can be refurbished into innovation parks or co-working spaces, incomplete public utilities can be reinforced with small scale supplies. This approach has been proposed and tested in several case studies. The first one is the EU project COWOCAT_RURAL (2014-2021) which aims to tackle worker outmigration and attract skilled professionals in rural areas by transferring in these regions the experience of coworking, digital business services and networking platforms. One of the most interesting services is Rural&Go, which combines workplaces for short smart working sessions in outstanding rural landscapes. An innovative combination of tourism and work can be tested in Gjirokastër. Another

Fig. 4 / Cowocat_rural coworking spaces and advertising. Source / internet https://bit.ly/2OI92Sc)

Fig. 5 / Transportation hub image on REGIO-MOB report. Source / Interreg Europe

case study which matches adaptive reuse strategy to stimulate work opportunities is the Campus of Generations - an intergenerational learning school created in the shrinking area of Brandeburg to update workers' qualifications and promoting re-employment (URBACT, 2013). Continuing this approach basic public utilities can be improved using small-scale distribution systems (Saladin, 2003) which can be less expensive and more tailored to the context.

To improve the state of conservation of heritage fabric, the design proposal has integrated the existing cultural landmarks such as the castle, the old bazaar, religious buildings with neighbourhood hubs, reinforcing the role of the residential urban fabric with the creation of small-scale urban spaces and services for tourists and the local community. This approach implements cultural heritage adaptive reuse with circular economy principles and smart specialization strategies, according to EU project CLIC (2017-2020). One of the CLIC best practices is the refurbishment of the New Bazaar in Tirana, which employs the Tourism / Business Improvement District (T/BID), an innovative governance and financing tool for the maintenance of the long-term sustainability of the process. The national scale of this case study and the evidence of its success can match the conservation needs of the non-labelled historical buildings in Gjirokastra. On the other hand, the neighbourhood regeneration process can reference the experience of San Roque Neighbourhood

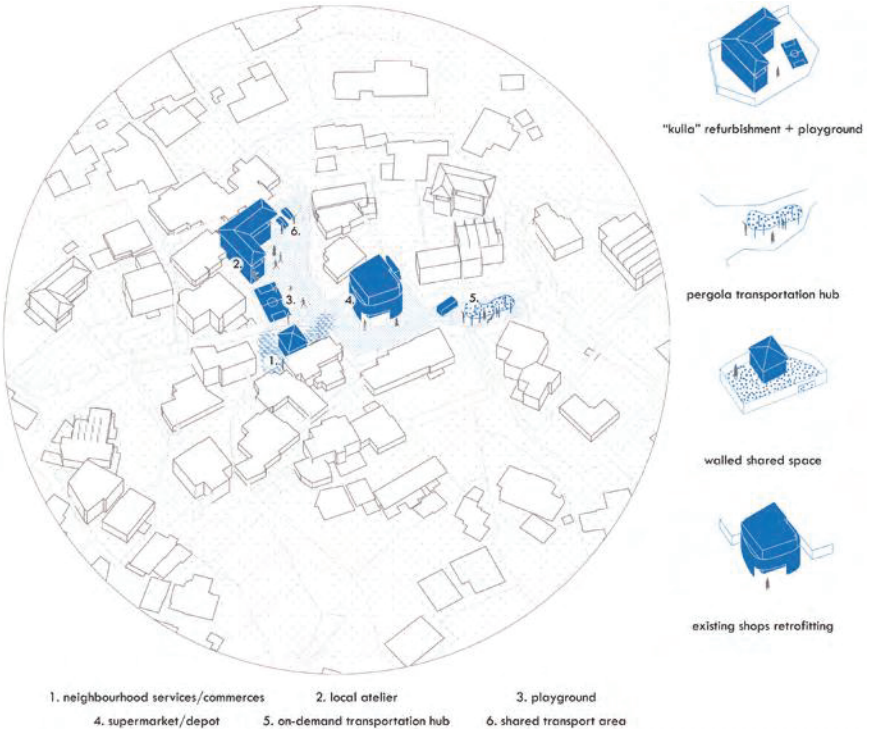

Fig. 6 / Gjirokastra urban proposal. The node "Neighbourhood Hub". Source / the author

in Ecuador. A working-class residential neighbourhood classed as a UNESCO World Heritage was starting to lose its distinctive cultural values due to economic issues and inappropriate refurbishments. The response was the establishment of Maintenance Campaigns, conducted with an inter-institutional governance model which included university, owners and the municipality. The Campaigns consist of collaborative refurbishment actions that maintain the local character of the urban fabric, changing its use if necessary. Side effects of this approach, particularly interesting for Gjirokastra's heritage, are the maintenance of local construction knowledge, the revitalization of local real estate market and the improvement of a common responsibility about cultural heritage (ICLEI, 2020).

The last element on which accessibility patterns are based is urban mobility. The existing mobility system is characterized by a mountainous topography, with several steep and narrow streets. It is more difficult to provide public transport in historical neighbourhoods, and as a result private cars and mopeds are the most used vehicles by the Gjirokastër's ageing population. To face these issues, the design solutions have been selected to reinforce multimodality and demand-based services with soft-mobility measures. The use of Demand Responsive Transport - DRT – with on-demand stops and small-scale transportation hubs, Mobility-as-a-Service – MaaS – systems to increase multimodality and improve sharing and community mobility, the creation of a Local Travel Plan Network – LTPN – are some the main proposal to increase the level of accessibility, interlacing the different parts of the city and promoting social, cultural, economic exchanges.
Mobility improvements in touristic areas and marginal regions have been studied in several EU projects during these years. The EU project STARTER (2012-2014) has promoted the creation of LTPNs to promote energy-efficient and sustainable mobility for tourism, indicating soft measures such as on-line information or shared promotion policies that influence significantly the tourists' travel behaviour. Regarding the improvement of sustainable mobility in marginal regions Interreg Central Europe RUMOBIL project (2016-2019) has been focused on cooperation strategies to support mobility in rural areas, promoting pilot actions such as real-time infomobility for DRT services, public participation in bus stops refurbishment, and multimodal transport hubs.

Indeed, Interreg Central Europe REGIO-MOB (2016-2020) has developed more integrated mobility strategies, e.g. a network of shared e-bikes, the promotion of carpooling by combining several transportation modes, and the use of advanced apps to manage and organize car journeys. All these pilot actions reveal how decentralized mobility solutions and soft mobility actions can increase accessibility in marginal areas, supporting local tourism and businesses with a positive impact on the environment and the quality of life.

Conclusions

The above-mentioned literature review and research proposal, supported by several pilot actions and case studies demonstrate how a wide accessibility approach can be useful to challenge the shrinking city phenomena. An accessibility-based approach can, therefore, improve the awareness about the impact on the ordinary life of proposed strategies and actions, encouraging bottom-up processes and high-impact actions in the long term. In this sense, ICT technologies and urban design can act as main devices to drive urban development: digital revolution can reduce negative effects of marginalization by implementing networks and build the digital imagery of the city. Urban design, then, can improve urban quality and re-imagine public and private spaces for fragile communities.

The main limitations can be found in the multidisciplinary nature of this approach, which could involve different expertise not always available in small-scale administrative organizations, the definition of common criteria regarding the multi-layered notion of accessibility, especially for its digital aspects, and context-related constraints, most relevant in shrinking cities that are facing an economic decline which is commonly linked to economical and decisional downgrade. Despite these constraints, current policies on shrinking cities and global trends show the potential of a multi-layered accessibility approach to face this issue and the potential of urban design to effectively impact wellbeing and sustain local activities. This perspective, now described in its principal aspects, is open to further studies to deepen the links between accessibility, urban design and people's quality of life.

Bibliography

Grasland, C., et al. (2008) Shrinking Regions: A Paradigm Shift in Demography and Territorial Development.

Study for Directorate-General for Internal Policies of the Union, Policy Department B: Structural and Cohesion Policy, European Parliament. Brussels: European Parliament.

United Nations, (2016) The World's Cities in 2016 – Data Booklet (ST/ESA/ SER.A/392).

EEA (2015) European environment — state and outlook 2015: Assessment of global megatrends, European Environment Agency, Copenhagen.

Oswalt, P. (2005) Shrinking Cities volume 1 – international reseach. 1st ed. Ostfildern-Ruit: Hatje Cantz Verlag, p.12.

ITF (2019), "Benchmarking Accessibility in Cities: Measuring the Impact of Proximity and Transport Performance", International Transport Forum Policy Papers, No. 68, OECD Publishing, Paris

Geurs, K., Wee, B. (2004) Accessibility evaluation of land-use and transport strategies: Review and research directions. Journal of Transport Geography. 12. 127-140. 10.1016/j.jtrangeo.2003.10.005.

Boorsma, B. (2018) A New Digital Deal. Beyond Smart Cities. How to Best Leverage Digitalization for the Benefit of our Communities. [S.l.]: Rainmaking Publications.

Baran, P. (1964) On Distributed Communications. Santa Monica, CA: RAND Corporation.

Weiss, D., Nelson, A., Gibson, H., Temperley, W., Peedell, S., Lieber, A., Hancher, M., Poyart, E., Belchior, S., Fullman, N., Mappin, B., Dalrymple, U., Rozier, J., Lucas, T., Howes, R., Tusting, L., Kang, S., Cameron, E., Bisanzio, D., Battle, K., Bhatt, S. and Gething, P., 2018. A global map of travel time to cities to assess inequalities in accessibility in 2015. Nature, 553(7688), pp.333-336.

Dalakoglou, D., 2017. The Road An Ethnography Of (Im)Mobility, Space, And Cross-Border Infrastructures In
The Balkans. Manchester: Manchester University Press.

Webliography

Clinton E. R., (2013). Environmental accessibility and its implications for inclusive, sustainable and equitable
development for all
[https://www.un.org/disabilities/documents/accessibility_and_development_june2013.pdf].

Martinez-Fernandez, C., Kubo, W., Noya, A. and Weyman, T. (2012) Demographic Change and Local Development. Paris: Organisation for Economic Co-operation and Development. [http:/www.oecd-ilibrary.org/content/book/9789264180468-en].

ESPON (2017) Policy brief: Shrinking rural regions in Europe. Luxembourg : ESPON EGTC. [Https:/www.espon.eu/rural-shrinking].

ESPON (2020) ESCAPE Interim report. Annex 10: Draft. Luxembourg: ESPON EGTC. [https:/www.espon.eu/escape].

Rink, D., Haase, A., Bernt, M. and Großmann, K. (2010) Addressing Urban Shrinkage Across Europe –Challenges and ProspectsShrink Smart Research Brief No. 1, November 2010 On behalf of the Shrink Smart
consortium .Helmholtz Centre for Environmental Research –UFZ, Leipzig
[https://shrinksmart.ufz.de/data/D9%20Research%20Brief%20214223.pdf].

Valdes, L. (1998) "Accessibility on the Internet," report to the United Nations (16 June 1998, updated 31
March 2004) available at http:/www.un.org/esa/socdev/enable/disacc00.htm, cited in Report of the Secretary-General, "Implementation of the world programme of action concerning disabled persons," (United Nations document (A/54/388/Add.1).

UNESCO, 2020. UNESCO World Heritage Centre - State Of Conservation (SOC 2019) Historic Centres Of
Berat And Gjirokastra (Albania). [https:/whc.unesco.org/en/soc/3960/].

URBACT, 2013. From Crisis To Choice: Re-Imagining The Future In Shrinking Cities.
[https://urbact.eu/sites/default/files/import/general_library/19765_Urbact_WS1_SHRINKING_low_FINAL.
pdf.

Saladin, M., 2003. Community Water Supply In Switzerland - What Can We Learn From A Century Of
Successful Operation?
[https://www.ircwash.org/sites/default/files/community_water_supply_in_switzerland_0.pdf].

ICLEI, 2020. Adaptive Reuse Of Cultural Heritage - An Examination Of Circular Governance Models From 16
International Case Studies. CLIC project. [https:/iclei-europe.org/publications-tools/?c=search&uid=ewTajtJT].