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Articles

A Spatial Analysis of Tourism Infrastructure in Romania: Spotlight on Accommodation and Food Service Companies

Daniela Luminita Constantin¹, Adriana Reveiu¹

¹ Bucharest University of Economic Studies, Bucharest, Romania

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Abstract. In recent decades the supply perspective of tourism, focusing on large agglomerations of tourism companies that bring benefits in terms of positive externalities at destination, has been more and more emphasized. It has become a complement of the classical demand-based perspective, which points to the availability of resources (attractions) demanded by tourists as the exclusive explanation for the location decisions of tourist companies. In line with these new orientations, our paper proposes an inquiry into the spatial distribution of accommodation and foodservice companies in Romania, seeking to reveal whether a significant cross-correlation between these two segments of tourism infrastructure occurs and, in case of an affirmative answer, to discuss their significance for tourism development policies. With this aim in view, the investigation methodology utilises a series of analytical tools that combine GIS and spatial agglomeration analysis based techniques, applied to datasets capturing all companies represented in the tourism industry in Romania provided by the National Authority for Tourism, combined with spatial data from the Environmental Systems Research Institute (ESRI). The results indicate an uneven territorial distribution of tourism infrastructure compared to the location of tourist attractions, significant differences between the geographical distribution of the accommodation and foodservice companies and suggest differentiated policies for supporting tourism infrastructure, in accordance with the specific needs of the tourist areas.

JEL classification: C19, C88, L83, R12

Key words: tourism infrastructure, accommodation and foodservice companies, GIS based techniques, spatial autocorrelation, Moran's index

1 Introduction

The Travel and Tourism Competitiveness Report 2013 issued by the World Economic Forum indicates a direct contribution of tourism of 1.5% to Romanian GDP and 2.3% to total employment. If total effects – direct and indirect – are taken into consideration, the contribution is higher, namely 4.7% to GDP and 5.3% to total employment (WEF 2013). It confirms tourism's capacity to generate important income and employment multiplier effects through the activity of traditional service providers and industry suppliers.

However, Romania's tourism competitiveness is far behind its significant potential: the same report shows that it ranks only 68 out of 140 countries considered, almost all other countries from Central and Eastern Europe displaying better ranks. If the tourism competitiveness pillars are examined, Romania presents competitive advantages with regard to tourism infrastructure units (rank 34), health and hygiene (rank 54), environmental sustainability (rank 58), ICT infrastructure (rank 59), safety and security (rank 63). The drawbacks are recorded in ground transport infrastructure (rank 109), prioritization in travel and tourism (rank 103), air transport infrastructure (rank 93), price competitiveness (rank 84), etc.

As a result, various EU-funded programmes for 2014-2020 incorporate priorities regarding tourism development: the Regional Operational Programme, the Economic Competitiveness Programme and the National Programme for Rural Development, their denominator being the regional dimension of tourism development. From this viewpoint Romania is characterized by a relatively well-balanced spatial distribution of its natural and cultural-historic landscapes, making it possible to address tourism as a solution for boosting the development of regions lagging behind (Constantin, Mitrut 2009).

Based on these overall considerations this paper proposes the use of geographical information system (GIS) tools and spatial statistical models in order to investigate the spatial associations of territorial units with significant tourism activity, by examining the spatial relationships between accommodation companies/units (hotels, motels, pensions, etc.) and foodservice companies/units (restaurants, fast food chains, cafés, etc.). The choice of this segment of tourist infrastructure has been mainly determined by the supply perspective of tourism, which points to large agglomerations of tourist companies able to bring benefits represented by externalities generated at destination (increased income, cost reduction). This perspective, emphasized in studies published in recent decades (e.g. Chung, Kalnins 2001, Kalnins, Chung 2004, Marco-Lajara et al. 2016), complements the classical demand perspective that considers the availability of resources demanded by tourists as the exclusive rationale behind the tourist companies location decisions. Accordingly, our paper aims to reveal their distribution and resulted spatial agglomerations in Romania, as a background for rational decisions regarding the support that will be offered to the most relevant tourism destinations as well as the measures meant to enhance collaborative networks and competitiveness in the tourism activity-based agglomerations, creating synergies that can increase economic performance.

The research questions our paper is focused on are: Which are the main patterns of the spatial distribution of accommodation and foodservice companies in Romania? Is there a significant spatial cross-correlation between the two categories of tourism infrastructure? If so, in which geographical areas and what is their significance for tourism development?

The research is based on three working hypotheses, namely:

- H1:** Even if Romania displays competitive advantages in terms of tourism infrastructure units, these are not evenly distributed in the territorial units (counties, regions) with important tourist attractions. In addition, there are geographical areas where spatial clusters (agglomerations) of accommodation and foodservice companies are noticeable, which do not overlap with / do not belong to just one territorial unit.
- H2:** Apart from the geographical areas with a good representation of both accommodation and foodservice companies, there are a large number of cases with significant differences between the two.
- H3:** The specific spatial correlations between accommodation and foodservice infrastructure can suggest useful ideas for adequate policies in highly attractive tourist areas.

An inquiry into previous papers devoted to subjects in the same field shows that a lot of tourism-tailored GIS applications have been developed in order to analyse regional-specific information (Poslad et al. 2001). The approaches employed are spatial decision support applications and spatial statistics support applications. The former propose GIS based solutions particularly designed to identify spatial relationships to integrate tourism-specific information like tourist characteristics (Lau, McKercher 2006), landscape

elements and tourist locations (Brown 2006), temporal–spatial behaviour (Shoval et al. 2011) and the images added to these locations (Gaughan et al. 2009).

Another research mainstream is the empirical analysis of the distribution of tourism-related activities, such as selected attractions, supporting facilities and accommodation in general (Pearce 1995).

Usually the dependence testing is done by means of autocorrelation analysis. Autocorrelation is “the cross-correlation of a signal with itself” (Cheng et al. 2014, p. 1176) and, in case of spatial data, it can be measured using an index, most frequently the Moran index.

As far as the explanations for location choice and spatial distribution of companies providing accommodation and foodservices are concerned, the main research approach employed in recent studies consists of regression methods, based on classical economic theory (Zhang et al. 2012, Yang et al. 2014). Usually the explanatory variables used in the regression models are relating to labour, culture, capital and policy characteristics.

As pointed out by Salo et al. (2014) and Seul (2015), accommodation and foodservice companies compete with neighbours of similar quality, rather than with those which are differentiated in terms of quality¹. In addition, research results also suggest the possibility of cooperation between neighbouring hotels of a similar quality. In general, the accommodation companies are likely to locate in places proximate to their potential markets, thus stimulating a higher demand. They are usually highly clustered, which creates the chance of important benefits from agglomeration effects. When there is a particular interest in the identification of local clusters (hot spots) of cases, the phenomenon is named local heterogeneity (Haining 2014).

In the described context, the first step of our exploratory research has aimed to outline the methodological framework for identifying the significant spatial associations of territorial units in terms of two relevant indicators for tourist activity – accommodation and foodservice units – and, subsequently, for investigating whether a correlation between them has been established. The data sets have also been described. The interpretation of results has placed an important emphasis on the significance of the identified spatial cross-correlations, as a basis for appropriate, differentiated tourism-support policies in the highly attractive tourist areas.

2 Research Methodology and Support Data

In the beginning of the empirical investigation the spatial characteristics of accommodation companies and of foodservice companies acting in Romania are introduced, followed by the analysis of the spatial relationships by means of a set of spatial statistics and GIS based techniques. Frequency maps, a spatial autocorrelation approach and global and local spatial autocorrelation testing are used to identify the nature of the spatial distribution of tourism activity performed.

2.1 Data Sets

For the proposed analysis three data sets are employed. Two data sets comprise public data about all companies represented in the Romanian tourism industry in December 2014. The first data set includes information about 7157 classified foodservice companies while the second data set contains information about 10007 classified accommodation companies. The source for both data sets is the Romanian National Authority for Tourism. Both data sets are processed in order to get aggregate data at LAU-2 level², which means locality level. This source of data – at the lowest level of aggregation – has been chosen as a result of the fact that the statistical data offered by the National Institute of Statistics with regard to the economic activity in tourism are not available at this level, while a higher level of aggregation for this kind of analysis would not have been appropriate. In other words, as the tourism activity is strongly influenced by well-defined environmental,

¹This competition can have positive effects on the preservation and valorization of tourist attractions (natural, historic, cultural ones). At the same time, it helps to raise the quality of the services provided by these companies and, consequently, to improve their economic performance.

²Local Administrative Units

geographical features, this sort of analysis performed at county, regional or macro-regional level of aggregation would not have offered relevant results for the purpose of our study.

Another data set employed in this research contains spatial data about Romania which refer to the geographic description of the localities (LAU-2), useful for spatial data analysis and representation. These data are provided by the Environmental Systems Research Institute (ESRI).

The three data sets have been integrated and stored in a spatial database – a geodatabase – and managed by means of the Geographic Information System (ArcGIS) from ESRI.

2.2 *The Spatial Distribution of the Companies Acting in Tourism Industry*

The aggregation of the data sets with individual data about all companies within the tourism industry – in accommodation and foodservice sectors – has been performed at the locality (LAU-2) level. Then, the aggregate data have been distributed in territory using the locality geographic description offered by the third data set.

2.3 *Spatial Autocorrelation Analysis*

In order to identify significant spatial associations of LAUs in terms of number of accommodation and foodservice companies the spatial autocorrelation analysis (univariate and bivariate) has been envisaged.

Spatial autocorrelation may involve either positive or negative relationships between nearby values on a map. Positive spatial autocorrelation occurs when LAUs with high or low values of a variable tend to group together ('spatial clusters') and negative spatial autocorrelation appears when LAUs with high values are surrounded by LAUs with low values or vice-versa (Anselin et al. 2002, Griffith 2003, de Dominicis et al. 2007, Goschin 2015).

Spatial autocorrelation can be interpreted in various ways. For example, it can be seen as self-correlation which appears in 2-D space. Unlike the traditional Pearson correlation coefficient, which measures the co-variability of paired values in two variables, spatial autocorrelation measures "correlation among paired values of a single variable based on relative spatial locations" (Griffith, Chun 2014, pp. 1478-1479). As it concentrates on a tendency among values of a variable based on their spatial closeness, spatial autocorrelation "is measured within the combinatorial context of all possible pairs of observed values for a given variable where corresponding weights that are determined by spatial closeness identify the pairings of interest" (Griffith, Chun 2014, p. 1479).

Another interpretation of spatial autocorrelation is as a map pattern. Regional science operates with datasets of individual observations post-stratified by geographical unit such as census blocks/block groups, county boundaries, etc. When such areal units are used, the choropleth mapping of a variable portrays a pattern over space. A tendency towards similarity or dissimilarity for neighbouring values on such a map can be directly taken as spatial autocorrelation. Whereas large clusters of similar values on the map indicate positive spatial autocorrelation, when the tendency is for values to be dissimilar compared to those of their neighbours, it can be interpreted as negative spatial autocorrelation (Griffith, Chun 2014).

Various studies in regional science have attempted to numerically quantify the spatial autocorrelation. The most frequently used quantitative measure of spatial autocorrelation is the Moran index, which is analogous to the Pearson's correlation coefficient. (Griffith, Chun 2014). In addition, various local indicators of spatial association have been proposed, such as a local variant of Moran's index, Geary's coefficient, Getis-Ord local G_i index, which shows to what extent high and low values are clustered together.

From the available spatial autocorrelation statistics, the local Moran's I and Geary's C have been employed.

Local Moran's I has been used in order to detect the local agglomerations of companies providing accommodation and foodservices:

$$I_i = z_i \sum_j w_{ij} z_j$$

where:

- z_i and z_j are standardized scores of attribute values for administrative unit i and j ;
- j is among the identified neighbourhood of i , according to the weights matrix w_{ij} (Anselin 1995).

Values of I range from -1 to +1. Negative values indicate negative autocorrelation, while positive values indicate spatial autocorrelation. The zero value indicates a random spatial pattern.

The second metric, Geary's C , has been applied in order to measure if the variability of the considered variable is significantly smaller than the one expected theoretically of a random spatial distribution.

$$C = (n - 1) \frac{\sum_{ij} w_{ij} (z_i - z_j)^2}{2(\sum_{ij} w_{ij}) \sum_i (z_i - \bar{z})^2}$$

where:

- z_i is the value of the variable at location i ;
- n is the number of points;
- w_{ij} are weights which offers indications about the spatial relationship between points i and j .

When the Geary's C has a value ranging from 0 to 1 the spatial autocorrelation is positive and when the value is between 1 and $+\infty$, the spatial autocorrelation is negative. Geary's C does not have an upper limit, but it has a lower limit of 0, which corresponds to a situation where the spatial autocorrelation is maximal. In such a case, the values of y_i and y_j are identical (Dubé, Legros 2014).

According to Dubé, Legros (2014), the Moran or Geary statistics give similar results with regard to the detection of the presence or absence of autocorrelation of a variable. The main difference between the two statistics consists in the definition of the similarity index.

Local Moran's I , together with local Geary's C , local Gamma, Moran scatterplot, etc. are relevant examples of Local Indicators of Spatial Association (LISA), which are designed to assess the spatial association at a given location (Cheng et al. 2014), making it possible to identify local spatial clusters and to assess local instability. LISA is the most frequent technique for the exploratory spatial data analysis (ESDA), applications being found in regional science, spatial econometrics, social sciences, etc. (Symanzik 2014)³.

When the ESDA techniques are discussed in the GIS context, the aim is to explore the spatial nature of the envisaged data. These techniques can be grouped into techniques based on the neighbourhood view of spatial association (e.g. Moran scatterplots and LISA statistics) and techniques based on the distance view of spatial association (e.g. lagged scatterplots, variogram-cloud plots) (Anselin 1995).

³There are many relevant studies, which have utilized such techniques for tourism related research. For example, Williams, Shaw (1995) applied ESDA in order to illustrate the polarization of tourism, measured by the distribution of tourists and tourism-related employment in the United Kingdom between 1980 and 1990. Feng, Morrison (2002), Lau, McKercher (2006) and Chancellor, Cole (2008) used GIS techniques to represent tourists' movement patterns in Indiana, Hong Kong and North Carolina, respectively. More recently, Kang et al. (2014) have demonstrated the application of GIS-based ESDA in the assessment of the changing distribution of domestic tourism in South Korea between 1989 and 2011. Li et al. (2014) employed GIS tools and statistical models to investigate the spatial associations of urban tourism phenomena by examining the spatial relationships between hotel distribution and land types, attractions and other surrounding environmental factors in Hong Kong. In another register, Zhang et al. (2011) investigated the spatial dependence and the mechanisms of international and domestic tourist distributions in Chinese cities by means of ESDA based on GIS techniques.

In order to identify significant spatial associations of LAUs for each of the two variables considered for our analysis, the significance map has been created (allowing the identifying of locations with significant local Moran index).

Besides the spatial auto-correlation for a given variable (number of accommodation units or number of foodservice units), the cross-correlation between the two variables has also been investigated. In this case, the bivariate spatial autocorrelation analysis has been applied, using the bivariate Local Moran's I :

$$I_{kl}^i = z_k^i \sum_j w_{ij} z_l^j$$

Where k and l are the indices of the two variables considered (Anselin et al. 2002).

Thus, the forms of spatial autocorrelation (positive and negative) for the two data sets could be identified for both cases – univariate and, respectively, bivariate analysis.

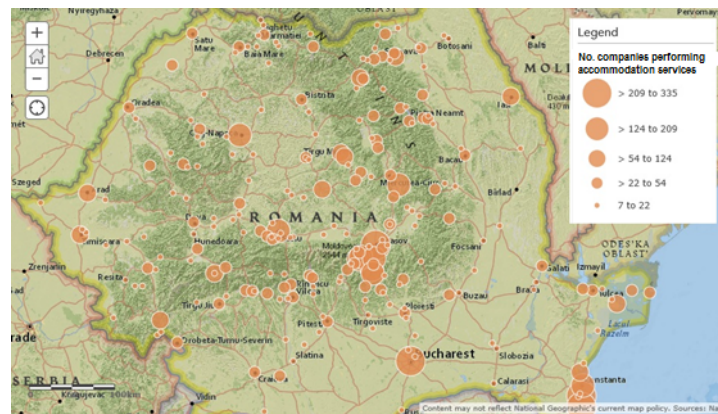
Subsequently, the classes of spatial associations for each of the two forms of autocorrelation have been highlighted (two classes for each form) by means of different colour codes.

3 Results

3.1 Spatial distribution of companies represented in Romania's tourism industry

According to the demand perspective, tourism attractions are seen as 'raw materials' of this sector and are location-specific. As a result, tourism-dependent industries – beginning with accommodation and foodservices – locate themselves as near as possible to these attractions, which draw visitors (OECD 2008).

Illustrating this fact, the majority of accommodation companies are distributed in Romania's mountain areas, Black Sea region, Delta of Danube and various cities (Figure 1). The most important localities are Bucuresti, Eforie, Costinesti, Brasov, Busteni, Constanta, Mangalia, Moeciu, Bran, Baile Felix, Predeal, Sibiu, Cluj-Napoca, Sinaia, Suceava, Iasi and Timisoara, many of them combining the natural and historic-cultural heritage attractions.

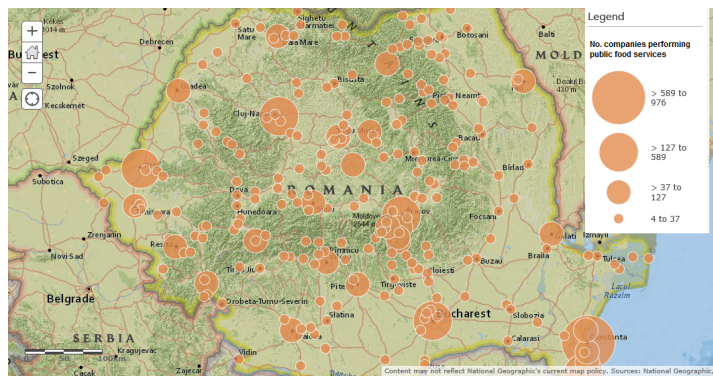


Sources: National Geographic, ESRI ArcGIS 2016 for topographic data; Romanian National Authority for Tourism 2014 for thematic data

Figure 1: Spatial distribution of accommodation companies

The top localities with the largest number of companies in the foodservice industry show the following ranking: Constanta, Cluj-Napoca, Arad, Mangalia, Bucharest, Brasov, Timisoara, Predeal, Sinaia. In this list there are large cities, mountain and seashore resorts. The distribution of all companies represented in the foodservice sector is presented in Figure 2.

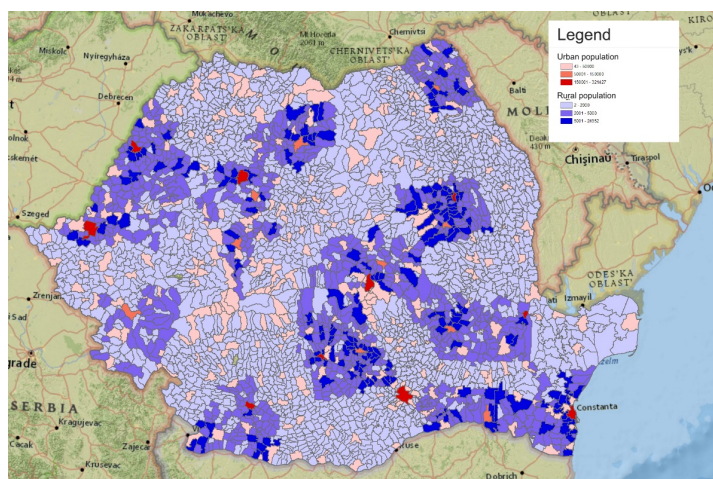
In addition to these two maps it is noteworthy to mention that there is a positive correlation between the distributions of accommodation and foodservice units and the



Sources: National Geographic, ESRI ArcGIS 2016 for topographic data; Romanian National Authority for Tourism 2014 for thematic data

Figure 2: Spatial distribution of foodservice companies

areas with a higher urbanisation index, as shown by Figure 3, which presents a map of the urbanisation index.



Source: ArcGIS 2016 for the administrative boundaries, National Institute of Statistics 2016 for thematic data

Figure 3: Urbanization index

3.2 Spatial Autocorrelation Analysis

3.2.1 Univariate spatial correlation

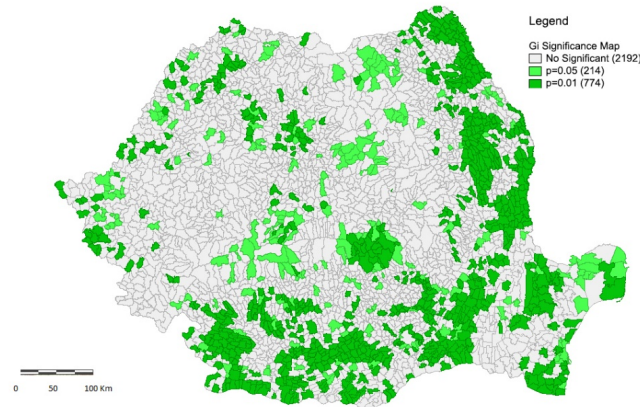
The map of locations that have a significant Moran index (for p -values below 0.05 and 0.01) corresponding to the “number of accommodation companies” variable is presented in Figure 4.

The significance map shows the locations with a significant Local Moran index, by using different shades of green depending on the p -value⁴.

In the first category, for $p < 0.05$ there are 214 LAUs (light green) and in the second category, for $p < 0.01$ there are 774 LAUs (deep green). For the rest of LAUs, the local Moran index is not significant.

For the significant associations of LAUs in the case of the “number of accommodation companies” variable, the map in Figure 5 offers the interpretation of this univariate Local

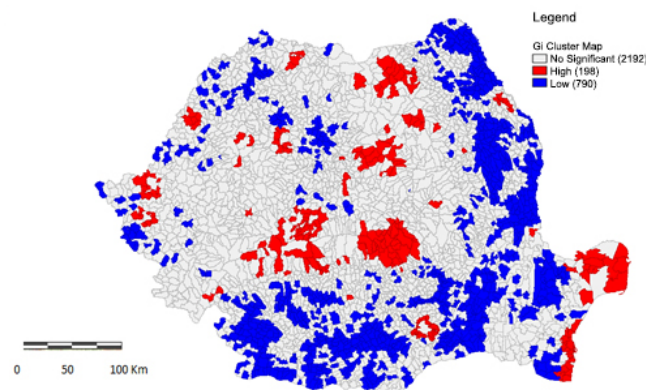
⁴The p -value is associated with the risk of rejecting the H_0 (null hypothesis: random spatial variance or, in other words, there are not spatial associations between neighbour territorial units).



Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 4: Moran significance map for number of accommodation companies per LAU (local administrative unit)

Moran, exploring the type of autocorrelation and the category of spatial association. For the considered variables, all 988 LAUs are included in positive autocorrelation agglomerations, two categories of spatial associations being distinguished: the first (in red), with 198 LAUs, indicates ‘high-high’ similarity based spatial clusters (agglomerations) (each LAU with a high value is surrounded by neighbours with high values too); the second (in blue), with 790 LAUs, indicates ‘low-low’ similarity based spatial associations, with a small number of accommodation units. This configuration is a confirmation of the first category incorporating the most important tourist areas in Romania (Black Sea, Delta of Danube, Prahova Valley, Bucovina, etc.), which indicates a ‘natural clusterisation’ as a response to the natural and, in some cases, historic and cultural environment advantages rather than the result of a clearly targeted tourism-support policy.

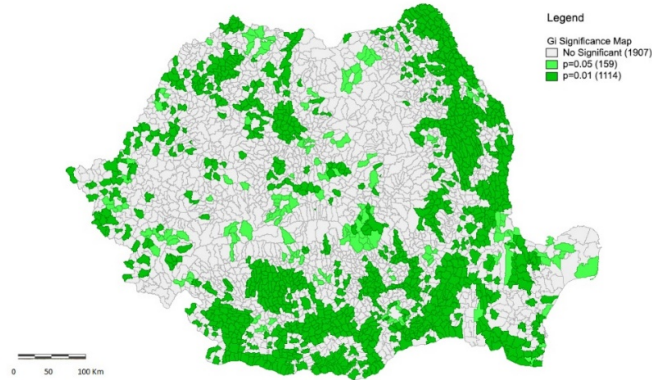


Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 5: Categories of significant spatial associations of LAUs in terms of number of accommodation companies

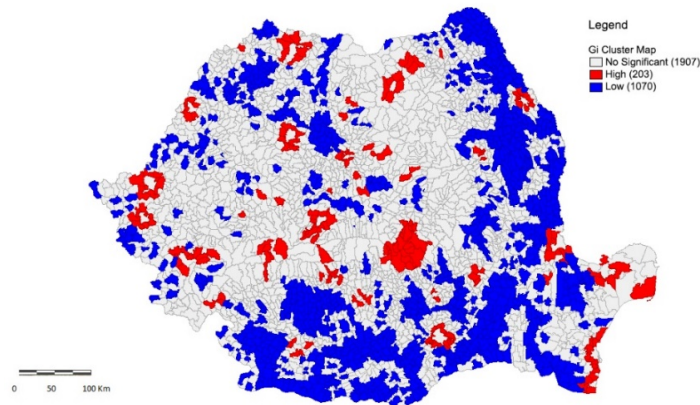
The same type of maps have been produced for the number of foodservice companies. The significance map (Figure 6) indicates 159 LAUs for $p < 0.05$ and 1114 LAUs for $p < 0.01$. Subsequently, Figure 7 shows ‘high-high’ similarity based spatial agglomerations with 203 LAUs and ‘low-low’ similarity based spatial associations with 1070 LAUs. According to this Gi cluster map, the largest agglomerations of foodservice companies are found in Brasov, Bucharest, Constanta, Tulcea, Braila, Galați, Arad, Timiș, Reșița, Caransebeș, Iași, Suceava, Câmpulung Moldovenesc, Cluj, Sibiu, Alba. Important tourist

attractions are located in all of these areas. For example, Constanta is the oldest continuously inhabited city in Romania (since 600 BC) and the largest city on the Romanian Black Sea coast, Tulcea is the gate to the Danube Delta, Suceava is Bucovina's historic capital, Brasov, Cluj, Sibiu are among the most attractive Transylvanian cities, etc.



Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 6: Moran significance map for 'number of foodservice companies' variable



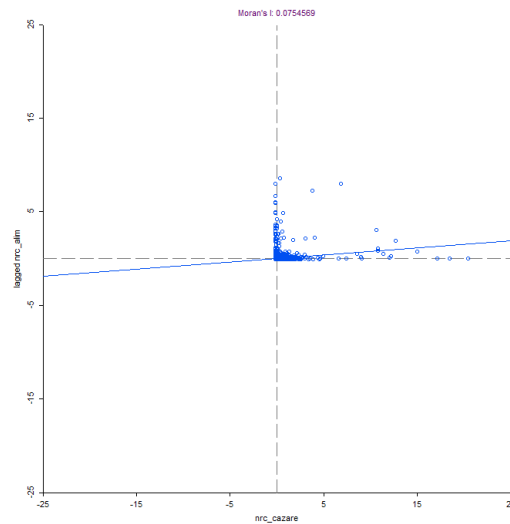
Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 7: Categories of significant spatial associations of LAUs in terms of number of foodservice companies

3.2.2 Bivariate spatial correlation

Moran's scatterplot for spatial correlation between the number of accommodation companies and the number of foodservice companies is presented in Figure 8.

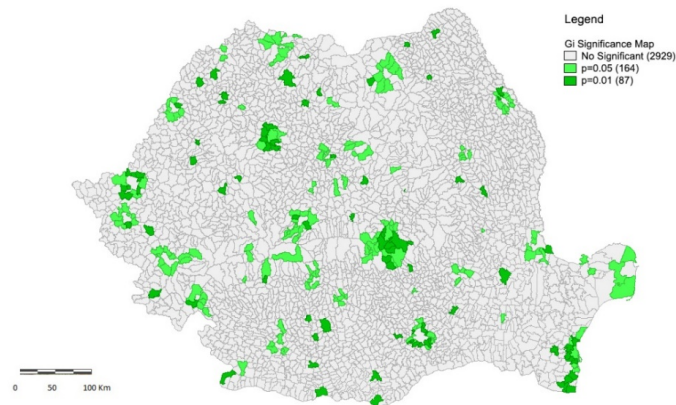
The value of Global Moran's I is 0.07. This value is positive, suggesting a positive spatial autocorrelation between the number of accommodation companies and the number of foodservice companies, but very low. Furthermore, the Geary's C has been also calculated. Its value is 0.7, confirming the positive spatial autocorrelation. Considering these results, one can conclude that the spatial autocorrelation exists in only some areas, mainly in the tourist areas. Nevertheless, the calculation and analysis of Local Moran's I (LISA) is recommended in order to identify the geographic areas with local spatial associations in tourism infrastructure.



Sources: Romanian National Authority for Tourism 2014 for thematic data

Figure 8: Moran's scatter plot for bivariate spatial correlation between the number of accommodation companies and the number of foodservice companies

The map of locations with significant bivariate spatial correlation between the number of accommodation companies and the number of foodservice companies (significant bivariate Local Moran index), for p -values below 0.05 and 0.01 is presented in Figure 9. In the first category, for $p < 0.05$, 164 LAUs are included and in the second category, for $p < 0.01$ there are 87 LAUs. Large areas with significant bivariate Local Moran indices are inside the following counties: Brasov, Bucharest, Constanta Timis, Arad, Cluj, Maramures, Sibiu, Iasi, Bihor, Tulcea and Suceava, many of them including the most important tourist attractions in Romania.



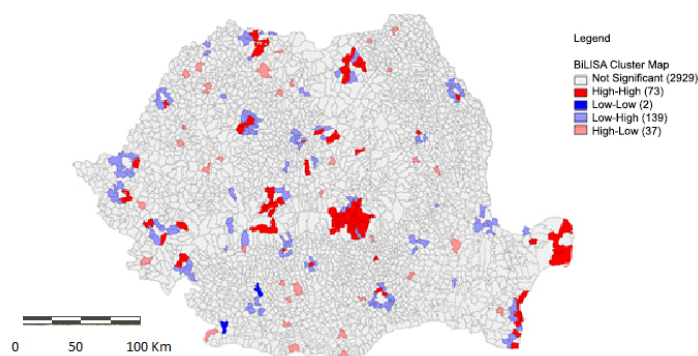
Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 9: Moran significance map for the cross-correlation between the number of accommodation companies and number of foodservice companies

The map with significant spatial associations of LAUs for the cross-correlation between the number of accommodation companies and the number of foodservice companies is presented in Figure 10. It reveals two classes (categories) of positive spatial correlations ('high-high' and 'low-low') and two classes of negative spatial correlation ('high-low' and 'low-high'). Usually the spatial associations corresponding to positive correlations are named 'spatial clusters'⁵ whereas those corresponding to negative correlations are

⁵This notion is employed in a different manner compared to that of 'industrial cluster' (or 'tourist

associated with the ‘spatial outlier’ notion (Anselin et al. 2002).



Sources: ArcGIS 2016 for the administrative boundaries, Romanian National Authority for Tourism 2014 for thematic data

Figure 10: Categories of significant spatial associations of LAUs for the cross-correlation between the number of accommodation companies and the number of foodservice companies

The four colour codes used for representing the four classes (categories) of significant associations of LAUs are as follows:

- dark red:** for representing LAUs with a large number of accommodation companies surrounded by neighbouring LAUs with a large number of foodservice companies;
- dark blue:** for representing LAUs with a small number of accommodation companies and surrounded by neighbouring LAUs with a small number of foodservice companies;
- pink:** for LAUs with a large number of accommodation companies (‘high outlier in’), but surrounded by neighbouring LAUs with a low number of foodservice companies (‘low neighbours in’);
- light blue:** for LAUs where there is a small number of accommodation companies (‘low outlier in’), but surrounded by LAUs with a large number of foodservice companies (‘high neighbours in’).

Considering the frequency and the significance of each class of spatial association, two categories are of a particular interest for policy purposes, namely:

1. *dark red* (‘high-high’) spatial clusters, indicating the traditional, well-developed tourist areas such as the Black Sea area, Danube Delta, Prahova Valley (mountain tourism), Maramures (traditional village/rural and mountain tourism), Bucovina (traditional village/rural and ecumenical tourism), Valcea and Harghita counties (balnear and mountain tourism), Sibiu area (mountain, traditional village/rural and cultural tourism) and Cluj-Napoca area (cultural tourism). They can be considered functional tourist areas – interpreted as differentiated geographical areas characterised by “a concentration of uses, activities and visitation related to tourism”, which incorporates “clear references to varied elements of natural space – area, concentration, soil usage, visitation and frontiers” (Panosso Netto, Trigo 2015, p. 66, with reference to Haylar et al. 2008). In these areas investment support is necessary in order to boost their competitiveness not only in a national but also an international context via increased quality and diversification of the provided services. At the same time the policy-makers’ attention should be directed to actions able to develop working tourist clusters, with strong organisation of the inter-firm relations as well as advanced networks between all significant local actors.

cluster’) as defined by M. Porter. However, the existence of spatial associations for high values of the two variables can be the first sign of existence of such clusters. Further investigation would be necessary in order to see their stage of development: incipient, pure agglomerations or mature clusters.

2. *light blue spatial associations ('low-high')*, where LAUs with relatively small number of accommodation units are surrounded by LAUs with a large number of foodservice units. This is the case in the metropolitan areas of the big cities (e.g. Bucharest, Constanta, Timisoara, Iasi, Cluj-Napoca, Galati, Oradea), where the interest in dining out in attractive natural areas is very high. In these areas the mixed restaurants prevail: they are visited by many locals and also draw important flows of tourists after the exploration of the tourist attractions specific to the urban environment (historic and art monuments, museums, exhibitions, etc.)⁶. In such cases efforts must be concentrated on providing good access infrastructure combined with rational land use in order to preserve the natural, green areas surrounding big cities.

In addition, considering the well-balanced distribution of natural and cultural-historic landscapes in Romania, adequate actions are recommended in order to create and promote new tourist destinations especially in regions that are lagging behind, where, so far, the map does not indicate significant spatial associations of LAUs in terms of number of accommodation and foodservice units. A particular case in this respect is represented by the pink spatial associations ('high-low'), indicating LAUs with a relatively high number of accommodation units surrounded by LAUs with a small number of foodservice units. These associations are placed in less developed areas with good potential for future development of tourism, but which are insufficiently exploited so far. The low level of income of the inhabitants in these areas was not able to stimulate the growth of the foodservice sector – restaurants primarily visited by locals.

In a broader perspective, the Appendix presents simple descriptive statistics that illustrate the imbalances at county level between the existing tourism infrastructure (accommodation and foodservice segments) and the number of incoming tourists. For example, the ratio between the number of incoming tourists and accommodation companies acting in each county varies between 213.2 and 5689.8, indicating that in some geographical areas the existing accommodation infrastructure is poorly correlated with demand. Such findings should be considered for laying the foundations of more rational decisions with regard to the future distribution of funding (EU support included) for the support of tourism infrastructure development.

4 Concluding Remarks and Further Developments

Our inquiry into the spatial distribution of the tourism infrastructure in Romania – the accommodation and foodservice components – has revealed the main patterns in this respect, highlighted significant spatial cross-correlations between them and discussed their implications for the future development of tourism, thus responding to the research questions formulated in the paper introduction.

The performed analysis can be considered helpful from a theoretical point of view, based on its capability to improve methodologies for examining the relationships between companies participating in tourism activities and the landscape elements, for conceptualizing and identifying functional tourism areas. Furthermore, the performed investigation is helpful for practitioners too, as it provides useful information for selecting sites for new businesses in the tourism industry, as well as for policy-makers highlighting those tourist areas where additional support for their development could be beneficial.

The analysis has confirmed the working hypotheses with regard to the uneven territorial distribution of tourism infrastructure compared to the location of tourist attractions, the large number of spatial associations in the 'low-high' and 'high-low' classes suggesting significant differences between the geographical distribution of the accommodation and foodservice companies and the need for differentiated policies supporting tourism infrastructure, according to the specific necessities of the tourist areas.

⁶A study devoted to restaurant market in tourist areas indicates that “the growth of the market of mixed restaurants is higher than of restaurants mainly visited by locals and more stable than of restaurants mainly visited by locals” (Terhorst, Erkus-Öztürk 2016, p. 294). In addition, the authors demonstrate that the quality of these restaurants is higher and they are more innovative.

However, this exploratory research should be seen as just a first step of a larger inquiry, able to offer a broader view on the spatial associations with relevant tourist activity. To this end, further investigation would envisage a wider range of indicators characterizing tourism development (e.g. number of beds in tourist accommodation units, number of accommodation units by quality class, number of arrivals, number of overnight stays, etc.), as well as indicators regarding the social-economic development level, the access to transportation infrastructure and so on. Also, the robustness of findings needs to be considered, so as to check whether the results are stable over time.

Another future direction of investigation points at the internal features of the ‘spatial clusters’ in the meaning derived from the interpretation of the univariate and bivariate Local Moran index: in other words, to what extent these significant spatial associations (and agglomerations of firms) exhibit the characteristics of tourist clusters, as clusters ‘à la Porter’, i.e. geographic concentrations of tourist resources and attractions, related infrastructure, equipment and service firms and other supporting sectors and administrative institutions with integrated and coordinated activities (Kirschner 2015). And, even if this paper cannot provide the empirical evidence necessary for establishing the stage of development, the simple existence of tourist clusters in the ‘dark red’ areas may also suggest the other side of the coin, namely competition relationships, which can be a source of increasing the quality of tourist services. Such relationships would also be interesting to explore.

In methodological terms, as mentioned by van Herwijnen et al. (2004), the success in applying GIS techniques for local or regional planning is closely related to the responses to requirements such as the meeting of scientific credibility standards (.i.e. very good links between GIS and spatial statistics, etc.) and the provision of customized products for scientific analysis. In such a context the local indicators of spatial association – local Moran index included – are seen as useful instruments for identifying local spatial clusters and for assessing the influence of a single location on the corresponding global statistics (Symanzik 2014). They can also be employed for highlighting influential points in a regression framework, representing a further direction of investigation for our research.

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Appendix: Descriptive statistics of tourism infrastructure available in Romania at county level in 2015

	No. of Food Services Companies	No. of Accommo- dation Companies	RANK Accommo- dation Companies	No. of Incoming Tourists	RANK Incoming Tourists	Ratio No. of incoming tourists/ accommo- dation companies
ALBA	86	233	18	154210	19	661.8
ARAD	413	166	21	214826	13	1294.1
ARGES	143	286	15	195200	14	682.5
BACAU	112	173	20	124517	22	719.8
BIHOR	155	330	9	344059	8	1042.6
BISTRITA NASAUD	56	76	29	80293	28	1056.5
BOTOSANI	17	28	39	37670	38	1345.4
BRAILA	41	44	35	71417	31	1623.1
BRASOV	586	1139	2	997601	3	875.9
BUCURESTI	308	303	13	1723999	1	5689.8
BUZAU	82	112	25	68295	33	609.8
CALARASI	13	22	41	17809	41	809.5
CARAS SEVERIN	223	246	17	171626	16	697.7
CLUJ	695	355	7	428812	7	1207.9
CONSTANTA	1555	1263	1	1021475	2	808.8
COVASNA	59	147	23	88800	26	604.1
DAMBOVITA	66	87	26	89548	25	1029.3
DOLJ	63	75	31	102486	23	1366.5
GALATI	75	48	34	74416	30	1550.3
GIURGIU	9	33	37	24860	40	753.3
GORJ	58	152	22	78418	29	515.9
HARGHITA	147	462	5	157659	17	341.3
HUNEDOARA	151	300	14	151060	20	503.5
IALOMITA	36	27	40	44863	34	1661.6
IASI	106	115	24	246470	12	2143.2
ILFOV	48	75	32	126858	21	1691.4
MARAMURES	137	341	8	154633	18	453.5
MEHEDINTI	46	79	28	81003	27	1025.4
MURES	216	327	10	495481	4	1515.2
NEAMT	130	277	16	182384	15	658.4
OLT	28	35	36	33343	39	952.7
PRAHOVA	266	572	3	467158	5	816.7
SALAJ	28	52	33	37962	36	730
SATU MARE	40	82	27	94908	24	1157.4
SIBIU	147	447	6	438611	6	981.2
SUCEAVA	262	506	4	310548	10	613.7
TELEORMAN	5	18	42	13214	42	734.1
TIMIS	199	229	19	338238	9	1477
TULCEA	110	324	11	69076	32	213.2
VALCEA	181	316	12	286892	11	907.9
VASLUI	19	29	38	37886	37	1306.4
VRANCEA	40	76	30	43290	35	569.6
Total	7157	10007		9921874		
Descriptive statistics						
Mean	170.4	238.3		236235.1		536.8
Median	96.0	159.0		125687.5		515.9
standard deviation	262.8	264.1		325282.6		206.8

Source: National Institute of Statistics, TEMPO-online database

An Index to Characterize the Multi-Dimensional Nature of Land Use Regulations in the Greater Houston Metropolitan Area

Luis Estevez¹

¹ St. Cloud State University, St. Cloud, MN, USA

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Abstract. Although housing prices and the lack of real income growth are cited as the main factors behind the housing affordability problem, it has been proven that land use regulations have some responsibility as well. Indexes have been the most common indicator used to characterize the stringency of local land use regulations; however, these studies focus primarily on those most stringent regulatory environments, and therefore there is no evidence of the validity of such indexes in areas regarded as less stringent. In response to this lack of evidence, using a unique data set, this article presents an index characterizing local regulatory environments in a well-known less stringent regulatory environment: the Houston-Galveston Area in Texas. This index proves to be a robust measure capable of capturing the multi-dimensional nature of land use regulations. The analysis and validation of the index confirms the importance of the use of these composite measures to characterize land use regulatory environments of metropolitan areas.

Key words: Land use regulations, affordable housing, index

1 Introduction

Studies suggest that stringent land use regulatory environments (LUREs, hereafter) exacerbate the problem of affordable housing. Although this effect is clearer in Metropolitan Statistical Areas (MSA) with stringent regulatory environments, it is also present in other MSAs with less stringent regulations. For instance, Texas is among the states whose metropolitan areas have been considered as less stringent in terms of its LUREs (Pendall et al. 2006, Gyourko et al. 2008). Additionally, even if the impact on affordable housing is not clear, other related problems such as segregation could be strongly related to the type of land and development regulations in place (Quigley, Rosenthal 2005).

Analysis regarding the effect of land use regulations on housing markets is abundant. However, most of these studies are limited to the study of the effect of one specific regulation (e.g., growth boundaries, impact fees), failing to consider the multi-dimensional nature of land use regulations and the accompanying consequences (Cutsinger et al. 2005). Only a few studies look at the multi-dimensional nature of LUREs and their effect on residential markets (Knaap 1998, Quigley, Rosenthal 2005).

The attempt to study the overall effect of LUREs is complex. To do this, most studies have relied on the creation of an index that could capture the different dimensions involved. Any effort to create such an index requires that all regulations present in local

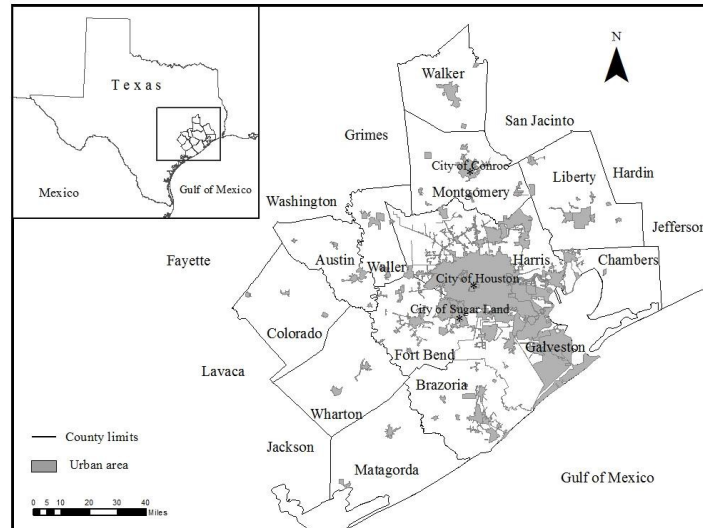


Figure 1: Houston-Galveston Area and its 13 Counties

jurisdictions be considered. Thus, the first challenge that these studies should overcome is to obtain an inventory of land use regulations in each jurisdiction being analyzed.

Surveys to obtain data on local land use regulations have been conducted by authors and institutions such as Black, Hoben (1985); the Wharton Project (Linneman et al. 1990); Pendall et al. (2006); Gyourko et al. (2008); Glickfeld, Levine (1992); Lewis, Neiman (2000); The Pioneer and Rappaport Institute (Dain 2006), and Ihlanfeldt (2007). Most of the indexes created with this data have been conducted in LUREs known to be stringent (e.g. California, Florida, Massachusetts), which raises questions about whether generalizations based on such results can be accurate (Green 2009, Malpezzi 2009).

Based on previous studies and the limitations which have been observed, the main question driving this paper is whether an index of land use regulatory stringency could be a valid measure to characterize regulatory environments for housing markets in other geographies with less stringent regulatory environments. To answer this question, an index is created to reflect the different LUREs in the Houston-Galveston Area in Texas (H-GA, hereafter). Houston's lack of zoning ordinance makes this region a unique case study to contribute to the literature by creating an index characterizing LUREs for housing markets. However, the lack of zoning in Houston does not mean that there are no other types of land use regulations in place. Deed restrictions (covenants) are the most common type of land use regulations in the city. The H-GA is defined by the 13 counties which are part of the Houston-Galveston Area Council (see Figure 1).

The plan of the article is as follows: The data and methodology section describe the survey instrument and the methodological process of creating the LURE index. The following section describes in detail the process of the creation of the LURE index and its sub-indexes and the rankings of jurisdiction. The final section presents the analysis and validation of the index through statistical correlations with local traits and comparison with a second alternative. There is a summary and statement of general conclusions.

2 Literature review

Composite indicator, index, performance indicator, and rating scale are some of the different terms frequently used to describe a measure that expresses the final rating based on a measure created by either using a single or multiple items or attributes. For the purposes of this research, and because similar approaches and methodologies are used in comparable exercises and fields, the terms Composite Indicator (CI) and Index (I) are alternatively used to describe the measurement used to characterize multi-dimensional phenomena. Indexes are commonly found in the economic, social, health, and policy fields

(Freudenberg 2003). The uniqueness of having a measure to characterize multi-dimensional phenomena makes them a useful tool. Some of the ways in which these fields make use of indexes is to create a ranking using this measure and then to measure performance or to rank countries or institutions. For instance, up until 2008, there were 178 CIs ranking country performances based on economic, political, social, or environmental measures (Bandura 2008).

Indexes are popular because of their capacity to characterize complex phenomena. The multi-dimensional aspects of some constructs make them difficult to grasp at first glance, so indexes are useful in providing a single measure to capture the totality of such phenomena (Nunnally 1978).

A fundamental part of the construction of a statistically sound and consistent index is the appropriate definitions of dimensions that the index is intended to measure. Literature review and the opinion of experts and stakeholders are essential to select the appropriate framework with variables that could fulfill the required dimensions.

The literature review provided: 1) a general array and classification of different variables related to land use regulations; 2) a detailed review of the studies creating inventories of land use regulations and studies creating LURE indexes; and 3) a list of candidate variables that was used in the creation of the LURE index.

The creation of LURE indexes has relied on inventories of land use regulations from which candidate variables have been selected. Most of the indexes were either created based on already existing databases of land use regulations (Glaeser, Ward 2009, Malpezzi 1996, Quigley, Raphael 2005, Somerville 1999) or by creating an inventory of land use regulations first and then crafting an index (Black, Hoben 1985, Gyourko et al. 2008, Ihlanfeldt 2007, Pendall et al. 2006, Segal, Srinivasan 1985).

Studies creating an inventory of land use regulations have relied on the implementation of a survey directed (in most of the cases) towards the jurisdiction's planning staff (Black, Hoben 1985, Dain 2006, Glickfeld, Levine 1992, Gyourko et al. 2008, Ihlanfeldt 2007, Lewis, Neiman 2000, Linneman et al. 1990, Pendall et al. 2006).

Of all the inventories which were reviewed, the ones of the Wharton Urban Decentralization Project (Linneman et al. 1990) and Glickfeld, Levine (1992) probably have been the most frequently used by other studies in the creation of indexes. Other inventories used were those from institutions such as the American Institute of Planners (AIP 1976), the National Multi Housing Council (NMHC 1982), the Urban Land Institute 1980-81 (Black, Hoben 1985), the US Department of Housing and Urban Development (HUD 1991), Lewis, Neiman (2000) and the Pioneer Institute for Public Policy Research and Harvard's Rappaport Institute for Greater Boston (Glaeser, Ward 2009).

The geographical coverage of each of these studies was different. Some were defined on a national level and the surveys were sent to either all municipalities in the U.S. (Gyourko et al. 2008, Linneman et al. 1990) or were limited to local governments in specific MSAs (Black, Hoben 1985, Pendall et al. 2006, Segal, Srinivasan 1985). Others surveyed jurisdictions at the state level (Glickfeld, Levine 1992, Ihlanfeldt 2007, Lewis, Neiman 2000).

The goals for creating an index were different in every study. Some were investigating the effect of regulations on: a) land prices, housing, and rent costs (Black, Hoben 1985, Ihlanfeldt 2007, Malpezzi 1996, Segal, Srinivasan 1985); b) concentration of homebuilders (Somerville 1999); and c) supply and price (or rent) of housing (Quigley, Raphael 2005). In other cases, the goal was to create an index in order to characterize regulatory environments based on their stringency (Gyourko et al. 2008, Pendall et al. 2006).

Some studies were particularly interested in creating an index which took into account a certain amount of specific regulations, such as growth control measures, minimum lot sizes, etc. (e.g. Malpezzi 1996, Glaeser, Ward 2009), while others were interested in creating an index that would reflect the overall multi-dimensional nature of land use regulations (Pendall et al. 2006, Gyourko et al. 2008).

In terms of the specific methodology in the creation of indexes, studies have relied on the simple addition method (linear arithmetic addition) for aggregation and either equal or factor analysis approaches for weighting. In relation to the last two options, some studies claimed not to find significant differences in their results when using either one of

these methods (e.g. [Gyourko et al. 2008](#)).

Among all these studies, the one done by [Gyourko et al. \(2008\)](#) deserves special mention. This study offered detailed information regarding the methodological process used in creating their index. Details such as normalization, aggregation, weighting and imputation procedures were clearly explained.

The creation of the LURE index had to take these methodological aspects into account to allow for the possibility of comparison with these other reviewed exercises. This information was also helpful in establishing a sound framework as the first step in creating the LURE index.

3 Data and methodology

Data on regulations for the H-GA comes from an instrument created to identify land use regulations related to housing markets. It was created with the intention of being simple enough to generate relevant information and be easily implemented on a regular basis. The design process was based on a multi-methodological approach: a) using surveys from studies which have developed these types of inventories; and b) interviews with different experts and stakeholders in Texas (city planning officials, housing developers, and law experts).

The survey was sent to the planning directors of the areas where such an office existed. In the areas where there was no planning director, the survey was sent to either a local elected official (e.g., mayor, planning board chair, city clerk) or a municipal officer (e.g., city manager, city engineer). All 133 jurisdictions of the H-GA received the LURE survey. No random sample was selected.

Once missing and extreme values were analyzed, verified, and corrected, the information was used in the creation of the LURE index. Specific methodological and implementation details of the survey can be found in [Estevez Jimenez \(2012\)](#).

3.1 Methodology

The methodology for the creation of the LURE index was designed in order to ensure a top-quality indicator in terms of its statistical soundness and consistency. The methodology allowed that the index would include assessments following the requirements for measures in psychometric theory: validity, reliability and sensitivity to change ([Nunnally 1978](#), [Nunnally, Bernstein 1994](#)). The methodological steps were: 1) definition of the framework; 2) imputation process; 3) creation of sub-indexes by simple addition of values; 4) assessment of the statistical dimensionality of the framework by Principal Component Analysis (PCA); 5) normalization of sub-indexes through standardized scores; 6) definition of weights for the aggregation through FA/PCA analysis; and 7) aggregation by simple addition. Following is a brief description of these steps.

The LURE index is defined by 10 sub-indexes and 29 indicators, which were considered sufficient to capture the different dimensions characterizing the H-GA's LURE. Because the [Gyourko et al. \(2008\)](#) index is a well-created composite indicator as far as methodology, the conceptual framework and specific procedures selected for the creation of the LURE index follow the same approach. Nine of the ten sub-indexes are similar to those created by [Gyourko et al. \(2008\)](#). Table 1 shows the 10 sub-indexes, the indicators and their coding, and score units. The sub-index Local Government is the only new addition in the creation of the LURE index. Experts and stakeholders interviewed recommended the inclusion of this particular indicator due to its relevance for Texas jurisdictions.

The Multiple Imputation Procedure (MI) was the technique utilized based on the pattern of missing values and the presence of some extreme values in the dataset. From the 27 variables, just two were not considered in the estimation of missing values because they were not found to have any missing information. The iterative Markov Chain Monte Carlo (MCMC) method was the best suited for the MI procedure. Scale variables were modeled through linear regression and categorical variables with a logistic regression. The accuracy of the MI modeling was checked by: a) verifying the presence of negative and out-of-bound values, and b) by assessing the model convergence.

Table 1: Framework for the LURE index

<i>Sub-Indexes</i> Indicator (Variable)	code	score	
		permitted values	unit
<i>Local Government (LGI)</i>			
Category of Municipality	LGIgeneral	0 or 1	GL/HR ^a
<i>Local Planning Approval (LPAI)</i>			
Zoning commission	LPAIzc	0 or 1 ^b	Board
Planning commission	LPAIpc	0 or 1 ^b	Board
Historic commission	LPAIhc	0 or 1 ^b	Board
Board of adjustments	LPAIba	0 or 1 ^b	Board
Neighborhood zoning areas	LPAInza	0 or 1 ^b	Board
<i>Local Planning Requirement (LPAIR)</i>			
Comprehensive (master, general) plan	LPAIcp	0/1/2 ^c	Document
Zoning ordinance	LPAIzo	0/1/2 ^c	Document
Other ordinances governing plats, land development and subdivisions	LPAIoo	0/1/2 ^c	Document
Jurisdiction is a unit in which the county applies its own subdivision provisions to new development	LPAIosp	0 or 1 ^b	Yes or No
<i>Local Affordable Housing (LAHI)</i>			
Multifamily housing units have been built in the last two years	LAHI _{mh}	0 or 1 ^b	Yes or No
Manufactured and modular housing have been added to jurisdiction in the last two years	LAHI _{mm}	0 or 1 ^b	Yes or No
Developers have to include “affordable housing” (however defined)	LAHI _{ah}	0 or 1 ^b	Yes or No
<i>Density Restriction (DRI)</i>			
Minimum lot size for single family units within the city limits	DRIm _{lsfu}	0 <	Sq. ft.
Minimum lot size for single family units within the city’s extraterritorial jurisdiction (ETJ)	DRIm _{lsfuetj}	0 <	Sq. ft.
Minimum floor area for single family units within the city limits	DRIm _{fasfu}	0 <	Sq. ft.
<i>Local Subdivision Requirements (LSR)</i>			
Developers have to pay building permit fee	LSRI _{bpf}	0 or 1 ^b	Yes or No
Developers have to pay development review fees	LSRI _{drf}	0 or 1 ^b	Yes or No
<i>Open Space (OSI)</i>			
Developers have to supply mandatory dedication of space or open space (or fee in lieu of dedication)	OSI	0 or 1 ^b	Yes or No
<i>Exactions (EI)</i>			
Developers have to pay allocable share of costs of infrastructure improvement	EI	0 or 1 ^b	Yes or No
<i>Supply Restriction (SRI)</i>			
Measure limiting development beyond a boundary (such as urban limit line, urban growth boundary, greenbelt, or urban service area)	SRI _c	0 or 1 ^b	Yes or No
Measure establishing a limit on growth (population limit or building permits in a given time frame)	SRI _{gc}	0 or 1 ^b	Yes or No
Measure which requires adequate service levels for residential development or service capacity as a condition of approval of residential development	SRI _{lr}	0 or 1 ^b	Yes or No
Measure which reduces the permitted residential density by general planning or rezoning	SRI _{pd}	0 or 1 ^b	Yes or No
Measure which re-designates or rezones residential land to agriculture or open space (e.g., shore line protection)	SRI _r	0 or 1 ^b	Yes or No
<i>Local Standard Development Perception (LSDPI)</i>			
Perception of jurisdiction’s standards for development when compared to surrounding jurisdictions	LSDPI _{sj}	0/1/2 ^d	See note c
Perception of jurisdiction’s standards for development when compared to county	LSDPI _c	0/1/2 ^d	See note d

^a GL/HR = General Law/Home Rule. ^b Y/N= Yes/No (Y=1, N=0). ^c Y/N/P= Yes/No/In Progress (Y=2, P= 1, N=0). ^d 0/1/2/= Lower standards/Comparable standards/Higher standards.

Notes: The three variables defining the Density Restriction (DRI) sub-index were transformed by obtaining the natural logarithm of their values in order to achieve convergence of the model during the multiple imputation procedure.

Table 2: An example of the index calculation

Subindexes	LGI	LPAI	LPAIR	LAHI	DRI	LSRI	OSI	EI	SRI	LSDPI	Index
FA weights	.09	.04	.05	.16	.24	.07	.12	.04	.11	.08	
Z-score	-.86	.80	.99	-.18	3.35	.69	.86	.70	-.35	1.26	
	-.08	.03	.05	-.03	.80	.05	.10	.03	-.04	.10	1.02

Multivariate Analysis (MA) allowed for the verification of adequate correspondence between the theoretical structure (depicted by the different dimensions/sub-indexes and indicators in the framework) established before the creation of the H-GA's land use regulations inventory and the statistical structure seen in the collected data. Factor Analysis (FA) was carried out to confirm the number of dimensions/sub-indexes (components).

FA was performed involving: 1) computation of correlation matrix (small partial correlation coefficients are a desired effect to perform FA); 2) extraction of factors (components); and 3) rotation of factors. All correlation coefficients among the sub-indexes were small, which is a good indicator that the different sub-indexes are not highly correlated. Therefore, it is clear that the ten dimensions/sub-indexes established in advance accurately capture the different aspects of the H-GA LURE and its effect on housing markets. The fact that five dimensions account for almost 65% of the variance shows that the effect of LUREs on housing markets is indeed a multi-dimensional phenomenon. (In this instance, it is not considered necessary for a few factors to explain as much variance as possible.)

In order to compare the LURE index with other similar composite indicators, a normalization of the ten sub-indexes was performed. The standard deviation from the mean procedure (Z-score) was the approach selected to create the LURE index.

The Z-score procedure was defined as:

$$z = \frac{x - \bar{x}}{s}$$

Where z is the standard score, x the actual value, \bar{x} the mean value of the actual values, and s the corresponding standard deviation.

FA was the technique selected for the weighting of the ten sub-indexes of the LURE index because it is the most common method used in other similar LURE indexes. The linear aggregation method (weighted mean or arithmetic average) was used to create the LURE index. Linear aggregation's properties made it suitable for the characteristics of the dataset of the LURE index.

The linear aggregation used to create the LURE index is defined:

$$\text{Index} = \sum_{k=1}^n w_k x_k \quad \text{where} \quad 0 \leq w_k \leq 1 \quad \text{and} \quad \sum_k w_k = 1$$

Table 2 shows an example of the calculation of the index for the City of Roman Forest:

4 The LURE index and its ten sub-indexes

The creation of the sub-indexes was a straightforward process because most of the score units for the indicators were the same. There was no need for the normalization of values. The advantage of this approach is that the richness of the values is preserved (Nardo et al. 2004).

4.1 Sub-index descriptions

Local Government Sub-Index (LGI). Only the variable "category of municipality" defined this sub-index. If a municipality is a home rule jurisdiction, then a value of 1 is received. If general law is the answer, then a value of zero is recorded. It is assumed that the ability of home rule jurisdictions to implement their own regulations allows

them to have a more direct effect on housing markets, as opposed to general law jurisdictions.

Home Rule = 1 General = 0

Local Planning Approval (LPAI). Five items are used to create this sub-index. Jurisdictions are asked if they have a: 1) zoning commission (LPAIzc); 2) planning commission (LPAIpc); 3) historic commission (LPAIhc); 4) board of adjustments (LPAIba); and 5) neighborhood zoning areas (LPAInza).

Whenever the response is a “yes” regarding any of those entities, a score of “1” is received. The assumption is that the more entities involved in the regulatory process, the greater the impact on housing markets. The LPAI sub-index could be summarized as:

$$\text{LPAI} = \text{LPAIzc} + \text{LPAIpc} + \text{LPAIhc} + \text{LPAIba} + \text{LPAInza}$$

Local Planning Approval Requirement (LPAIR). The LPAIR sub-index is formulated based on answers to questions about the existence in jurisdictions of: 1) comprehensive (master, general) plan (LPAIcp); 2) zoning ordinance (LPAIzo); and 3) other ordinances governing plats, land development and subdivisions (LPAIoo); and if the jurisdiction is a unit in which the county applied its own subdivision provisions to new developments (LPAIosp).

$$\text{LPAIR} = \text{LPAIcp} + \text{LPAIzo} + \text{LPAIoo} + \text{LPAIosp}$$

Local Affordable Housing (LAHI). This sub-index is based on answers to questions about whether: multifamily housing units have been built in the last two years (LAHImh); manufactured and modular housing have been added to the jurisdiction in the last two years (LAHImm); and if developers are required to include “affordable housing” (LAHIah).

$$\text{LAHI} = \text{LAHImh} + \text{LAHImm} + \text{LAHIah}$$

This is the only case where responses of “no” added a value of 1 to the sub-index. The assumption is that communities not adding either multifamily or manufactured housing to their development are likely restricting the production of affordable housing.

Density Restriction (DRI). Three questions are used for this sub-index: minimum lot size for single family units within the city limits (nLDRImlsfu); minimum lot sizes for single family units within the city’s extraterritorial jurisdiction (nLDRImlsfuetj); and minimum floor area for single family units within the city limits (nLDRImfafsu).

$$\text{DRI} = \text{nLDRImlsfu} + \text{nLDRImlsfuetj} + \text{nLDRImfafsu}$$

Local Subdivision Requirements (LSRI). The LSRI sub-index is created from questions about if developers must pay building permit fees (LSRIbpf) and if developers must pay development review fees (LSRIDrf).

$$\text{LSRI} = \text{LSRIbpf} + \text{LSRIDrf}$$

Open Space (OSI). This sub-index simply uses one item: whether developers have to provide mandatory dedication of space or open space. OSI could be stated as having a value of 1 if there is a “yes” answer and 0 otherwise.

Exactions (EI). The EI sub-index is formulated based on whether developers have to pay an allocable share of costs of infrastructure improvement. The index received a 1 if “yes” is the answer and 0 if “no” is the answer.

Supply Restriction (SRI). This sub-index is generated by the answers to whether the jurisdiction has any: measure limiting development beyond a boundary (SRIc); measure establishing a limit on growth (SRIgc); measure which requires adequate service levels for residential development or service capacity as a condition of approval of residential development (SRIir); measure which reduces the permitted residential density by general planning or rezoning (SRIpd); or measure which

re-designates or rezones residential land to agriculture or open space (SRIr). For any “yes” response in any of these measures a value of 1 is given.

$$\text{SRI} = \text{SRIc} + \text{SRIgc} + \text{SRIir} + \text{SRIpd} + \text{SRIr}.$$

Local Standard Development Perception (LSDPI). Two items are used to create the LSDPI sub-index: 1) perception of a jurisdiction’s standards for development when compared to surrounding jurisdictions (LSDPIsj); and 2) perception of a jurisdiction’s standards for development when compared to the county (LSDPIC).

$$\text{LSDPI} = \text{LSDPIsj} + \text{LSDPIC}$$

This is the only sub-index in which the values ranged from 0 to 2 because the possible answers for these questions are 0 for lower standards, 1 for comparable standards, and 2 for higher standards.

4.2 LURE index ranking results

Table 3 shows the LURE index values and rankings obtained for each one of the 91 jurisdictions. The interpretation of the index is straightforward. High values (positive) mean that those jurisdictions have a highly regulated housing market and low values mean that the markets are less regulated.

5 Analysis and validation of the LURE index and its sub-indexes

The analysis and validation of the LURE index and its sub-indexes follows a two-sided approach: a) a comparison of the means of the LURE index’s ten sub-indexes across clusters; b) a comparison of the individual variables’ scores (responses); and c) validation by correlating the index with local trait indicators and comparing with an alternative scenario (index). With this strategy it is possible to evaluate in detail the role of each specific variable in the creation of the ten sub-indexes, and the relative importance of the sub-indexes in the definition of the LURE index.

Cluster analysis (CA) is performed before the analysis so that the LURE index could be easily compared with previous studies. Creating clusters makes the interpretation of the results more appropriate for all of the 91 jurisdictions and gives insight into the structure of the dataset. The non-hierarchical method of k-means was selected to create the clusters. Names are assigned to the four obtained clusters based on the degree of regulatory stringency: 1) the most regulated; 2) highly regulated; 3) lightly regulated; and 4) the least regulated.

5.1 Comparing means among clusters

Table 4 summarizes the means of the values of the ten sub-indexes across clusters. It is clear that the differences in the means among clusters are important. This is precisely the purpose of CA: to choose clusters so that the differences between them could be maximized. However, when looking in more detail at the differences between sub-indexes, it can be seen that for every cluster, the differences are not the same across all ten sub-indexes. Based on how the clusters are obtained, the proportion of jurisdictions in each cluster for each sub-index ideally must follow a descending order (the most regulated cluster with the greatest proportion and the least regulated with the least, or lesser, proportion). This is not always the case and for this reason, occasionally the differences in mean values do not follow the same pattern.

When comparing clusters 1 and 2, the larger difference can be seen in the OSI sub-index (0.64 standard deviations). It can be noted that the value of the mean of the EI sub-index for cluster 2 is greater than for cluster 1. The reason is that in cluster 1, only 77% of the jurisdictions (17) require the developer to pay an allocable share of the costs of infrastructure improvement, while in cluster 2, 80% (24) of the jurisdictions have this requirement.

The sub-index with the highest difference when comparing clusters 2 and 3 is DRI (0.73 standard deviations). The mean value for the LSRI index is the same in both clusters.

Table 3: LURE index rankings

Ranking	Jurisdictions	LURE Index	Ranking	Jurisdictions	LURE Index
1	Roman Forest	1.02	47	Cleveland	.02
2	Sugar Land	.74	48	Shoreacres	.02
3	Katy	.67	49	East Bernard	.02
4	Fulshear	.63	50	Wharton	.01
5	Palacios	.59	51	Huntsville	.01
6	Brookside Village	.57	52	Eagle Lake	-.05
7	Spring Valley	.54	53	Pasadena	-.06
8	Tomball	.54	54	Jersey Village	-.06
9	Willis	.50	55	Stafford	-.06
10	El Lago	.48	56	Magnolia	-.06
11	Seabrook	.48	57	Bunker Hill Village	-.10
12	Taylor Lake Village	.44	58	New Waverly	-.11
13	Sealy	.41	59	Old River-Winfree	-.11
14	Piney Point Village	.40	60	Oak Ridge North	-.14
15	Lake Jackson	.38	61	La Porte	-.15
16	Orchard	.38	62	Webster	-.15
17	El Campo	.38	63	Nassau Bay	-.16
18	Shenandoah	.36	64	Dickinson	-.17
19	Texas City	.35	65	Clear Lake Shores	-.17
20	Iowa Colony	.35	66	Conroe	-.23
21	Simonton	.34	67	Brookshire	-.23
22	Friendswood	.33	68	Santa Fe	-.24
23	Hedwig Village	.31	69	Richmond	-.25
24	West University Place	.27	70	Beach City	-.26
25	Hillshire	.26	71	West Columbia	-.28
26	Missouri City	.26	72	La Marque	-.30
27	Dayton	.25	73	Bayou Vista	-.30
28	Clute	.23	74	Baytown	-.35
29	Sweeny	.23	75	League City	-.37
30	Quintana	.20	76	Houston	-.38
31	Surfside Beach	.18	77	Angleton	-.39
32	Cut and shoot	.17	78	Needville	-.42
33	Deer Park	.15	79	Jones Creek	-.45
34	Meadows Place	.15	80	Arcola	-.45
35	Alvin	.13	81	Southside Place	-.47
36	Tiki Island	.13	82	Danbury	-.48
37	Manvel	.11	83	Holiday Lakes	-.56
38	Freeport	.11	84	Anahuac	-.69
39	Pleak	.10	85	Riverside	-.69
40	Bay City	.10	86	South Houston	-.70
41	Pearland	.09	87	Daisetta	-.73
42	Montgomery	.07	88	Pine Island	-.80
43	Humble	.07	89	Bonney	-.83
44	Mont Belvieu	.07	90	Splendora	-1.01
45	Richwood	.07	91	Thompsons	-1.31
46	Bellair	.06			

Table 4: Means of sub-indexes' scores and local trait indicators by cluster

	Clusters						
	1 The most regulated	Diffe- rence	2 Highly regulated	Diffe- rence	3 Lightly regulated	Diffe- rence	4 The least regulated
<i>Sub-indexes</i>							
LGI	.23	.16	.07	.07	.00	.86	-.86
LPAI	.32	.16	.16	.22	-.06	1.06	-1.12
LAPIR	.35	.16	.19	.30	-.11	1.01	-1.12
LAHI	.40	.50	-.10	.07	-.17	-.13	-.04
DRI	.63	.42	.21	.73	-.52	-.02	-.50
LSRI	.47	.41	.06	.00	.06	1.63	-1.57
OSI	.76	.64	.12	.59	-.47	.23	-.70
EI	.21	-.06	.27	.34	-.07	1.11	-1.18
SRI	.42	.36	.06	.12	-.06	.97	-1.03
LSDPI	.56	.18	.38	.62	-.24	1.61	-1.85
<i>Local traits</i>							
Median house value	201,540	22,277	179,263	3,927	175,336	96,803	78,533
Median family income	92,301	13,195	79,106	3,892	75,214	24,681	50,533
Percentage of families below poverty line	7	-3	10	0	10	-5	15
Percentage White	64	5	59	0	59	3	56
Percentage Black	7	-4	11	0	11	0	11

Note: All community trait data are from the U.S. Census Bureau, 2010 and 2006-2010 American Community Survey. White and Black populations are non-Hispanic.

The reason for this is that the proportion of jurisdictions with requirements for developers to pay building permit fees and development review fees is the same in both clusters. The greatest difference between the mean values among clusters happens between clusters 3 and 4. The sub-index LSRI has the largest difference, with 1.63 standard deviations. The proportion of jurisdictions in cluster 3 (97 and 63 percent for the two requirements) is more than double those in cluster 4 (45 and 11 percent).

In sub-indexes LHAI and DRI, the mean values for cluster 4 are greater when compared to cluster 3. Although cluster 4 is the least regulated, it does not have a higher proportion of jurisdictions either having multifamily housing built the last two years or requiring developers to include affordable housing. It only has the highest proportion of jurisdictions with manufactured housing built in the last two years, but this is not sufficient to make the mean value for the LHAI sub-index lower than cluster 3. In regards to the DRI sub-index, the mean of cluster 4 is greater than cluster 3 only because the average of the minimum lot size requirement in cluster 4 (natural logarithm of 7.98) is greater than the minimum required in cluster 3 (7.87).

5.2 Individual scores (variables) and the ten sub-indexes

The analysis is performed by comparing responses (scores) to individual variables. Because most of the scores of the indicators are based on a “yes” or “no” response to having a specific regulation, process, or measure, the analysis relied on the proportion of these responses.

The Local Government Sub-Index (LGI). The LGI sub-index is created based on whether the jurisdictions are either a general law or home rule category of municipality. The variance among the LURE index clusters is similar between clusters 1, 2 and 3. There is no home rule municipality in cluster 4. Due to the important difference between the proportion of jurisdictions being either home rule (39) or general law (52), this variable could still be significant for characterizing the LURE related to housing markets.

The Local Planning Approval Sub-Index (LPAI). Of the four clusters, number 4 is the only one having just one jurisdiction with a zoning commission and neighborhood zoning area. In the other three variables, only two jurisdictions declared having in place a planning commission, historic commission, and board of adjustment.

Cluster numbers 1, 2 and 3 showed a small difference in the proportion of responses. The variables accounting for these differences are board of adjustments and zoning and planning commissions. In all the clusters, the variable with the highest number of positive responses is having a planning commission. The mean difference is more important between clusters 3 and 4 (1.06 standard deviations).

The high percentage of jurisdictions (at least those in clusters 1, 2 and 3) already having zoning and planning commissions in place could prevent this variable from being a good candidate for future use for measuring variability among communities.

Overall, 78% (71 out of the 91 jurisdictions) ranked by the LURE index answered yes to having a planning commission; 63% to having zoning commissions and a board of adjustments; 36% to having neighborhood zoning areas; and 30% to having a historic commission.

The Local Planning Approval Requirement Sub-Index (LPAIR). The variable “having other ordinances governing plats, land development, and subdivisions” has the highest proportion of jurisdictions answering “yes.” The difference in proportions among the variables in the same cluster is not remarkable. This small variance could suggest their removal in future studies for use as indicators capturing variance among jurisdictions. 87% of jurisdictions (79 out of 91) claimed having “other ordinances”; 68% have a zoning ordinance; and 66% have a comprehensive plan.

As far as the difference among the clusters’ means for the LURE index, cluster 4 is again the one on the extreme side with a difference of 1.01 standard deviations from cluster 3.

The Local Affordable Housing Sub-Index (LAHI). The LAHI sub-index is the one of all ten sub- indexes which has the smallest difference among all clusters (the difference between the highest and lowest value) with a mean index total value of 0.57 standard deviations (between cluster 1 and 3).

Nonetheless, the variances among variables within the clusters are notable. In cluster 4 (the least regulated), 66.7% of the jurisdictions claimed to have manufactured housing built in the last two years (more than double the value for the other variables and clusters).

Although the variance between clusters is not remarkable, the variables indicate what is happening in the H-GA in terms of affordable housing. From the 91 jurisdictions: 1) 15 (17%) claimed developers are required to include affordable housing; 2) 28 (31%) answered yes to having multifamily housing built the last two years; and 3) 34 (37%) responded yes to having manufactured housing built in the last two years.

The Density Restriction Sub-Index (DRI). The mean index difference among the clusters in the DRI sub-index is between clusters 2 and 3 (0.73 standard deviations). The DRI sub-index is one of the three sub-indices in which the mean index value for a cluster does not follow the trend of being lower than the preceding cluster (cluster 4 has a higher value than cluster 3).

The difference between clusters 3 and 4 is due to a higher value for the mean of the natural logarithm of minimum lot size within the city’s ETJ in cluster 4 (7.98) compared to cluster 3 (7.87). The mean values for the other two variables across clusters follow the pattern of descending values (from cluster 1 to 4). This irregularity and the probability of double counting because of the inclusion of highly correlated variables in this sub-index raises questions about the appropriateness of including this variable in the creation of the sub-index.

The Local Subdivision Requirements Sub-Index (LSRI). LSRI is the sub-index with the second highest difference between the highest and lowest mean index value (2.04

standard deviations). It is also the only sub-index in which there is no difference between two clusters and their mean index values (clusters 2 and 3).

The variability between the two variables within the clusters is important, with the lower difference being in cluster 1 (a difference of 13.6 points).

Almost 100 percent of the jurisdictions have the requirement that developers pay building permit fees (84 of 91 jurisdictions). If this continues to be the trend, its inclusion will not signal a difference among jurisdictions.

The Open Space Sub-Index (OSI). The requirement that developers supply dedicated space or open space (or pay a fee in lieu of dedication) shows an important variance among clusters. (The total observed mean index difference between the highest and lowest value is 1.46 standard deviations). 21 of 22 jurisdictions in cluster 1 have this type of requirement in place. At the other extreme, just 2 of 9 jurisdictions in cluster 4 have this requirement.

In general, only 52 of the 91 jurisdictions (57%) have this requirement in place. The low proportion of jurisdictions currently imposing this type of measure makes it feasible to continue to use this indicator for the characterization of the Texas LURE.

The Exactions Sub-Index (EI). The requirement for the developer to pay an allocable share of the costs of infrastructure improvement is one of the three sub-indexes in which the mean index value for a cluster (cluster 2, with a 0.27 value) is higher when compared to its preceding cluster (cluster 1, with a 0.21 value), making the mean value difference negative between clusters 1 and 2.

The variance among the clusters for the variables making up the EI sub-index is small among clusters 1, 2 and 3 (0.34 standard deviations). On the other hand, the difference between these three clusters and cluster 4 is high (1.18 standard deviations between clusters 3 and 4).

In general, 61 of 91 jurisdictions (67%) have this type of requirement already in place. The high proportion of jurisdictions in clusters 1, 2 and 3 already having this requirement suggests a trend that could make this variable not a good candidate for characterizing the LURE in the H-GA.

The Supply Restriction Sub-Index (SRI). Because of the difference in the diversity of variables included in the SRI sub-index, this is probably the sub-index with the most discrepancies in the variables within the clusters and among the clusters.

In cluster 4 the sub-index does not record any measure for four of the five variables (the other variable has just one jurisdiction). Having a measure which requires adequate service levels for residential development or service capacity as a condition of approval of residential development is the variable with the most jurisdictions in the analysis (56 of 91). On the other hand, the variable having the least jurisdictions is a measure which re-designates or rezones residential land to agriculture or open space (13 of 91). The variance and the small number of jurisdictions recorded as implementing these measures make these variables good candidates for continued inclusion in the LURE index.

The Local Standard Development Perception Sub-Index (LSDPI). The LSDPI sub-index is the one with the highest mean difference index value among clusters (2.41 standard deviations). In addition, this sub-index is also the one having the highest difference between two clusters in their mean index values (clusters 3 and 4 have a 1.61 standard deviation difference).

5.3 Validation of the LURE index

Table 4 shows the mean values of local traits such as median housing values, median family income, percentage of families below poverty line, and percentage of White and Black population. Cluster 1, the most regulated, is where the most valuable houses are

Table 5: Correlations between the LURE index and local traits

Indicators (all 2010)	Pearson Correlation (Sig. 2-tailed)	
Percentage Black	-.155*	(.143)
Percentage of families below poverty line	-.224*	(.032)
Percentage White	.112	(.289)
Median family income	.260*	(.013)
Median house value	.170 ⁺	(.106)

Note: Standard errors in parentheses. *: Correlation is significant at the 0.05 level (2-tailed). ⁺: Correlation is significant at the 0.10 level (2-tailed). White and Black populations are non-Hispanic.

located. The median house value (\$201,540) in this cluster is almost three times the value of cluster 4 (\$78,533), the least regulated. Regarding income, the difference between cluster 1 and the other three clusters is also noticeable. Median family income is almost double in cluster 1 (\$92,301) when compared to cluster 4 (\$50,533). Poverty is another trait in which the differences are remarkable. The most regulated cluster has the smallest percentage of families below poverty line (7%). It is half the proportion compared to the least regulated cluster (15%) and 3 percentage points below the highly and lightly regulated clusters.

In terms of distribution of races, there is a pattern, although small, in which cluster 1 has a higher percentage of White population when compared to the other clusters. Cluster 4 has a higher percentage of Black population when compared to cluster 1.

Table 5 shows the correlation values between the LURE index and the local traits. Although the coefficients are low, the statistical correlation shows that four out of the five variables have a significant relationship with the regulatory stringency of the jurisdictions characterized by the LURE index. The proportion of Black population, families below poverty level, and median family income have a statistically significant relation with the LURE index at the 0.05 level. The median house value relation is significant at the 0.10 level. Proportion of White population does not show a significant relation.

These results allow agreement with the findings of other authors that the null hypothesis of a lack of relation between the LURE index and these four local indicators can be rejected. These correlation results validate the appropriateness of indexes as measures in characterizing LUREs for housing markets (Baldassare, Protash 1982, Bates, Santerre 1994, Burnell, Burnell 1989, Donovan, Neiman 1992, Gyourko et al. 2008).

The second validation step taken for this analysis was to contrast the rankings of the cities based on the LURE index against another index alternative or scenario, in this case, an equal weighting assumption. Equal weighting is the second most used assumption in the creation of indexes of regulatory stringency. It is important to clarify that the creation of an index involves multiple assumptions during the process of creating it; therefore, an index reflects those assumptions and does not necessarily always capture the real phenomena measured.

The correlation between the LURE index and the equal weighting alternative is statistically significant (Spearman correlation = 0.922). Scatterplot in Figure 2 shows how fluctuations are more present in the middle half of the ranked jurisdictions. The most (upper quartile) and least regulated (bottom quartile) jurisdictions for both indexes are the most robust to change in the weighting assumptions. When looking at the differences (number of shifts in ranking from one index to the other for any particular jurisdiction), 56 out of the 91 jurisdictions (62%) have 10 or less shifts on their rankings. 20 jurisdictions (22%) have a shift between 11 and 20. 11 jurisdictions (12%) have a shift of between 20 and 30. Only 4 (4%) have a change of between 30 and 50 places. If 62% of the jurisdiction changing less than 10 places between the two weighting methods is acceptable, this means that either EW or FA weightings assumptions yield similar ranking results for the creation of the indexes to characterize land use regulatory environments for housing markets.

Like other indexes' results, not all cities were affected in the same way in their rankings under the two alternatives. Figure 2 allows us to see which jurisdictions are the most impacted by these two weighting methods. The cities of Cut and Shoot, Southside Place,

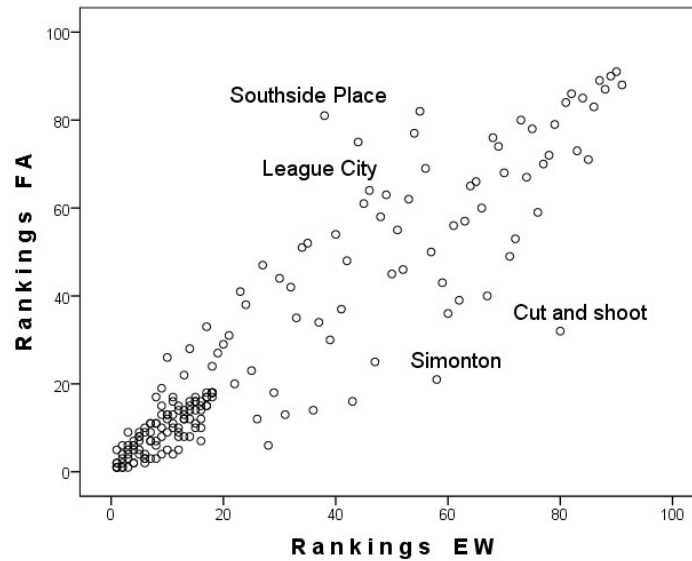


Figure 2: Correlations between the LURE Index and Alternative Scenario Using EW Approach

Simonton, and League City, which have a difference between the two rankings of more than 30 places, are the four jurisdictions with the most extreme variation. On the opposite side, two jurisdictions (Spring Valley and Jones Creek) got the same ranking in both indexes.

6 Conclusions

The LURE index has been created with the objective of validating the use of an index as an appropriate composite measure to characterize the stringency of land use regulatory environments for housing markets in metropolitan areas.

Factor analysis proved that the LURE index is a measure capable of capturing the latent factors linking housing markets and land use regulations. At least four to five dimensions (from the ten established in the theoretical framework) are detected by the statistical procedure as capturing more than 65% of the total variance in the sample of the LURE index data. The correlation between the index and the specific local traits showed statistical significance at the 0.10 and 0.05 significant levels. These results validate similar correlations found in the literature.

The decomposition analysis, performed to ascertain the role of each variable, confirmed the multi-dimensional nature of land use regulations for housing markets. The analysis of the LURE index results shows that highly regulated jurisdictions tend to be so almost across the board (in every sub-index value). In general, highly regulated jurisdictions are richer and have much higher housing values than the lightly and least regulated. Median family income in highly regulated jurisdictions is higher, by more than \$40,000, compared to the least regulated. Median house value in highly regulated jurisdictions is almost three times the value compared to the least regulated. Highly regulated jurisdictions have a greater fraction of White households, but the difference is modest in contrast to the least regulated jurisdictions.

The statistical correlation between the LURE index and an equal weighting alternative validates the robustness to change in the weighting assumption of the index. Further research could involve the use of more scenarios, taking into account other procedures not used in this study (e.g. non-compensatory aggregation, excluding other variables).

In summary, the results of the creation and assessment of the LURE index verify that an index of these characteristics is a valid and reliable measure to characterize the multi-dimensional nature of LUREs for housing markets.

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Towards an Integrated Evaluation Approach for Cultural Urban Landscape Conservation/Regeneration

Francesca Nocca¹, Luigi Fusco Girard¹

¹ University of Naples Federico II, Naples, Italy

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Abstract. The contemporary economic crisis (and also ecological and social crisis) calls for a new model of urban development. The international debate is today focused on the necessity of a new paradigm (Hosagrahar et al., 2016) that will define sustainable development policies and programmes: this new paradigm moves the concept of development towards a more humanistic and ecological point of view. The recent international debate around Sustainable Development Goals (SDGs) is going to highlight the role of cultural heritage for sustainable development (United Nations 2016, 2015a). Cultural heritage can play a critical role in the achievement of the above mentioned new humanistic and ecological paradigm of sustainable cities. In this paper some indicators to evaluate cultural urban landscape conservation/regeneration projects are identified, starting from case studies. The purpose of the analysis of good practices is to support the elaboration of a multidimensional matrix that can produce empirical evidence about the impacts of cultural urban landscape conservation/regeneration. After a particular focus on the relationship between variation of landscape and variation of wellbeing, this paper will present a methodological proposal to evaluate cultural urban landscape conservation/regeneration projects.

Key words: Cultural Heritage conservation, landscape variation/wellbeing variation, multidimensional indicators

1 Introduction

The contemporary economic crisis (and also ecological and social crisis) calls for a new model of urban development. The international debate is today focused on the necessity of a new paradigm (Hosagrahar et al. 2016) that will define sustainable development policies and programmes: this new paradigm moves the concept of development towards a more humanistic and ecological point of view. The necessity to change towards this more humanistic (suggested in the Agenda 2030 of United Nations) and more ecological (Paris Cop21 and Agenda 2030) paradigm is deeply felt. It is characterized by the human scale of development and is inspired by the wisdom of nature. The 2030 Sustainable Development Agenda has been defined as a plan of action for people, planet and prosperity (United Nations 2015a), based on 17 Sustainable Development Goals (SDGs) and 169 targets coming out from the Millennium Development Goals (MDGs) (United Nations 2015b). Most of these can be achieved in the space of cities. All of the problems, for example

problems related to climate change, energy, water, food or wellbeing, are localized in the cities and thus can be faced in these cities.

The international debate around Sustainable Development Goals (SDGs) recently is highlighting the role of cultural heritage for sustainable development ([United Nations 2015a](#)). Cultural heritage can play a key role in the achievement of the above-mentioned new humanistic and ecological paradigm of the sustainable city. Therefore, cultural resources should be integrated into the sustainable development of cities. “Cultural matters are integral parts of the lives we lead. If development can be seen as an enhancement of our living standards, then efforts geared to development can hardly ignore the world of culture” ([Sen 2000](#)).

Despite the important role that cultural heritage can have in sustainable development and the acknowledgment of its importance at the national level (and not only), it has been kept out of the sustainable development debate for too long. It should be included in the framework of sustainable development because it reflects the mutual adaptation between humans and their environment and the relationship between people and heart. Cultural heritage plays an irreplaceable role as the source of a sense of belonging and identity for communities ([UNESCO 2013](#), [European Commission 2014](#), [CHCfE Consortium 2015](#)). It also reveals and symbolizes how people relate to other communities and what they value to enhance and improve the quality of their life. Cultural heritage is an integral part of communities’ life and it is involved in social, economic and environmental processes. It is an expression of the culture, identity and religious beliefs of societies.

For this reason, all actions aiming to protect and improve the environmental, social and economic wellbeing of communities should take into account cultural heritage, the opportunities that it offers and the threats it poses due to inappropriate use. Despite all of these considerations, Cultural Urban Landscape and, more generally Cultural Heritage (CH), is weakly considered in strategies for achieving sustainable development: it is explicitly mentioned only once in Goal 11 (“make cities and human settlements inclusive, safe, resilient and sustainable”), and particularly in target 11.4, regarding “strengthening efforts to protect and safeguard the world’s cultural and natural heritage”.

The analysis of the relationship between cultural heritage and sustainable development could represent a first step to recognizing the critical role of cultural heritage in the current debate. This relation is highlighted, for example, in the Historic Urban Landscape Approach ([UNESCO 2011](#)) and European Landscape Convention ([European Commission 2014](#)). Both documents recognize the contribution of high quality landscapes to urban productivity. Cultural heritage is increasingly considered as a source of local development thanks to its capacity to produce new employment, to stimulate the localization of creative activities, to increase inclusion and social cohesion ([UNESCO 2013](#), [European Commission 2014](#), [CHCfE Consortium 2015](#)).

The role of culture heritage to achieve a more inclusive, resilient, safe and sustainable city is going to be more and more recognized. Cultural heritage is here understood through a holistic and systemic interpretation of landscape. “Landscape can be interpreted as a complex indicator for the sustainability of a city or territory, of the quality of life, vitality of a place, and a community’s sense of belonging” ([Hosagrahar et al. 2016](#)). This vision is fundamental to operationalize the project. Complexity is related to multidimensionality, heterogeneity and dynamism. It is linked to technical-scientific and humanistic knowledge, to the individual’s perception and how it turns into a community perspective. The subjective perception is here transformed into a community and inter-subjective result through dialogic and participative processes. It is therefore an inter-subjective result.

The answer to the main question, that is if Cultural Urban Landscape can play a role in sustainable development, could be yes only if we are able to produce empirical evidence about the contribution of cultural heritage to improve the economic, social and environmental productivity of the city ([Fusco Girard 2013](#)). It is important to convince public, private and social actors about the convenience (economic, social, environmental benefits) of cultural heritage conservation/regeneration. In order to achieve this goal, empirical evidence needs to be produced. Current studies about empirical evidence are limited to some benefits, in particular the economic ones. However, as [Dalmas et al.](#) highlighted ([Dalmas et al. 2015](#)), the notion of cultural heritage is “inseparable from its

multidimensional nature". For this reason, multidimensional impacts need to be considered. If we want to be convincing about the capacity of cultural heritage to implement the new urban paradigm (Hosagrahar et al. 2016), we have to produce empirical evidence about the multidimensional benefits. There needs to be improved knowledge about the relationship between quality landscape variation and wellbeing variation (it will analyze in the third paragraph). In this new perspective linking landscape and productivity, the complex landscape could be considered as an indicator of the health of a city/region (Fusco Girard 2013). In other words, the aim is to demonstrate the productivity of conservation projects, including how cultural urban landscape conservation/regeneration can contribute to increasing local productivity and also to improving the wellbeing of inhabitants. In this perspective, Cultural Urban Landscape represents a precious resource. This paper would be a first step towards this goal, proposing a specific set of indicators in order to support the demonstration that cultural heritage conservation is an investment and not a cost (because benefits overcome costs). The purpose is to deduce, starting from experiences, a more effective evaluation approach, that can make integrated conservation more effective in implementing human sustainable development strategies (Fusco Girard 2014b). Tools are fundamental, but more important is an understanding of which perspective we want to move towards: the risk is that cities are not being able to achieve the human scale in this evolutionary dynamic.

The most recent operative tool proposed for the impact assessment of different projects on Cultural Heritage (included HUL) is the Heritage Impact Assessment (ICOMOS 2011). This is a fundamental tool to understand the impacts of projects on the integrity and authenticity of cultural heritage (Pereira Roders et al. 2013). It provides a framework for assessing the impacts of urban transformations on the cultural value of properties. However, it has some remarkable limitations; for example, it does not include the economic and social dimensions of heritage conservation. It is based on expert judgement without considering community perceptions and intangible dimensions that are important factors of Historic Urban Landscape. It is not a multidimensional approach. It considers HUL conservation/regeneration as a mere cultural issue and not as a driver/vehicle for sustainable development. Furthermore, HIA is a tool for the assessment of impacts on Cultural Heritage; we also need tools for the assessment of impacts from Cultural Heritage conservation on city productivity and wellbeing. Therefore, it needs to go beyond HIA, integrating it with the evaluation of impacts from cultural heritage and not only impacts on it, in order to evaluate all multidimensional benefits of HUL conservation/regeneration through an effective approach. We need a systemic approach based on empirical evidence and not only on principles. The challenge is to elaborate an evaluation approach able to make the integrated conservation more effective to achieve human sustainable development. The above-mentioned new perspective of city humanization suggests the steering of this approach towards human and social impacts of cultural heritage conservation/regeneration. In other words, it should be focused on its capacity to produce employment (direct, indirect, induced), social capital (bonds, synergies, etc.), social cohesion, human wellbeing/health thanks to the new attractive atmosphere and also on the capacity of these impacts to implement new value creation chains in a virtuous and self-reproducing spiral in time. Some indicators to evaluate cultural urban landscape conservation/regeneration projects are identified in the following paragraphs, starting from case studies. The purpose of this analysis of good practices is to support the elaboration of a multidimensional matrix that can produce empirical evidence about impacts of cultural urban landscape conservation/regeneration.

After a particular focus on the relationship between variation of landscape and variation of wellbeing, this paper will present a methodological proposal to evaluate cultural urban landscape conservation/regeneration projects.

2 Multidimensional benefits of cultural landscape conservation

In this period in which cities are facing three important challenges (economic, social and environmental crisis), it is important to understand and demonstrate the role that cultural heritage could have in sustainable development. It is important to demonstrate

the capacity of cultural heritage to increase the economic (EVoCH 2012), social and environmental productivity of cities. City productivity is related to the capacity of the city to produce new added values starting from its available resources (rate between output and input). They are not only referred to as the good economic performance of the city, but they include also social and environmental dimensions. Cultural heritage can be considered as an input in this production process that, through the lens of landscape, can contribute to the enhancement of cities economic, social and environmental performance. The capacity to produce multidimensional benefits depends on strategies, policies and actions adopted that, in turn, depend on different aspects (i.e. city size, intensity of bonds and relationships).

In order to pass from principles to their operationalization, we need tools. We need to evaluate investments in cultural heritage in an operative way, deducing indicators starting from empirical evidence: in this paper some indicators, extrapolated from case studies, are proposed in this perspective. Many more indicators can be proposed (Nocca 2017). As empirical evidence shows, culture can boost the economy (CHCfE Consortium 2015). It is able to produce income, employment and new businesses. It can foster entrepreneurship capacity and skills and be a source of creativity and innovation (Fusco Girard 2013). Culture is also linked to the social dimension because it is able, through broadening capacities and increasing opportunities, to face poverty. It can support marginalized people because cultural-based activities can, for example, provide people with opportunities.

The indicators are grouped into 6 categories (each of them divided into sub-categories) (Fusco Girard et al. 2015, Nocca et al. 2016):

- Tourism and recreation
- Creative and cultural activities
- Environment and natural capital
- Community and social cohesion
- Real estate
- wellbeing

The set of indicators for each category has been extracted from 17 case studies of cities from all over the world – 9 in Europe, 3 in Africa, 3 in South America, 1 in North America and 1 in the Middle East (Fusco Girard et al. 2015). The first category is about tourism and recreation (Table 1). The indicators about this category are the most popular because the impacts related to the tourism sector are more immediate and obvious, especially in the short term (D'Auria 2009). It is a sector able to transform cultural values into economic ones. It produces new employment and new wealth in the short time. There are many good practices that empirically demonstrate the benefits in the tourism sector, in terms of hotels, restaurants, visitors, etc.

Tourism refers, in particular, to the instrumental value of cultural heritage, but the latter has also intrinsic and social value (Fusco Girard 1987). The first one can be a source of shared identity and a sense of belonging or meaning etc., in other words, of heritage community. It is not linked to the use or function that it serves; it bonds community to places “determining the spirit of a place and the source of pride that is of interest for future generations”. Social value refers to the capacity of cultural heritage to be a catalyst of social links and relationships (that trigger new economic value). Relationships become bonds that are able to create new value chains, which increase city productivity through circular processes, synergies and symbiosis (Fusco Girard 2014a). All of the above values are able to increase (in a direct or indirect way) the comprehensive productivity and thus prosperity of a city.

Cultural heritage regeneration could have negative impacts, such as the museification and gentrification of historic centres (Glass 1964). Development/transformation generates some interferences with landscapes. Overdevelopment often represents a cost to landscapes. Without proper measures, regeneration/valorization actions can produce negative

Table 1: Tourism and recreation indicators

Sub-category	Indicator	Unit measure
Employment	N. of new jobs in touristic sector	n./year
Employment	% of employed population related to tourism sector	%
Employment	% of the total workforce employed in hotels	%
Employment	Average number of jobs in touristic activities (hotels, restaurants, shops)	n./year (or day, week, month)
Employment	Monthly salary	€/month
Employment	% of hotels' contribution to tourism sector income	%
Employment	% of hotels' contribution to tourism sector total revenues	%
Touristic Demand	N. of visitors per year (or per day)	n./year (or day)
Touristic Demand	Visitors' expenditure per day (or per year)	€/day (or year)
Touristic Demand	Average length of stay	nights/person
Touristic Demand	Occupancy rate of touristic units	%
Touristic Demand	Average growth rate of number of nights and guests	%
Touristic Demand	% of international tourists	%
Touristic Demand	N. of one-day trips	n. trips/year
Touristic Demand	% of crowding in restaurants during holidays	%
Touristic Demand	Average number of daily users in stores	n./day
Touristic Demand	Average daily expenditure of users in stores	€/day
Touristic Demand	Average number of daily users in restaurants	n./day
Touristic Demand	Average daily expenditure of users in restaurants	€/day
Touristic Demand	N. of airline passengers	n./years
Touristic Demand	N. of visitors to museums	n./day
Touristic Supply	% of fixed assets related to the tourism sector	%
Touristic Supply	Average annual growth in touristic units and rooms	%
Touristic Supply	Average growth of touristic sector	%
Touristic Supply	N. of new touristic shops	n/year
Touristic Supply	N. of touristic residences in rural space	n. units/year
Touristic Supply	Growth of service and infrastructures	%
Touristic Supply	Growth of catering sector	%
Touristic Supply	N. of hotels	n.
Touristic Supply	N. of hotel rooms	n.
Touristic Supply	N. of hotel beds	n.
Touristic Supply	N. of new travel agencies	n.
Touristic Supply	N. of airlines operating at the airport	n.
Touristic Supply	N. of new public underground parking lots	n.
Touristic Supply	N. of commercial licenses	n.
Economic Vitality	Average of companies lifespan	%
Economic Vitality	% of buildings for industrial use	%
Economic Vitality	% of formal/informal activities	%
Production of Goods	N. of new industrial activities	n./year
Typical Productions	Employment distribution in production sector	%
Typical Productions	Annual growth rate of traditional production	%
Typical Productions	Average value of traditional production per hectare	€/ha
Typical Productions	Selling price of traditional products (without VAT)	€
Typical Productions	Net present value of economic activity	€
Typical Productions	Internal profit rate of economic activity	%
Typical Productions	N. of artisan units	n.

Source: Indicators deduced from reports about analyzed case studies ([Actum 2011](#), [Bigio 2010](#), [Dalberg 2013](#), [HR&A Advisors 2010](#), [IUCN 2014](#), [Labadi 2008](#), [Landorf 2009](#), [Loureço-Gomes 2009](#), [Mendes Zancheti, Gabriel 2010](#), [Ogilvie 2009](#), [Orbasli 2010](#), [Pais et al. 2014](#), [Quartesan, Romis 2010](#), [Roland et al. 2004](#), [Throsby 2012](#), [Torquati, Giacché 2013](#), [Torquati et al. 2011](#), [Trivelli, Nishimura 2010](#), [World Bank 2015](#))

impacts, such as more footfall, more noise, increase in pollution and disturbances to the ecological balance of the place, but also the erosion of “intrinsic values”. Sometimes this excessive increase can also produce a particular phenomenon, gentrification, meaning local communities and young people can no longer afford to buy/rent apartments because of rising prices. As has emerged from some case studies, many apartments remain unused for years, and the owners do not care about maintenance, leading to deterioration. Furthermore, the increase in property values produces “touch and go” tourism because of the high prices to stay in the area of the project. Therefore, gentrification (interpreted as expulsion of the most vulnerable part of the population both in economic terms and cultural ones) often represents a consequence of regeneration. In addition to removal of the lower classes, there is also a loss of authenticity of a place. They are transformed from places to live in to places to consume, mainly in the touristic sense.

Gentrification is often considered an inevitable consequence of urban regeneration processes. According to this point of view, modifying social composition allows the redistribution of economic benefits from having richer inhabitants that, having more money to spend, can contribute to revitalizing the economy of the neighbourhood. But, in this way, the problem of poverty or more generally of social issues are simply moved outside. It is the consequence of actions that consider only economic attractiveness. Social and cultural components need to be considered in regeneration strategies/policies in order to limit the negative impacts. Furthermore, choices have to come from bottom-up approaches, through community involvement. The economic impacts are generally interpreted only in the touristic demand perspective, but empirical evidence shows that there are other impacts. It is important to highlight that the contribution of cultural heritage to economic development does not end in the tourism economy.

Cultural Urban Landscape conservation/regeneration is able to produce impacts also in creative, cultural and innovative activities (Table 2). Cultural activities refer to activities that embody and convey cultural expressions. Besides the traditional arts sectors (performing arts, visual arts, cultural heritage, etc.), these activities also include services and goods such as film, music, books and press, DVD, video, television and radio, video games as well as new media. This category includes historic and artistic heritage (cultural heritage) and contents, as well as the information and communications industries (publishing, cinema, advertising, television and radio) where the integration of high tech is a common thread.

Productivity, competitiveness and attractiveness of cities and regions are improved through innovations (Florida 2002), based on local resources, that is on human and social capital. Indicators about use of ICT related to knowledge/use of cultural heritage did not emerge in the analyzed case studies. The ICT impacts on cultural heritage are considerable and therefore indicators are needed to monitor the benefits produced by them.

Another category of indicators include environmental and natural capital (Table 3). Most benefits in this category are indirect; they are expressed in terms of “avoided costs” (reduction of energy consumption, waste reduction, etc.).

The World Bank recognized the investments in cultural heritage as a good solution to reduce CO₂ emissions and climate change: activities related to cultural heritage represent an intrinsically more sustainable model of land use, consumption and production that has been developed over time through a continuous adaptation between communities and their environments. Cultural heritage can help to face challenges related to climate change, for example, “through the protection and revitalisation of the huge amount of embedded energy in the historic building stock” (CHCfE Consortium 2015). Therefore, the indicators deduced from case studies should be integrated with indicators related to the avoided costs due to the improvement of health conditions. Most case studies are lacking in these indicators, demonstrating the lack of awareness regarding benefits that cultural heritage conservation/regeneration can produce for the environment. But the lack of data does not imply the absence of such benefits.

The indicators about the real estate category (Table 4) are, as for the tourism category, more known because the impacts are more immediate and obvious, especially in the short term. The real estate benefits are direct benefits for owners and, at the same time, they

Table 2: Creative and cultural activities indicators

Sub-category	Indicator	Unit measure
Creative Firms	N. of new handcraft shops	n./year
Creative Firms	N. of craft producers	n.
Creative Firms	N. of antique stores/second hand bookshops	n.
Cultural Demand	Visitors stay for temporary cultural events	%
Cultural Demand	N. of visitors for cultural reason	n./year
Cultural Demand	N. of participants in cultural events	n./year
Cultural Demand	N. of schoolchildren taking part in the cultural events	n/year
Cultural Demand	Perception of cultural benefits	qualitative
Cultural Demand	Visitors' Willingness to make a contribution to heritage restoration	%
Cultural Supply	N. of cultural events per year	n./year
Cultural Supply	% of growth of cultural events	%
Cultural Supply	N. of cultural institutions	n.
Cultural Supply	Growth of creative activities	%
Cultural Supply	Attraction of new investments in Cultural Heritage	€
Cultural Supply	N. archives	n.
Cultural Supply	N. libraries	n.
Cultural Supply	N. movie theatres	n.
Cultural Supply	N. art galleries	n.
Cultural Supply	N. museums	n.
Cultural Supply	N. theatres	n.
Cultural Supply	N. of cultural facilities	n.
Employment	N. of jobs created in the short term in cultural activities	n.
Employment	N. of artists taking part in cultural activities	n/year

Source: see Table 1

Table 3: Environment and natural capital indicators

Sub-category	Indicator	Unit measure
Ecosystem Preservation	Economic value of ecosystem services (regulating and maintenance)	€ Net Present Value
Ecosystem Preservation	Attraction of new investments in ecosystem preservation	€
Ecosystem Preservation	Avoided damages from ecosystem/land preservation	€
Ecosystem Preservation	Benefits from preservation of agricultural land (ecosystem services evaluation)	€
Green Areas & Facilities	Attraction of new investments for enhancement of green areas	€
Green Areas & Facilities	Avoided costs of traffic congestion for the community (due to the enhancement of public transport)	€/year
Green Areas & Facilities	Avoided cost of traffic congestion for the community (due to pedestrian and bicycle routes)	€/year
Pollution Reduction	Attraction of new investment in infrastructure to reduce pollution	€

Source: see Table 1

can turn into tax impacts for the public. Therefore, cultural heritage is able to generate tax revenue for public bodies. Heritage landscape conservation refers to both intangible and tangible assets. The valorization, regeneration and “re-use” of heritage relates to the fixed capital, but also to values and knowledge. In built environments there is a great potential for saving energy. The investments can pay back well during the life cycle of the goods. Energy saving can be achieved through investments in technologies (such as renewable energy systems, energy efficient lighting, cooling, heating) but also through territorial management and behavioural and lifestyle changes. Through the protection and revitalisation of the huge embedded energy in the historic building stock, cultural heritage can contribute to facing climate change challenges (CHCfE Consortium 2015). The amount of raw materials- water, etc. and embedded energy savings can be a useful indicator for assessing environmental benefits from cultural heritage re-use.

Cultural heritage can contribute to facing climate change thanks to some key features. An effective orientation and the physical characteristics, for example the walling’s gauge, contribute to guarantee a lower temperature inside and outside the buildings, improving the general microclimatic condition.

Furthermore, heritage reuse can contribute to revitalizing local economies with jobs, new businesses, tax revenues and local spending, as well as providing a valuable wildlife habitat and recreational amenities. Through functional re-use, we are also able to regenerate values, keeping them in time. The adaptive re-use (Douglas 2006) produces multidimensional benefits: cultural benefits (conserving “alive” a symbol of community identity), economic benefits (in terms of increase in productivity), and environmental benefits (i.e. reduction of resource consumption) and social benefits (i.e. employment). Cultural heritage adaptive re-use, that realizes operationally the circular economy model (Angrisano et al. 2016), can ensure that cultural heritage continues to “live” for present and future generations through ensuring use-values in an indefinite lifespan, thus preserving its intrinsic value. On the contrary, abandonment and obsolescence threaten its existence.

Through conservation/regeneration, new use values are created consistent with the value independent from the use. This does not mean loss of identity of heritage, but it means “to give” the places new functions (adequate to community’s dynamism and changing needs) through projects and strategies highlighting the relationships between cultural resources and city transformation policies. The functional reuse of cultural heritage is here considered as a way to valorize the identity of the territory. This is based on its history, values, specific knowledge, etc. It is also a pretext to stir up cultural values, the recognition of a common identity (not just local, but also widen), traditions and shared memory. The functional reuse is an entry point to regenerate cultural, community and collaborative values in the belief that the challenges to development can be overcome only together.

There is still a lack of evidence about the contribution of heritage to the social cohesion/inclusion (Table 5). Cultural heritage has positive impacts on social capital, revitalizing synergies, bonds and collaborative relationships. It is able to encourage associations, crowdfunding projects, and cooperation that contribute to local economic productivity. Therefore, the importance of evaluating this specific category needs to be stressed. Cultural heritage is able to build social capital and to contribute to social cohesion through providing a framework for participation and engagement and also fostering integration (CHCfE Consortium 2015). Cultural heritage expresses values and identity and organizes communities as well as their relationships through its powerful symbolic and aesthetic dimensions. The preservation of the diversity of cultural heritage, an equitable access to it and a fair sharing of its benefits can enhance the sense of belonging and place. Cultural heritage expresses and maintains the values and traditions of a city and its community, but its significance differ amongst communities and also among members of the same community. It links past, present and future but, at the same time, has the potential for generating conflicts. Diverse social groups could have different values and belief as well as different perceptions about what is relevant for their identity this can attribute different values to a heritage place. Coexistence of these differences can represent a problematic issue and sometimes can be the cause of actions that could have negative impacts on heritage values.

Table 4: Real estate (RE) economic indicators

Sub-category	Indicator	Unit measure
Employment	Growth of employment within RE development	%
RE Values	Average monthly rent	€
RE Values	Average market value	€
RE Values	Increase in private land value	€
RE Values	Increase in public land value (due to infrastructure development)	% and €
RE Values	% of Increase in property values	%/year
RE Values	Evolution of ownership and rental structures	%
RE Values	Volume of transactions in the RE market	€
RE Values	Number of office spaces	n.
RE Values	Price of properties	€/year
RE Values	N. of commercial units	n.
RE Values	Value of historic buildings	€/sqm
RE Values	Increase in value of surrounding buildings	€/sqm
RE Values	Rent values for commercial-use properties	€
RE Values	Rent values for residential properties	€
RE Values	Average value of property transactions	€
RE development	N. of new residential units	n.
RE development	Square feet of commercial development	Sq. feet
RE development	Property taxes gained from commercial development	€
RE development	Increase in municipal taxes	€/ year
RE development	N. of new construction activities and new permits	n.
RE development	Number of construction, restoration and adaptation works on historic buildings	n.
RE development	Re-functionalization of historic buildings	%
RE development	Housing vacancy rate	%
RE development	% of well-preserved buildings	%

Source: see Table 1

Table 5: Community and social cohesion indicators

Sub-category	Indicator	Unit measure
Social Care	Number of individuals receiving social care	n./inhab.
Social Cohesion	N. of volunteers	n./year
Social Cohesion	New funds to support activities of a non-profit organization	€/year
Social Cohesion	Perception of personal safety	qualitative
Social Cohesion	Number of association	n./10000 inhab.
Sharing/ Collaborative Economy	N. of new cooperative enterprises	n.
Sharing/ Collaborative Economy	N. of participants in crowdfunding initiatives	n.
Sharing/ Collaborative Economy	Amount of money crowdsourced through crowdfunding campaigns	€

Source: see Table 1

Conflicts and disagreements (in terms of values, interests and beliefs) can represent, if not well managed, an obstacle in the achievement of heritage outcomes to produce benefits for each involved stakeholder. Differences are inevitable, but they need to be acknowledged and respected in order to mitigate possible conflicts. A fundamental step of heritage management is to understand heritage values held by different groups within a society. Effective cultural heritage conservation can be achieved only through a wide community participation in choices and actions. It is necessary to ensure community participation in decision processes related to heritage conservation. This needs to facilitate dialogue and open the lines of communication to improve relationships. In the consensus building process, the identification of stakeholders and their different interests, values and identities play a key role. The interaction between community and expert knowledge is a prerequisite for implementing the UNESCO approach (UNESCO 2011). Collaborative processes are important to resolve differences in order to reach consensus and adopt decisions that can be effectively and sustainably implemented. Today, the increasingly multicultural society requires dialogue and reciprocity. Cultural heritage becomes a source of identity and can represent an entry point for cultural dialogue, mutual knowing and comparison.

Cultural heritage is subject to continuous changes and continuous hybridization processes that adapt throughout history (Fusco Girard et al. 2014): each building expresses the “graft” of new points of view, new styles, etc. in the historical tradition. It represents an “ingredient” for putting end to conflicts through a mutual knowledge of values. Therefore, cultural heritage can play a key role in promoting a more peaceful coexistence.

The last category of wellbeing indicators (Table 6) is analyzed in more detail in the following paragraph. There are some indicators that are currently not proposed and do not emerge from the case studies. Some indicators can be proposed to quantify benefits related to social cohesion (Fusco Girard et al. 2015):

- Community participation for common goods management;
- N. of crowdfunding projects launched;
- N. of crowdfunding projects completed;
- Average donation per person;
- N. of “rewards” allocated;
- N. of local companies involved;
- N. of banking and community foundations.

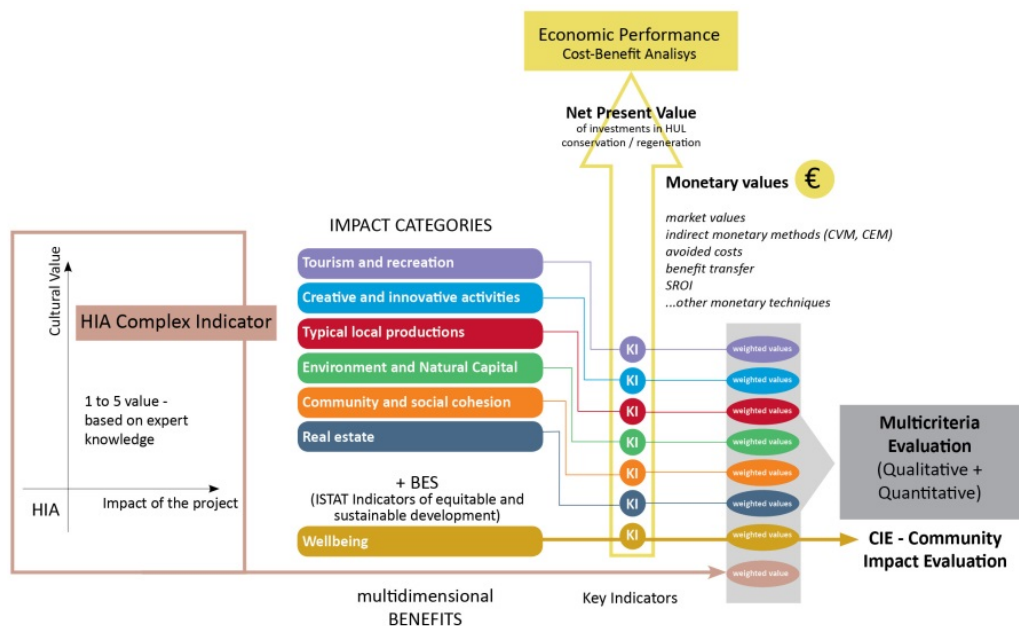
Some indicators about the social economy category can be proposed:

- N. of cultural urban landscape regeneration projects financed through municipal bonds;
- N. of released bonds;
- Areas of cultural urban landscape regenerated through municipal bond/crowdfunding project.

3 Multidimensional indicators of cultural landscape conservation

Tables 1 to 5 reflect the list of selected multidimensional indicators. Considering these multiple dimensions of cultural heritage, as also Dalmás et al. (2015) recognized, an “inclusive approach” is necessary. This concept recalls the notion of Social Complex Value (Fusco Girard 1987) that expresses the value of the asset without separating it from the community and the environmental context. In this perspective, the value is expressed through a set of multidimensional indicators.

As emerged from the analysis of the case studies, it is important to underline that indicators can be both objective and subjective, both quantitative and qualitative. This is



Source: Fusco Girard et al. (2015)

Figure 1: A methodological proposal for the assessing Cultural Urban Landscape

because the cultural urban landscape, just being a landscape, can be perceived in different ways from people who live within it. Our effort is to transform individual perception into a shared interpersonal perception.

Objective indicators are based on hard data, while subjective indicators refer to soft data. Subjective indicators are related to community perception of the landscape. Although they are not based on hard data, the subjective indicators can influence choices and have consequences for the economy and productivity of a city. Several community surveys and focus groups are necessary to support hard data about cultural heritage investments (Rypkema, Cheong 2011).

Once the matrix of the multidimensional indicators has been identified, it is important to understand how to use and “translate” them into operative terms. A first step towards an integrated approach is to evaluate these multidimensional indicators (related to impacts of investments in cultural heritage/landscape conservation/regeneration) as proposed in the methodological framework shown in Figure 1 (Fusco Girard et al. 2015).

This proposed approach considers the enhancement of the cultural value and the multidimensional benefits produced, taking into account all stakeholders’ categories. The proposed assessment framework aims to be one step ahead of the Heritage Impact Assessment. It aims to integrate the assessment of integrity and authenticity of cultural heritage with the assessment of the multidimensional benefits produced by the projects. Therefore, in order to capture all impacts produced, indicators referring to all identified categories are considered. Key indicators are identified for each category. They depend on different aspects: scale of intervention, political context, socio-economic conditions, etc. They have to be identified on a case by case basis. The choice of the key indicators is based on both expert knowledge and the results of a participatory process of community involvement. Interviews and questionnaires allow understanding of through which indicators the different stakeholders perceive the project’s impacts. Of course, it needs to be considered that the judgment is subjective and it can be influenced by external factors. A greater number of stakeholders increases the reliability of the results. The interaction between community and expert knowledge (Fusco Girard et al. 2013) is essential at this stage in order to identify shared and understandable indicators for (almost) everyone.

The proposed assessment framework has two significant outputs, represented by the Economic Performance and the Multicriteria Evaluation. Some key indicators can be

monetized using different techniques (direct market pricing, avoided costs, contingent valuation, etc.), resulting in the monetary value produced by Cultural Landscape conservation/regeneration projects. This value should be compared to the investment and maintenance costs. This economic performance is only one of the outputs of the methodology. A multicriteria evaluation, based on heterogeneous values of key indicators can be structured using the identified impact categories. This process can integrate the Heritage Impact Assessment, providing a new comprehensive impact assessment. Considering the multidimensionality of the issue, it needs to hybridize different evaluation methods. The proposed assessment framework considers Cultural Urban Landscape “as a complex indicator for sustainability of the city or territory, of the quality of life, vitality of the place, and the community’s sense of belonging” (Hosagrahar et al. 2016).

4 Landscape variation/wellbeing variation

In a period characterized by considerable unsustainability, the evaluation of wellbeing assumes a central role and human well-being can be recognized as the ultimate goal of sustainable development. According to this goal all public institutions should ensure wellbeing, both individual and collective. It is not only related to economic wealth, but also to the condition of ensuring social cohesion, human rights fulfilment, human needs fulfilment etc. In this perspective, understanding the linkage between the variation of landscape and the variation of wellbeing becomes a relevant issue. First and before evaluation, the concept of wellbeing needs to be defined. Wellbeing is a multidimensional concept that changes in the spatial and temporal dimension. It changes in time, place and culture. So it is difficult to define it in a univocal way.

Despite the health dimension, principally associated with medicine (that have always the same parameters), the wellbeing dimension involves dynamic characteristics. So, in order to define the wellbeing dimension, it is important to understand the context in which people live. The latter is important to define human wellbeing because different factors can interfere with each other and influence it.

Interesting considerations about the assessment of wellbeing and its dimensions are identified by the National Institute of Statistics (ISTAT) and analysed in the BES and URBES Reports (ISTAT 2015a,b). Equitable and Sustainable Wellbeing (BES) is an analysis of the aspects that contribute to the quality of life and it is articulated in 12 sectors (wellbeing dimensions) and 130 indicators. These reports (BES and UrBES) are part of the international debate on the topics “beyond GDP” and the “need for broader measures of progress to complement gross domestic product” (United Nation 2012). Their purpose is to produce a set of multidimensional indicators able to evaluate wellbeing. They achieve this by integrating the “traditional economic indicators” with indicators related to the quality of life that considers equity and sustainability issues in order to give a more complete point of view about society’s development. The aim of ISTAT is to support the debate “beyond GDP”, trying to bring together social, economic, environmental and good governance aspects (all of them are fundamental to achieve wellbeing). The wealth of the society has been for too long linked to increasing GDP. It represents an important economic indicator able to evaluate the wealth of a society; this linkage – between GDP (gross domestic product) and the wealth of society – is a common belief based principally on the idea of “economic growth”. Nevertheless, GDP is not able to capture the multidimensional aspects of wellbeing. It does not represent human wellbeing (Stiglitz et al. 2009): instead it needs to go beyond the mere economic number. Economics should be only instrumental to the achievement of wellbeing. GDP is an oversimplified measure that leaves out many aspects that are not economically evaluable: it is not able to capture information about wellbeing, happiness and the level of life quality.

The above mentioned considerations and the shift towards the new paradigm (Hosagrahar et al. 2016) require an overcoming of this assumption. Therefore, in this perspective the need for new indicators emerges. The issue related to the evaluation of wellbeing assumes a central role in the current debate. It is important to evaluate wellbeing through multidimensional approaches, able to take into account for example aspects of subjective

evaluation from citizens. In the ISTAT reports some indicators are identified. They (integrated with others) could be considered in the seventh category (wellbeing category) of the evaluation framework proposed in this paper. Due to the complexity of the notion of wellbeing and its subjectivity (wellbeing is perceived), it is difficult to identify general shared indicators.

In the common understanding wellbeing is associated with a good quality of life. It is a true assumption, but quality of life is not the only indicator of wellbeing. Wellbeing is associated with a comfortable, healthy, happy life and life quality affects this state. Life satisfaction is another indicators used (in combination with others) to assess wellbeing. The binomial “landscape-wellbeing” assumes a central role in the international debate related to sustainable development (Duxbury et al. 2016, Hosagrahar et al. 2016, ISTAT 2015a,b). Landscape is important for our wellbeing and this is intuitive: we unconsciously search for a place able to communicate to us a sense of harmony, balance, liveliness. At the same time, we usually get away from places that communicate untidiness.

An important factor of landscape is also its identity. A landscape is “good” if it is recognizable and it is “bad” if it has elements not recognizable as identities of that place, but rather seeming extraneous to it. Aesthetic value can contribute to wellbeing but, at the same time, it is the most subjective and personal value. Considering a landscape only as a source of aesthetic enjoyment is an oversimplification. It can also produce wellbeing or illness according to other aspects more complex and less immediately perceptible characteristics. The quality of landscape depends on aesthetic factors and also on aspects related to all landscape values. It is not only related to a visual perception (D’Auria, Monti 2013). In landscape the signs of the past are stratified, in a constantly changing way. The landscape keeps the signs of the evolution of the relationship between man, the environment and its history. This relation impacts on our wellbeing, “communicating” to us a sense of belonging, security, etc., contributing to individual and collective wellbeing. A good landscape produces a sense of wellbeing, a bad landscape produces illness. The landscape also affects our actions and our choices. A healthy landscape corresponds to attractiveness capacity, economic and social dynamics, etc., while an ill landscape corresponds to relocation and degradation, etc.

The economic dimension of the binomial landscape-wellbeing is also important. A good landscape has repercussion also on the economic field: a beautiful and interesting place, for example, attracts tourists, investors, etc. A good quality landscape is an attractor for localization of cultural services, art galleries, museums, theatres. Also the intangible landscapes (human and social) play a central role in local development, creating cooperative capacity, synergies and symbioses (Fusco Girard 2013). Empirical evidence shows that there is a relationship between landscape quality and goods and service demand/sale; in/for a good landscape, there is a higher willingness to pay.

If we are able to conserve Cultural Heritage, we build memory of ourselves and therefore we are able to conserve identity in the face of globalization changes. Conservation expresses the deliberate effort to fix memories in time, to avoid losing our identity. We can react to the risk of losing our identity (because of globalization) through Cultural Heritage. We fix the memory through Cultural Heritage that has been handed down and, in turn, we pass it on to future generations. For this reason, all actions aimed at protecting and improving the environmental, social and economic wellbeing of communities should take into account cultural heritage as well as the opportunities that it offers and threats due to an inappropriate use. Human participation in local cultural activities, such as music, dance and theatre, contributes to the improvements in wellbeing and quality of life (Duxbury et al. 2016). Community participation in cultural activities therefore fosters wellbeing.

There is not much empirical evidence about the contribution of cultural heritage to the achievement of wellbeing. This contribution is related both to the dimension of cultural heritage and identity, sense of belonging, etc. and to the mere functional dimension related to its use. Both of these are important to the achievement of sustainable development with particular reference to the wellbeing category. Cultural heritage contributes to bettering urban life in different ways. For example providing options for housing (through reuse etc.) to improve public spaces, etc. Below some wellbeing indicators (extracted from

Table 6: Wellbeing indicators associated to cultural heritage conservation

Sub-category	Indicator	Unit measure
Education and training	Young people who do not work and do not study	%
Work and life balance	Employment	%
Work and life balance	Non-attendance at work	%
Economic well-being	Available income	€
Housing quality	% of population living in homes without toilet	%
Social relationships	N. of volunteers in non-profit	N./10,000 inhab.
Social relationships	N. of non-profit institutions	N./10,000 inhab.
Social relationships	N. of social cooperatives	N./10,000 inhab.
Security	Murder	N./100,000 inhab.
Security	Theft in dwelling	N./100,000 inhab.
Security	Pickpocketing	N./100,000 inhab.
Security	Robberies	N./100,000 inhab.
Landscape & cultural heritage	Public libraries	N./100,000 inhab.
Landscape & cultural heritage	Museums	N./100,000 inhab.
Landscape & cultural heritage	Libraries users	N./100 inhab.
Landscape & cultural heritage	Museums visitors	N./100 inhab.
Landscape & cultural heritage	Green space	Sqm on 100 sqm
Environment	Drinking water drainage	% of water scattered on the fed volume of water
Environment	Urban air quality	Daily value for PM10
Environment	Urban green space	Green square meters per inhabitant
Environment	Protected natural areas	% of the municipal area
Environment	Urban gardens	Sqm per 100 inhab.
Research and innovation	Patents	Patent applications per million inhab.
Research and innovation	Productive specialization	Productive specialization in knowledge-intensive technological sectors for 100 emp. of local units
Quality of services	Cycle paths	km per 100 km ²
Quality of services	Pedestrian areas	smq per 100 inhab.

Source: Il Benessere Equo e Sostenibile nelle Città – Report ISTAT (ISTAT 2015b)

URBES indicators) are listed that could be considered for cultural heritage conservation projects.

An example is the case study of Skopje (Throsby 2012). The project aimed at the preservation of cultural heritage, the revitalization of the area and the promotion of participation of residents in the program design and implementation (2005). This produced an increase in the employment rate, for example the number of staffing in museums increased from 13 employees (pre-2005) to 50 employees (post-2005). The improvement of landscape increased the attractiveness of the city. It is “translated” in terms of increases in the number of visitors (economic benefits). In fact, the average number of visitors per year for three main museums/galleries in the Skopje old bazaar increased from 257,000 (pre-2005) to 414,000 (post-2005). Another social indicator able to show the capacity of cultural heritage to produce wellbeing is related to the increase in the average monthly wage/salary level that rose from 270 US\$ (pre-2005) to 515 US\$ (post-2005) for Managerial/administrative staff and from 185 US\$ (pre-2005) to 380 US\$ for service/selling staff (post-2005) (Throsby 2012).

Oaxaca De Juarez is another case study (Quartesan, Romis 2010) demonstrating the multidimensional benefits of cultural heritage conservation/regeneration. A significant indicator related to the conservation project of this city (year 2005) is the decrease of vecindades (units that hosts different families that share facilities such as lavatories, kitchens, etc.) from 75 (year 1997) to a number of 35 (2008) (Quartesan, Romis 2010).

The conservation project of the historic center of Salvador De Bahia is another significant example of the contribution of cultural heritage conservation to the increase of wellbeing and city productivity. In fact, after the conservation project, the median worker income increased from 609 Brazilian Reais (year 2000) up to 631 Brazilian Reais (year 2007) and the total unemployment rate decreased from 26.5% in the years 2001-2003 to 22.4% in the years 2005-2007 (Mendes Zancheti, Gabriel 2010).

The preservation project of Toronto produced an increase in the number of artists from 10.5 million (year 2004) to over 11.5 million (year 2006). In addition, the attendance at City-funded and City-operated cultural programs for youth (16-24) increased from 281,000 (year 2004) up to 593,000 (2006) (Ogilvie 2009).

After the nomination as European Capital of Culture 2008, Liverpool registered an increase in the number of employees in creative industry enterprises from 10,000 (year 2004) up to 10,987 (year 2008). It is also important to note the perception of the community. By the end of 2008, 85% of Liverpool's residents agreed that the city, after the nomination as European Capital of Culture, is a better place than before nomination with an improved quality of life (Garcia et al. 2008).

From case studies some data related to wellbeing has emerged: data related to job satisfaction, generalized trust, perceived access to services or satisfaction with relationships did not emerge. Like these case studies, there are many others demonstrating the benefits produced by cultural heritage conservation/regeneration, not only economic benefits, but multidimensional ones. They emerged also in the analysis of the case study of Pozzuoli (South of Italy) that is a forthcoming work (Nocca 2017).

5 Conclusions

This is a very important moment for urban policies because the international debate is focused on sustainable development and the "New Urban Agenda" has been approved at Habitat III, the United Nations Conference on Housing and Sustainable Urban Development, that was held in Quito, Ecuador, in October 2016 (United Nations 2016). It strengthened the idea that cultural heritage and landscape conservation /regeneration can play a key role in sustainable development.

Cultural heritage is interpreted as an essential component of the urban system, of the city as a living organism, and as Patrik Geddes anticipated in 1915 (Geddes 1915), of the city as a dynamic, complex and adaptive system reflecting the changes in society, turning with it, and adapting to new demands in a dynamic perspective. Therefore, the city as a living organism should emulate the behaviour of nature through organizing all processes according to circular economy processes in which nothing is wasted, but everything can be reused (Nocca 2017). In this way, each "product" becomes nutritious for the other and does not produce waste. In this perspective Cultural Heritage can be considered part of a circular productive process through maintenance, reuse and recycling.

The indicator matrix emerging from the present study represents a first step towards a new effective approach able to support the recognition of the key role of cultural heritage in sustainable development. As has emerged from the previous paragraphs, the cultural heritage approach requires an adaptation of evaluation methods. The challenge is to identify a more effective evaluation approach/method that contributes to make integrated conservation more effectively into sustainable human development strategies.

The above-mentioned perspective of city humanization through cultural heritage conservation/ regeneration suggests focusing on social and human impacts of conservation. The aim is to identify and evaluate the value of cultural heritage through quantitative and qualitative data, developing indicators and maps in order to demonstrate that cultural heritage can contribute to comprehensive local productivity.

As emerged from empirical evidence, Cultural Urban Landscape conservation can be an effective catalyst for stimulating local and regional economies (Licciardi 2012, Luxen 2010). The good practices demonstrate that it is able to contribute to city productivity. It is also able to produce economic impacts (Nypan 2005), but there is a need to demonstrate the multidimensional effects of investments. Economic parameters alone are not able to effectively evaluate the progress of societies, but they need to be integrated with social

and environmental information and with indicators of inequality and sustainability.

Surely, the economic impacts of cultural heritage conservation/ regeneration need to be understood more in depth, especially because the society of today speaks the only language of economics. An economic matrix is absolutely necessary, but it is not sufficient. It is not able to capture the multidimensional benefits of cultural heritage conservation/regeneration. Hybrid evaluation methods (Fusco Girard 2014b,c) are therefore required in order to integrate the economic matrix with qualitative indicators, expressed by social (social matrix) and environmental components (ecological matrix) (Fusco Girard et al. 2015, Nocca, De Rosa 2015).

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European urban freight transport policies and research funding: are priorities and Horizon 2020 calls aligned?

Giacomo Lozzi¹, Valerio Gatta¹, Edoardo Marcucci²

¹ University Roma 3, Rome, Italy

² Molde University, Norway

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Abstract. The European Commission has recently developed a growing awareness with respect to the challenges urban freight transport (UFT) poses to cities and, consequently, has started defining specific policies and promoting dedicated tools to address them. Transport is a shared responsibility between the European Union and the Member States, where the subsidiarity principle applies. Accordingly, the former provides European local authorities with support in different areas, including research and innovation funding. This paper aims to assess the linkage and consistency between European policy priorities for UFT and the corresponding calls of the Horizon 2020 (H2020) Research Programme, created to foster research and innovation. The paper identifies and extrapolates in a comparable format ten UFT priority solutions and estimates their degree of correspondence with the H2020 Work Programmes using the amount of research funds allocated to each of them as a proxy. Findings show that, generally, the European Commission addresses UFT through a systematic and coherent approach. Moreover, all the identified solutions are covered by at least one H2020 call, although the extent of the coverage is heterogeneous. Four of the UFT solutions present an overall consistency when it comes to comparing the extent of the scope of the solution and the number of policy documents addressing it, on the one hand, and the number of calls considering it and the budget (potentially) available, on the other.

Key words: Horizon 2020, urban mobility, urban freight transport, European Union, transport policy

1 Urban freight transport challenges and opportunities for research

European cities host 72% of the European Union population (80% in 2020) and generate over 80% of its GDP. About 25% of CO₂ emissions produced in urban areas are attributable to the transport sector, as well as 30-50% of other transport-related pollutants, such as particulate matters and Nitrogen Oxide (ALICE/ERTRAC 2014). Congestion causes inefficiencies producing losses of around 80 billion € per year (European Commission 2011). The 2011 White Paper on Transport identifies the need to take additional steps to ensure that cities contribute to reducing Europe's dependence on imported oil and cutting carbon emissions in transport by 60% by 2050 and achieving essentially CO₂-free city logistics in major urban centres by 2030 (European Commission 2011).

During the last two decades, the European Commission has developed a growing awareness with respect to the challenges of the urban transport sector, and, consequently,

has started defining specific policies and developing dedicated tools to tackle them. Transport is a shared responsibility between the European Union and Member States (MSs) where the subsidiarity principle¹ applies. Urban mobility is essentially a local responsibility. However, in the light of the challenges mentioned above, there is an increasing demand for strengthening cooperation. In fact, urban mobility policies are too heterogeneous, both between and within MSs. For this reason, the European Union provides local authorities with support in the following areas: i) setting a common policy framework; ii) funding for implementation; iii) funding for research and innovation; iv) facilitating the exchange of experience and best practice; v) raising awareness.

Concentration of economic activities and population in European cities are both high and rising. The two phenomena produce new challenges for goods distribution. Public authorities have recently developed a growing, yet still insufficient, awareness of the crucial role urban freight transport (UFT)² policies play within the overall urban mobility system. European MSs need to further integrate UFT in the general city mobility management system. The European Commission is setting up coordinated UFT initiatives and actions. One of these supporting actions is to promote research and innovation to deliver innovative and effective solutions to tackle urban mobility challenges. This is realised through Horizon 2020 (H2020), the European research and innovation programme for the period 2014-2020.

This paper aims to identify the most important UFT policy solutions proposed in the relevant European policy documents, and to evaluate how policy priorities result in funding. In more detail, the paper describes UFT challenges for policy-makers and how policy priorities are defined and assesses whether H2020 funds are consistently allocated to the identified UFT policy solutions according to the weight attributed to UFT in the policy documents.

The paper is structured as follows: section 2 illustrates the methodological steps and the logic behind the analyses performed. Section 3 discusses the main topics and the corresponding solutions reported in the policy documents with respect to UFT. Section 4 shows the results of the consistency evaluation between policy priorities and research funding. Section 5 concludes highlighting future research endeavours.

2 Methodology

The methodology adopted consists of three main steps: (1) selecting policy documents; (2) identifying the most relevant UFT policy solutions; (3) assessing consistency between policy priorities and H2020 research funding.

Three criteria have been used for selecting policy documents. The first criterion refers to the type of documents. A premise on legal aspects is necessary to motivate the choice made. At European level, there are various forms of action: recommendations, directives, communications and acts concerning the organization and functioning of the institutions. Their qualification, structure and legal effects result from various provisions of the treaties or the rules adopted in their application. Also of note is the importance of White Papers³, Green Papers⁴ and Action programmes, through which agreements

¹Its legal basis is Article 5(3) of the Treaty on European Union (TEU): “Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level”.

²The European Commission defines UFT as “the movement of freight vehicles whose primary purpose is to carry goods into, out of and within urban areas” (MDS 2012). But the it also provides a very similar definition of ‘urban logistics’: “[...] the movement of goods, equipment and waste into, out, from, within or through an urban area” (European Commission 2013a). For this reason, the choice here is to consider the two expressions as synonyms and to use only “UFT”, systematically replacing “urban logistics” with “UFT” every time the research incurred in the former expression.

³White Papers communicate a decided Commission policy or approach on a particular issue. They are chiefly intended as statements of Commission policy, rather than a consultation or starting point for debate.

⁴Green Papers are usually used to launch a consultation process. They present Commission policy orientations for debate to interested parties who may wish to comment. The Commission will generally prepare a subsequent proposal.

on long-term objectives among MSs are made. The European Commission prepares and publishes guidance documents relating to the areas over which it has (full or residual) jurisdiction. In the case of urban mobility, the binding power resides in the hands of the MSs, but, in some cases and for certain types of actions, the European Union can intervene through the subsidiarity principle. Since the aim of the paper is to focus on the relationship between UFT policies and the research programmes financed by H2020, the types of acts considered are non-binding guidelines, which can take different forms (e.g. White Papers, Green Papers, Communications⁵), while binding legislative provisions are out of the scope.

The second criterion relates to the field considered. European policies, when addressing any area where concrete intervention is required, very often imply a certain overlapping with other fields. For example, the White Paper on Energy, when dealing with transportation fuels, may provide recommendations that indirectly influence the transportation sector. Such considerations could lead to an analysis of all other sectors' policy documents, having even the slightest potential impact on UFT. However, in order to define an accurate picture, the paper concentrates solely on the documents drafted by the European Directorate-General for Mobility and Transport (DG MOVE) of the European Commission and directly related to UFT⁶. In fact, since each DG has a key role in the definition of the H2020 affecting its sphere of influence, it is considered appropriate to assess the alignment between policy documents and H2020 calls produced by the same DG in the first place. The only exception is the Freight Transport Logistics Action Plan, since it specifically analyses UFT, delving into a significant aspect of logistics in general.

The third criterion simply assumes that only publicly available documents are considered.

Adopting the criteria illustrated above produces the list of documents reported below:

1. Transport White Paper 2001
2. Green Paper "Towards a new culture for urban mobility"
3. Freight transport logistics action plan
4. Action Plan on urban mobility
5. Transport White Paper 2011
6. Urban Mobility Package
7. A call to action on urban logistics

The second methodological step is the identification of the most important UFT policy solutions so to successively link them with H2020 Work Programmes. A qualitative analysis of the above-mentioned policy documents, investigating the entire set of relevant topics addressed, was carried out. An in-depth description is provided in section 3. The selection of the policy solutions is based on the following factors: i) how many, among the seven documents investigated, advocate these solutions (must be at least two), ii) the elements of continuity throughout all the seven documents, and iii) a qualitative assessment of the specific weight and degree of priority within each document.

The list of UFT solutions detected is reported here:

1. Including UFT in Sustainable Urban Mobility Plans (SUMP) + guidelines for local authorities
2. Deployment of ITS systems for (urban) freight
3. Clean Freight vehicles

⁵Communications usually set out a Commission action plan and may include concrete proposals for legislation.

⁶Although many are the policy documents DG MOVE has published in the last 20 years, partly addressing urban mobility, this paper refers only to those explicitly dealing with UFT that are also listed on the DG move urban transport webpage: http://ec.europa.eu/transport/themes/urban/urban_mobility/index.en.htm

4. UFT demand management
5. eFreight
6. Integration between long-distance freight transport and last-mile distribution
7. Shift Modes (bike, boat, rail)
8. Integration between passenger and freight transport
9. Eco-labels
10. Public procurement for freight

The third step refers to the evaluation of the consistency between UFT priorities and H2020 funding. Firstly, a quantitative analysis of the “weight of freight” in the policy documents and H2020 Work Programmes is performed. As it is for the former, a matrix is produced counting the number of recurrences of the following words and combinations of them: i) urban ii) urban logistics; iii) city logistics; iv) urban freight; v) logistics; vi) freight; vii) passenger; viii) public transport. The logic behind the choice of these words is the following:

- “Urban”: the paper narrows the scope of the analysis to the urban dimension of the goods distribution.
- “(urban/city) logistics” and “(urban) freight”: according to a complete literature review, these are the most commonly used terms in the literature to refer to urban goods distribution.
- “Passengers” and “public transport”: many studies ([Lindholm 2010](#), [Lindholm, Browne 2013](#), [UN-Habitat 2013](#)) have underlined the insufficient attention public authorities and European institutions pay to UFT operations. For various reasons, they seem to pay more attention to movements of people, rather than freight, i.e. undertaking policies for public transport and other passengers-related modes ([Lindholm 2014](#)). Therefore, the count of these words is used to compare the weight of the freight sector compared to the weight of the passenger sector in the European policy documents and H2020 Work Programmes.

This analysis indiscriminately considers how many times the specific words are mentioned in the documents, including titles, index and tables. A similar quantitative analysis is performed to provide an estimate of the weight urban logistics/freight topics hold in the H2020 programme considering the various calls, within “Mobility for Growth”, directly or indirectly addressing UFT. The analysis is based on the calculation of the funding share actually allocated to UFT projects’ proposals.

Finally, the paper both analyses the linkage between UFT policy solutions and H2020 Work Programmes and ranks the selected UFT policy solutions according to the weight, in monetary terms, resulting from the research funds allocated to each of them.

3 European strategy and UFT policy solutions

This section considers the seven policy documents listed in section 2, and highlights the policy priorities related to UFT, identifying ten corresponding solutions proposed by the European Commission.

The first European policy proposals in the area of urban mobility, the “Citizens’ Network”, date back to 1995 and 1998. They resulted in the launch of a series of initiatives based upon a “best practice” approach. However, the documents do not present any direct reference to UFT.

In 2001, the 1st White Paper on Transport was released ([European Commission 2001](#)). In Part 3 - Placing users at the heart of transport policy, section 4 specifically addresses the rationalisation of urban transport. The White Paper strategy for urban mobility essentially pursued two main objectives: 1) the promotion of a diversified energy portfolio

for transport, by establishing a new regulatory framework for substitute and sustainable fuels and stimulating demand by experimentation; 2) the promotion and exchange of good practices, aiming at taking better use of public transport and existing infrastructure.

This White Paper didn't specifically address UFT. However, the CIVITAS initiative, launched in October 2000 to support the development of innovative projects on clean urban transport, represented an important step for research in this field, aiming at reducing private car use in city centres and promoting clean urban transport. The solutions envisaged went in three different directions: demand management measures, the integration of urban transport services, and the promotion of low and zero emissions vehicles, also for freight.

In 2007, a European policy document made explicit reference to UFT for the first time. In fact, the Green Paper "Towards a new culture for urban mobility" ([European Commission 2007b](#)) suggests local authorities to consider all urban logistics related to passenger and freight transport together as a single logistic system. Urban distribution needs for an efficient integration between long-distance freight transport and last mile distribution. To this end, the use of smaller, more efficient and clean vehicles is encouraged. When addressing UFT, local authorities should ensure the active involvement of all relevant stakeholders. UFT should be better integrated within the local policy-making process and institutional setting: freight transport distribution is often neglected and considered a mere responsibility of the private sector. Moreover, the role of intelligent transport systems (ITS) for freight becomes essential in order to improve efficiency, especially through better timing of operations, higher loading factors and more efficient use of vehicles. Finally, the document suggests (joint) green procurement of clean and energy-efficient vehicles by public authorities as a new solution to boost the deployment of clean vehicles.

The urban dimension of freight logistics is further developed in the Freight Transport Logistics Action Plan ([European Commission 2007a](#)). It reiterates that local authorities should focus their attention on transport demand management, supported by the deployment of innovative ITS-based solutions. In order for this to happen, a roadmap for the implementation of eFreight⁷ should identify the critical areas where European actions are required (e.g. standardisation). The European Commission also commits to help establishing a set of recommendations, best practice and standards for urban transport logistics, aiming to define common benchmarks or performance indicators for the measurement of efficiency and sustainability of UFT solutions. This aims to reinforce the freight section of CIVITAS fostering the coordination and integration between passenger and freight transport, and between interurban (long-distance) and urban transport logistics.

Based upon the results of the consultation of the Green Paper, in 2009 the Action Plan on urban mobility was adopted ([European Commission 2009](#)), presenting for the first time a comprehensive support package of 20 measures in the field of urban mobility. This stresses again the importance of urban areas as efficient interconnection points for the trans-European transport network and places for a well-organised last mile transport. Action 1 introduces the concept of Sustainable Urban Mobility Plans, aiming to cover all types of transport, including UFT. Action 19 specifically addresses UFT, requiring to better incorporate it in the local transport strategy and to "better manage and monitor transport flows". Finally, the Plan aims to find new ways for improving and sharing data collection and statistics for urban transport and mobility (Actions 16 and 17).

In 2011, the 2nd White Paper on Transport was released ([European Commission 2011](#)). This document represents the current official position of the European Commission for transport in Europe, and sets a roadmap of 40 initiatives for the next decade to build a competitive transport system to increase mobility, foster growth and employment, reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. It includes the specific objective of achieving "essentially CO₂-free city logistics in major urban centres by 2030". The initiative n. 33, "a strategy for near-'zero-emission urban logistics' 2030", encourages again the realisation of best practice guidelines to "better monitor and manage urban freight flows", and promotes joint public procurement for low emission freight vehicles. Inspired by the above-mentioned Freight

⁷The concept of eFreight refers to the favouring of the multimodal transport of goods by creating the appropriate framework to allow tracing goods in real time and ensure intermodal liability.

Transport Logistics Action Plan, it claims a more efficient interface between long-distance and last-mile freight; the deployment of ITS for real-time traffic management, to increase efficiency for last mile distribution, and the definition of strategies for off-peak deliveries, to reduce air emissions and noise. The document also reinforces the concept of eFreight. The initiative n. 28, “vehicle labelling for CO2 emissions and fuel efficiency”, launches a review of the labelling directive and also extends its scope to light freight vehicles.

The Urban Mobility Package (UMP) document ([European Commission 2013b](#)) promotes two non-regulatory initiatives related to the urban mobility sector. On the basis of the subsidiarity principle, it addresses initiatives 31, 32 and 33 of the 2011 White Paper. Initiative n. 33, as described before, refers to best practice guidelines to improve urban freight flows monitoring and management. The central element of the UMP is the Communication “Together towards competitive and resource-efficient urban mobility”, complemented by an annex that sets out the concept of Sustainable Urban Mobility Plans ([Wefering et al. 2013](#)), as well as four Staff Working Documents ([European Commission 2013a](#)), one of which is dedicated to UFT. The central Communication, stressing the importance of the coordination between the public and private sector, claims the coordinated deployment of urban ITS and the importance of urban nodes, considered the “starting point or the final destination (first/last mile) for passengers and freight moving on the trans-European transport network”. It fosters more action on UFT (aspect further developed in the Staff Working Document), promoting measures for the procurement of freight clean vehicles in the framework of the Clean Vehicle Portal⁸. It also defines the future scope of action of the CIVITAS initiative, which will focus on “tackling urban road congestion, reducing the use of conventionally-fuelled vehicles in urban areas, reducing UFT impacts and costs, and strengthening the capacities of local authorities to develop and implement sustainable urban mobility plans”. All these topics directly or indirectly refer to UFT.

Finally, the most specific document on UFT is the “Call to action on urban logistics”, Staff Working Document of the UMP. The document discusses the main challenges related to UFT and identifies possible solutions, also clarifying the role of each governance level (European, National, local) in the process. It highlights that the European research programmes have been supporting and will support research and dissemination for UFT vehicles and solutions, such as the CIVITAS projects. Some of them are focusing particularly on UFT, in testing innovative policy and technological solutions. As regards the challenges at stake, the document identifies e-commerce and online services; comprehensive UFT strategies for cities; cooperation and understanding amongst stakeholders; information and understanding of freight flows; information for urban transport operators about UFT policies, regulations and services; joint procurement of low emission urban freight vehicle; proper consideration of UFT in SUMP. The solutions should follow four main directions: i) Manage urban logistic demand (service and delivery plans); ii) Shift modes (bike, boat or rail); iii) Improve efficiency (better selection of modes and vehicles, increasing load factors, new ITS solutions, eFreight initiatives, driver training); iv) Improved vehicles and fuels: new types of vehicles and operational models (e.g. electric vehicles, off-peak deliveries), deployment of alternative fuels infrastructure”.

To sum up, the main policy solutions are summarised in Table 1.

4 Evaluation of policy priorities and funding

4.1 Quantitative analysis of the “weight of freight” in policy documents and H2020 Work Programmes

This sub-section reports the results of a quantitative analysis performed using the the seven selected policy documents and the two H2020 Work Programmes (2014-2015 and 2016-2017) published so far.

It is divided into two parts. The first provides a quantitative estimation of the “weight of freight” based on the number of recurrences of specific UFT-related words in the

⁸www.cleanvehicle.eu [27-08-2016 – offline]. The Clean Vehicle Portal as a new web-database aims to ensure a level of demand for clean and energy-efficient road transport vehicles and encourage manufacturers to invest in development of vehicles with low energy consumption CO2 emissions and pollutant emissions.

Table 1: Selected UFT policy solutions and their descriptions

Policy Solution	Description
Including UFT in SUMP + guidelines for local authorities	Member States should ensure UFT is given proper consideration in their national approaches to urban mobility and in SUMP's guidelines. Local authorities should include specific UFT provisions in their own SUMP's and enhance UFT stakeholder engagement in the planning/implementation process.
Deployment of ITS systems for (urban) freight	New ITS solutions can help to optimise routes, improve service and reduce costs and impacts. ITS allow for optimised trip planning, better traffic management and easier demand management.
Clean Freight vehicles	The operational characteristics of UFT can often be suitable for the early introduction of new types of vehicles (e.g. electric vehicles). Improvements in vehicles can make UFT quieter, safer, cleaner and more efficient.
UFT demand management	- new operational and business models: e.g. off-peak deliveries, reverse logistics, consolidation, increase load factors, logistic hotels, etc. - incentives and regulations: parking policies, traffic and access regulations and charges, rewarding schemes, information and awareness raising.
eFreight	The concept of eFreight refers to the favouring of the multimodal transport of goods by creating the appropriate framework to allow tracing goods in real time and ensure intermodal liability. As part of the eFreight initiative, attention is given to the optimisation of information exchange for UFT as part of longer (international) logistics chains.
Integration between long-distance freight transport and last-mile distribution	Urban nodes are key elements for the construction of a comprehensive European transport network. Action by European cities is crucial for achieving the objectives of TEN-T policy. The European Commission recognises the need to "provide for the development of the comprehensive network in urban nodes, as those nodes are the starting point or the final destination ('last mile') for passengers and freight moving on the trans-European transport network and are points of transfer within or between different transport modes".
Shift Modes (bike, boat, rail)	Framework solutions provided by city authorities to create favourable conditions for freight shift modes, e.g. strategy, dedicated space, enforcement, privileged access, planning conditions, free parking etc., in order to achieve economic viability in addition to overall improvements.
Integration between passenger and freight transport	Local authorities need to consider all UFT related to passenger and freight transport together as a single logistics system.
Eco-labels	Introduction of a "labelling" scheme to recognise the efforts of pioneering cities to combat congestion and improve living conditions.
Public procurement for freight	Support to projects and exchange of best practices to understand and facilitate joint procurement of urban freight vehicles and of public services and goods by public administrations.

policy documents. The second part focuses on H2020 Work Programmes, illustrating the most relevant information linked to the calls specifically dealing with UFT providing an overview of the resources allocated to the various projects.

4.1.1 European policy documents

In order to support and reinforce the qualitative analysis performed in section 3 that enables selecting the main UFT-related policy solutions, a simple and straightforward quantitative approach is proposed here. The number of recurrences of specific UFT-related words have been systematically counted in the seven policy documents selected, so to provide a snapshot of the “weight of freight” for each of them.

In order to calculate the relative weight of UFT within the policy documents, the paper establishes a simple criterion: all the identified key words are standardised with respect to “urban” (last column in Table 2), which represents the minimum common denominator encompassing all the other ones. “Urban” is central in this analysis, since it represents the physical and conceptual dimension of both the freight and passenger transport sector policies at stake. In other words, the number of times “urban” is mentioned represents the “proxy” which allows us to quantify the relative “weight of freight”.

Noticeably, in some cases and for single documents, the number of recurrences of some key words is higher than the number of recurrences of “urban” (in particular in Transport White Paper 2001 and Freight transport logistics action plan). This reflects the fact that those are broader documents addressing not only the “urban” dimension, but the whole transportation panorama in Europe. Therefore, key words such as “passengers” and “freight” quantitatively prevail, since they also refer to long-distance, extra-urban aspects of transportation.

The results of the quantitative analysis of the “weight of freight” in the policy documents is shown in Table 2 which reports, in absolute terms, the number of times given words or their combinations, directly or indirectly referring to UFT, appear in the documents considered.

As expected, the most frequently mentioned item is “urban” (547), followed by “freight” (241), while “logistics” (165) has fewer occurrences with respect to “passenger” (176). These items only partially address the specific topic considered in this paper. “Urban logistics” appears 72 times, whereas “urban freight” and “city logistics” 28 and 8 times, respectively, obtaining an overall result of 108 recurrences. It is interesting to note that most of the documents use both “urban logistics” and “city logistics”, without explaining whether they are considered synonyms or different concepts. Moreover, an interesting result is that “passenger” and “public transport” occur, combined, the same number of times as “freight” (241). This result suggests a greater attention the freight sector has constantly gained among the European policy-makers over the last 20 years. However, when focusing the analysis at the urban level, the gap is still significant.

4.1.2 H2020 Work Programmes

H2020 is the European Research and Innovation programme, a source of nearly €80 billion⁹ for European research activities for the 2014-2020 programming period. H2020 takes over the Seventh Framework Programme for Research and Technological Development (FP7)¹⁰, and the Innovation section of the Competitiveness and Innovation Framework Programme (CIP).

The programme is based on three pillars: Excellent Science, Industrial Leadership and Social Challenges. The largest share of the budget (38.5%, €29.7 billion) is dedicated to the “Social challenges” pillar, which is, in turn, divided into seven thematic areas including “Smart, Green and Integrated Transport”. A budget share of 8.2% (€6.3 billion) was allocated to the transport sector (Gavigan 2014). The challenge of H2020 is to create

⁹<https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

¹⁰FP7 was the main research programme for the 2007-2013 period, to give financial support to European initiatives promoting research, innovation and technological development for the creation of a European research area (ERA). With a budget of 50.521 billion euro, FP7 funded projects relating to research and technological development with the aim of stimulating growth, competitiveness and employment.

Table 2: Recurrences of UFT related words in the seven policy documents (absolute terms)

Policy docs*	1	2	3	4	5	6	7	Total	Weight wrt “urban”
Key word(s)									
Urban	42	44	10	105	38	186	122	547	-
City logistics	0	0	0	0	2	2	4	8	1%
Urban logistics	0	1	0	1	2	13	55	72	13%
Urban freight	0	2	1	4	1	1	19	28	5%
Σ city logistics + urban logistics + urban freight	0	3	1	5	5	16	78	108	19%
Logistics	10	6	52	3	5	18	71	165	30%
Freight	84	19	53	10	37	2	36	241	44%
Passenger	110	20	2	10	32	1	1	176	32%
public transport	32	13	0	12	5	3	0	65	12%

*The documents taken into account are: 1) Transport White Paper 2001; 2) Green Paper “Towards a new culture for urban mobility”; 3) Freight transport logistics action plan; 4) Action Plan on urban mobility; 5) Transport White Paper 2011; 6) Urban Mobility Package; 7) A call to action on urban logistics.

Source: Self-elaboration

a transport system making efficient use of resources, which is environmentally friendly and safe. H2020 supports the research for new methods to obtain these results, and identifies two key topics, i) technology and ii) behavioural analysis, to develop innovative intervention strategies.

The budget is allocated every two years via a biannual Work Programme. Table 3 and Table 4 provide a budget overview of the H2020 Work Programmes 2014-2015 and 2016-2017, respectively, and an estimation of the (potential) financial support allocated for UFT in the framework of the “Mobility for Growth” call. With respect to FP7, the budget was increased by about 30%, considering the same topics (Gavigan 2014).

The first H2020 Work Programme (European Commission 2015a) was adopted on 10 December 2013 and structured in four broad cross-cutting lines of activities (i.e. resource efficient transport that respects the environment; better mobility, less congestion, more safety and security; global leadership for the European transport industry; socio-economic and behavioural research and forward looking activities for policy making) and three Calls for proposals (i.e. Mobility for Growth; Green Vehicles; Small Business Innovation for Transport) for an overall budget of €792.5 mln. Different calls for proposals directly or indirectly addressed UFT, but the call MG.5.2-2014 was specifically dedicated to this topic. In particular, it aimed at (i) improving basic knowledge and understanding on freight distribution and service trips, (ii) implementing innovative policies and solutions to ensure a better use of infrastructure (e.g. delivery spaces, off peak deliveries, non-road modes, urban waterways) and vehicles, (iii) testing consolidation and distribution centres. This call was directly linked to MG.6.1-2014 which looked for the right business models fostering (horizontal and vertical) synergies to decouple the growth of urban and inter-urban freight transport demand from its consequences on traffic and the environment. Other calls addressing UFT were MG.5.1-2014, MG.5.3-2014, MG.5.4-2015 and MG.5.5-2015. All of them generally referred to “freight”, while the latter makes a specific reference to “urban freight logistics”.

The Work Programme 2016-2017 was adopted on 13 October 2015, accompanied by an overall budget of €756.1 mln (European Commission 2015b). It presents the same structure and lines of activities of the previous one, with a small change in the calls for proposals. Again, in the urban mobility section there is a call dedicated to UFT, but in this case it addresses an even more specific topic. In fact, the title of the call is MG-4.3-2017 - Innovative approaches for integrating urban nodes in the TEN-T core network corridors. The solutions tested in this framework should investigate: (i)

Table 3: H2020 Work Programme 2014-2015: a budget overview

Selected Call		Budget (mln €)
<i>MG.5.1-2014</i>	<i>Transforming the use of conventionally fuelled vehicles in urban areas</i>	} 40
MG.5.2-2014	Reducing impacts and costs of freight and service trips	
MG.5.3-2014	Tackling urban road congestion	
MG.5.4-2015	Strengthening the knowledge and capacities of local authorities	9
MG.5.5-2015	Demonstrating and testing innovative solutions for cleaner and better urban transport and mobility	57.5
MG.6.1-2014	Fostering synergies alongside the supply chain, including e-commerce	} 32
MG.6.2-2014	De-stressing the supply chain	
<i>MG.7.1-2014</i>	<i>Connectivity and information sharing for intelligent mobility</i>	} 28
<i>MG.7.2-2014</i>	<i>Towards seamless mobility addressing fragmentation in ITS deployment in Europe</i>	
TOTAL (selected calls)		166.5
Share of total funds allocated to calls to be potentially used for UFT projects		(29.8%)
Total budget of Mobility for Growth calls [374.50 (2014) + 184 (2015)]		558.5

Notes: normal: calls *directly* addressing UFT; italic: calls *indirectly* addressing UFT

new approaches for linking long-distance with last-mile freight delivery in urban areas, (ii) the design of freight corridors in cities, (iii) an efficient and sustainable (e.g. using alternative fuel vehicles) solution for 'last mile' delivery, and a greater use of intermodal urban freight logistics. Nevertheless, other types of UFT innovative solutions can still be funded and tested through other urban mobility calls. In particular, the call MG-4.1-2017 includes issues such as new governance models for freight and passenger transport, better coordination and cooperation, synergies between passenger and freight transport, stakeholder engagement, etc. In the Logistics section, the first call MG-5.1-2016 is directly linked to MG-4.3-2017. In particular, it aims at connecting (sections of) the TEN-T freight network with each other and last mile delivery services, and developing prototype Modular Load Units, optimised for automated handling and high load factors in all transport modes. Although not directly related to UFT, the calls MG-5.2-2017 and MG-5.3-2016 pursue the deployment of ITS and green transport in the logistics sector. Other related calls are MG-4.2-2017 and MG-4.4-2016.

The total amount of funds allocated to the "Smart, Green and Integrated Transport" sector is €1,572.5 mln for the entire period 2014-2017. Out of this amount, the funds allocated to Mobility for Growth calls are €994.1 mln. According to the results shown in Tables 3 and 4, the share of the total funds allocated to calls that can be potentially addressed by UFT projects' proposals is €258.5 mln (26% of the total available budget), of which €166.5 mln (29.8% of the budget) for the period 2014-2015 and €92 mln (21.1% of the budget) for the period 2016-2017. This means that about a quarter of the total budget of the first 4 years of the H2020 programme is potentially available to fund UFT projects. Attention should be called to the difference in funding between the two periods: the first puts out a general call for UFT (MG.5.2-2014), and potentially allocates almost a third of the total funds to UFT projects; the second period proposes a very specific call for UFT (MG-4.3-2017) and potentially allocates only a fifth of the total funds to UFT projects.

As for the first period (2014-2015), the paper provides a further step of analysis. Since the funding period is over, it is possible to define the degree of alignment between the resources potentially available and the ones actually allocated (see Table 5). It may be noticed that 95% of the budget potentially available was actually assigned to projects (€157.4 vs €166.5 mln). Among these, considering the freight scope in general, a total of €57.5 mln has been allocated to this type of projects, corresponding to 36% of available

Table 4: H2020 Work Programme 2016-2017: a budget overview

Selected Call		Budget (mln €)
MG-4.4-2016	<i>Facilitating public procurement of innovative sustainable transport and mobility solutions in urban areas</i>	2
MG-4.1-2017	Increasing the take up and scale-up of innovative solutions to achieve sustainable mobility in urban areas	} 22
MG-4.2-2017	Supporting 'smart electric mobility' in cities	
MG-4.3-2017	Innovative approaches for integrating urban nodes in the TEN-T core network corridors	2
<i>MG-4.5-2016</i>	<i>New ways of supporting development and implementation of neighbourhood-level and urban-district-level transport innovations</i>	10
MG-5.1-2016	Networked and efficient logistics clusters	12
MG-5.2-2017	Innovative ICT solutions for future logistics operations	12
MG-5.3-2016	Promoting the deployment of green transport, towards Eco-labels for logistics	2
<i>MG-6.2-2016</i>	<i>Large-scale demonstration(s) of cooperative ITS.</i>	25 ¹
MG-6.3-2016	Roadmap, new business models, awareness raising, support and incentives for the roll-out of ITS	5
TOTAL (selected calls)		92
Share of total funds allocated to calls to be potentially used for UFT projects		(21.1%)
Total budget of Mobility for Growth calls [210.10 (2016) + 225.50 (2017)]		435.6

Notes: Key: normal: calls *directly* addressing UFT; *italic*: calls *indirectly* addressing UFT

¹ Unique budget for 6.1 & 6.2.

funds. Moreover, €31.7 mln have been specifically allocated to UFT projects¹¹. This corresponds to 20% share of the overall available fund for the period 2014-2015.

Finally, a comparison between the relative “weight of freight”, as outlined in Table 2, and the share of resources actually allocated to UFT projects, has been carried out. Results show an overall consistency: “city logistics”, “urban logistics” and “urban freight” (considered as synonyms in this paper) are mentioned 19% of times with respect to “urban” (chosen as benchmarking) in the policy documents, the same percentage related to the funding share allocated to UFT projects. Similarly, “freight” is mentioned 44% of times with respect to “urban” in the policy documents, which is a percentage relatively close to the overall funding share of 36% attributed to freight projects. However, the picture changes when considering “logistics” as a synonym of “freight”: in this case, the share rises up to 74%, significantly deviating from the share of funds actually attributed to freight projects.

4.2 Comparison between UFT solutions and corresponding call(s)

This section aims at analysing the link between the ten UFT policy solutions, considered essential for the achievement of a more efficient, less polluting and less impacting urban distribution of goods, and H2020 Work Programmes considering the weight in monetary terms resulting from the research funds allocated to each of them.

Table 6 shows the ten solutions, ranked according to the total funding budget available, along with the information about the documents where they are mentioned and the extent of their scope¹², indicating the corresponding H2020 calls in Work Programme 2014-15 and 2016-17.

The ten identified solutions differ in their scope: for example, “Including UFT in SUMP” and “UFT demand management” can be defined in many different ways,

¹¹UFT projects are those whose main objective is the adoption of sustainable solutions for UFT (for example, the SETRIS and PORTIS projects have a specific work package dedicated to UFT, but the main aim of the projects does not refer to this topic).

¹²The research qualitatively attributes a weight from 1 to 3, accordingly to the extent of the scope of each solution: + (narrow), ++ (medium), +++ (wide).

Table 5: Comparison between the resources potentially available and the ones actually allocated (Work Programme 2014-2015)

Call	Acronym	European Union contribution (mln €)	Budget/call (mln €)
MG.5.1-2014	EMPOWER	4.9	
	ELIPTIC	6.0	
MG.5.2-2014	SUCCESS	3.2	
	NOVELOG	4.4	
	CITYLAB	4.0	
	U-TURN	2.7	
MG.5.3-2014	CREATE	4.0	
	FLOW	3.8	
	TRACE	2.9	
	CIPTEC	3.5	
Subtotal (MG.5.1, 5.2, 5.3)		39.4	40
MG.5.4-2015	SUMPS-UP	4.0	
	PROSPERITY	3.2	
Subtotal (MG.5.4)		7.2	9
MG.5.5-2015	CIVITAS ECCENTRIC	17.4	
	CIVITAS DESTINATIONS	17.9	
	PORTIS	16.4	
	CIVITAS SATELLITE	3.0	
Subtotal (MG.5.5)		54.7	57.5
MG.6.1-2014	NEXTRUST	18.1	
MG.6.2-2014	SYNCHRO-NET	7.6	
Subtotal (MG.6.1, 6.2)		25.7	32
MG.7.1-2014	SocialCar	5.9	
	OPTIMUM	6.0	
MG.7.2a-2014	EuTravel	3.9	
	ETC	4.5	
	MASAI	3.3	
	BONVOYAGE	4.0	
MG.7.2b-2014	ITS Observatory	1.3	
	CODECS	1.6	
Subtotal (MG.7.1, 7.2a, 7.2b)		30.5	28
Total		157.5	166.5
Total UFT projects		31.7 (20%)	
Total freight projects		57.4 (36%)	
Total non-freight projects		68.4 (64%)	

Key: bold: UFT projects; bold&italic: freight projects

according to the specific topic the applicant wishes to address. Conversely, “eco labels” and “procurement” are specific enough and they can hardly be suitable for different interpretations. The results reported show that, in principle, each of the selected solutions is covered by at least one call.

Figure 1 summarises the information provided taking into account the following variables:

- 1/a) the extent of the scope of the solution that was normalised with respect to 7, which is the number of policy documents investigated;
- 1/b) number of policy documents addressing each solution according to the results of Table 6;
- 2/a) number of calls considering each solution, as reported in Table 6. The maximum number of calls for a given solution is 7, thus normalisation is not needed;
- 2/b) budget (potentially) available for each solution. Directly linked to the calls, the amount per solution, specified in Table 6, is normalised with respect to 7.

In general, 2/a and 2/b follow the same steady decreasing trend, highlighting the consistency between the amount of funds and the related calls that make them available. 1/a and 1/b both follow a more volatile path, nevertheless presenting the same fluctuations and a decreasing trend which is overall consistent with the one of 2/a and 2/b.

Four of the UFT solutions present an overall consistency when it comes to comparing 1/a) and 1/b), on the one hand, and 2/a) and 2/b), on the other: the greater (lesser) the scope of the solution and the higher (lower) the number of mentions in policy documents, the more (less) it is addressed in H2020 calls and, therefore, more (less) potential budget available for its implementation. This seems the case for “UFT in SUMPs”, “clean freight vehicles”, “shift modes”, “integration passenger/freight”.

There are five solutions, out of ten, which do not present a clear path: “UFT demand management”, “eco-labels” and “public procurement for freight” seem under-funded (or over-covered), whereas “eFreight” and “ITS”, on the contrary, seems over-funded (or under-covered).

These solutions are discussed in more detail in what follows. In recent years, transport demand management has been discovered to influence agents’ behaviour in the urban sector (e.g. Ben-Elia, Avineri 2015, Dziekan, Kottenhoff 2007, Juhász 2013, Marcucci et al. 2007, 2013a,b, Mokhtarian, Salomon 2001, Watkins et al. 2011), through the adoption of soft policy measures (SPMs). These are gaining increasing attention in the field of sustainable mobility for various reasons, such as the lack of large budgets available or public dissent against coercive measures (Gärling, Schuitema 2007). SPMs aim to influence transport actors’ mobility choices, and therefore altering the demand for mobility (Jones et al. 2011). SPMs are often low-cost, compared to the other solutions, making “UFT demand management” a very cost-effective approach. In fact, it does not require a significant financial investment for research and innovation, but rather an extensive investigation on how the implementation and exchange of UFT SPMs’ best practices can be spread to ensure it is raising awareness and successfully transferring and adapting to different contexts. It is important to note that a robust demand analysis should foresee an evaluation of stakeholders’ policy acceptability, behaviour change and willingness to pay measures (e.g. Gatta et al. 2015, Le Pira et al. 2017b, Marcucci, Gatta 2016). Recent trends in freight demand management includes: i) off-hour deliveries (e.g. Holguín-Veras et al. 2014, Marcucci, Gatta 2017); ii) crowdshipping (e.g. Marcucci et al. 2017c, Punel, Stathopoulos 2017).

“Public procurement for freight” and “eco-labels” are also an effective and relatively low-cost solution and, in some respects, they follow the same principles as the “UFT demand management” category: the use of the procurement leverage and recognition schemes (including eco-labelling) potentially enhance safety and reduce emissions. Indeed, public administrations might set rules to procure external services according to certain “green” standards. In this way, they i) give signals to UFT stakeholders to improve their sustainability standards in order to participate in public tenders, and ii) give an example

Table 6: Comparison between UFT solutions and corresponding call(s)

UFT solutions ¹	Corresponding call(s) ²	Budget available ³
1) Including UFT in SUMP + guidelines for local authorities (focus on stakeholder engagement)	MG.5.2-2014	13
Policy documents: 2, 3, 4, 6, 7	MG.5.4-2015	9
Extent of the scope of the solution: +++	MG.5.5-2015	57.5
	MG-4.1-2017	22
	MG-4.2-2017	
	MG-4.3-2017	2
	Total	103.5
2) Deployment of ITS systems for (urban) freight	MG.6.1-2014	16
Policy documents: 2, 3, 5, 6, 7	<i>MG.7.1-2014</i>	28
Extent of the scope of the solution: ++	<i>MG.7.2-2014</i>	28
	MG-6.2-2016	12.5
	MG-6.3-2016	5
	<i>MG-4.2-2017</i>	11
	MG-5.2-2017	12
	Total	84.5
3) Clean Freight vehicles	<i>MG.5.1-2014</i>	13
Policy documents: 1, 2, 4, 5, 6, 7	GV.4-2014	18
Extent of the scope of the solution: ++	<i>MG-4.2-2017</i>	11
	GV-08-2017	16
	Total	58
4) UFT demand management	MG.5.2-2014	
Policy documents: 1, 3, 4, 5, 6, 7	MG.5.3-2014	26
Extent of the scope of the solution: +++	MG.6.1-2014	16
	MG-4.1-2017	11
	MG-4.3-2017	2
	Total	55
5) eFreight	<i>MG.6.1-2014</i>	32
Policy documents: 5, 7	MG.6.2-2014	
Extent of the scope of the solution: +	MG-5.2-2017	12
	<i>MG-4.2-2017</i>	11
	Total	55
6) Integration between long-distance freight transport and last-mile distribution	MG.6.1-2014	16
Policy documents: 2, 3, 4, 5, 6	MG-4.3-2017	2
Extent of the scope of the solution: ++	MG-5.1-2016	13
	Total	31
7) Shift Modes (bike, boat, rail)	MG.5.2-2014	
Policy documents: 1, 7	MG.5.3-2014	26
Extent of the scope of the solution: +		
8) Integration between passenger and freight transport	MG-4.1-2017	11
Policy documents: 2, 3	<i>MG-4.5-2016</i>	10
Extent of the scope of the solution: +	Total	21
9) Eco-labels	MG-5.3-2016	2
Policy documents: 2, 5		
Extent of the scope of the solution: +		
10) Public procurement for freight	MG-4.4-2016	2
Policy documents: 2, 5, 6, 7		
Extent of the scope of the solution: +		

¹ normal: policy documents directly mentioning the selected solution; *italic*: policy documents indirectly mentioning the selected solution. Extent of the scope of the solution (qualitative assessment) from + to +++. Policy documents: 1= Transport White Paper 2001; 2= Green Paper; 3= Freight transport logistics action plan; 4= Action Plan on urban mobility; 5= Transport White Paper 2011; 6= Urban Mobility Package; 7= A call to action on urban logistics

² normal: calls directly addressing the solution; *italic*: calls indirectly addressing the solution.

³ *italic*: estimated budget in the case more calls are grouped under a unique budget item

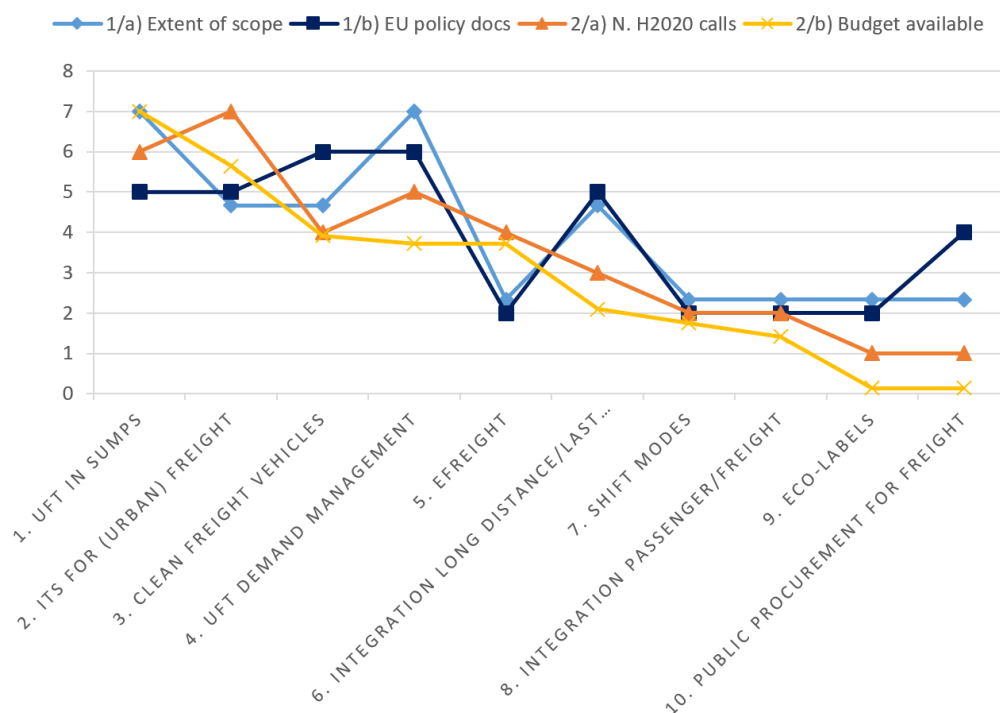


Figure 1: Analysis of the selected UFT policy solutions

of good practice, triggering a virtuous circle that allows them to frame these choices in the framework of behaviour change campaigns.

“eFreight”, mentioned in four calls, obtains an average ranking position, and “Deployment of ITS systems for (urban) freight” is also present in many documents. They can be addressed in many different calls, but only some of them specifically refer to UFT, affecting the possibility that a UFT-related project gets funded, because of the strong competition of other non-UFT-related project proposals.

To conclude, unlike other solutions, “Integration between long-distance freight transport and last-mile distribution”, is cited in almost all the documents but is considered only in few and very specific calls. This apparently biased result can be explained by the intrinsic characteristics this solution has, requiring more implementation than research supporting activities. In this case, other types of funding instruments which are not considered in this paper (e.g. Connecting Europe Facility¹³ funds which finance the trans-European transport network projects¹⁴) seem more appropriate.

5 Discussion and conclusions

The paper proposes an innovative approach for the assessment of the coherence and consistency between policy priorities and funds allocated to related research activities. It provides a systematic (living) “matching” tool, capable of constantly monitoring the parallel evolution of policies and projects.

Firstly, the paper carries out a detailed analysis identifying the UFT challenges, and the related policy solutions defined at European level. Findings show that, starting from 2001, with the 1st White Paper on Transport, and, in a more comprehensive way, from 2007, with the Green Paper, the European Commission addresses UFT challenges

¹³The Connecting Europe Facility for Transport is the funding instrument to realise European transport infrastructure policy. It aims at supporting investments in building new transport infrastructure in Europe or rehabilitating and upgrading the existing one.

¹⁴Since 2014, some Connecting Europe Facility calls address the urban nodes i.e. the cities on the network. Over 2014-2015, up to €500 million were dedicated to urban nodes.

through a systematic and coherent approach. Most of the significant priorities (constantly updated) aim to reach the same long-term objectives. Moreover, in 2013 the European Commission decided to dedicate one of the four accompanying documents of the Urban Mobility package to UFT (“A call to action on urban logistics”). This testifies the growing attention conferred to this topic. Ten solutions are proposed for the achievement of a more efficient, less polluting and less impacting urban distribution of goods.

At a second stage, the paper illustrates the H2020 research programme, providing an overview of the total budget allocated to it and the share of funds allocated to the transport sector. Based on the main UFT priorities identified in the policy documents, the paper selects the corresponding calls from the 2014-2015 and 2016-2017 H2020 Work Programmes to quantify the funds available to (potentially) finance UFT projects. The total amount of funds allocated to the “Smart, Green and Integrated Transport” sector is €1,572.5 mln for the period 2014-2017. About a quarter of the total budget of the first 4 years of the programme is potentially available to finance UFT projects, which represents a satisfactory share of available funds. The paper also investigates, limited to the concluded funding period 2014-2015, whether and how the funds a priori allocated correspond to those actually credited. Encouraging results are found. In fact, €31.8 mln are allocated to UFT projects, representing a 20% share of the overall potentially available funds. Moreover, considering the “freight scope” in general, a total of €57.4 mln are allocated, representing a 36% share of the available funds. These findings show an overall consistency with the “weight of freight” index. In fact, “city logistics”, “urban logistics” and “urban freight” hold together a relative weight of 19% in the policy documents, almost the same percentage of funds attributed to UFT projects (20%). “Freight” holds a relative weight of 44% in the policy documents, again close to an overall funding share of 36% of freight-related projects.

The approach proposed gives the opportunity to “weight” the importance of all significant UFT solutions proposed, by tying them with the H2020 Work Programmes and the corresponding budget allocated for their development and deployment. Results show that each of the selected solutions is covered by at least one call. As a consequence, there is the opportunity to undertake research and innovation projects in each of the UFT priority areas. Four of the UFT solutions present an overall consistency when it comes to comparing the extent of the scope of the solution and the number of documents addressing it, on the one hand, and the number of calls considering it and the budget (potentially) available, on the other. Other solutions do not follow a clear path. “UFT demand management” policies, “eco-labels” and “public procurement” can be considered cost-effective solutions, not requiring a significant financial investment. According to these findings, future research should identify the most promising UFT SPMs in the field of “UFT demand management”, implying a behaviour changing approach, and consequently test their potential for rolling out to different local environments. This also implies a higher level of local UFT stakeholders’ involvement and cooperation, led by local authorities (Lindholm, Browne 2013, Marcucci et al. 2017b, Quak et al. 2015), which can materialise into cooperative schemes, incentives and public-private partnerships. Indeed, recent literature indicates the need for including stakeholders’ preferences and their interactions within a participatory planning process (Gatta et al. 2017, Le Pira et al. 2017a, Marcucci et al. 2017a).

Looking at the list of the ten priorities identified in the policy documents, it is evident there is an absence of data collection and modelling for UFT. Data collection and modelling are essential to observe and analyse the movements of goods in urban areas in a reliable and comparable way, and, consequently, to plan and implement solutions based on the real needs of each context.

The need to place greater emphasis on research in this sector is also highlighted in the aforementioned Urban Freight Roadmap of ALICE/ERTRAC (2014), which “identifies data collection and knowledge building for urban logistics as the first step for a relevant urban logistics research agenda”. It also considers that the “development and use of modeling tools is necessary to better understand the economics and behaviour and assess the impact of (...) policy measures”.

The H2020 call MG.5.2-2014 (see section 4.1.2) has partially addressed this issue,

promoting research on indicators, measurement and data, as well as economic and behavioral modelling. However, the related projects have not been sufficiently coordinated in terms of sharing and consolidation of results, as would be appropriate for such a topic: it is emblematic of the non-binding guidelines of the European Commission "Data collection methodologies for urban freight policy", meant to provide specific information on the data that can be collected, purposes and best practices. Initially scheduled for January 2017, they have not yet been published. Therefore, further effort is still needed to develop a clearer and stronger strategy regarding research on new methods and practices for data collection and modelling.

To sum up, over the past 20 years, the identified challenges and the proposed solutions are developed in a consistent manner and UFT is sufficiently covered by H2020 research funds. However, funds are heterogeneously allocated between the UFT policy solutions investigated. It should be borne in mind that the research funds allocated by the H2020 Work Programmes are specifically intended for research projects. The paper does not investigate other funding, in particular the structural funding, nor other related European programmes, such as the Connecting Europe Facility for Transport, created for the implementation of the identified solutions, in particular as regards infrastructure improvements.

Future endeavours could imply extending the research to other DGs, policy documents and European funds, to understand and evaluate how the urban transport sector policy fits with and is affected by the overall European policies in terms of environment, energy, growth, competition, regionalism, etc. This will require a fully dedicated new study, since details and a complete coverage of European non-binding instruments addressing urban transport is difficult to obtain and incomplete, and the amount of those is likely to be very high.

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Barriers of Culture, Networks, and Language in International Migration: A Review*

Zhiling Wang¹, Thomas de Graaff², Peter Nijkamp³

¹ Jinan University, Guangzhou, China

² Vrije Universiteit Amsterdam and Tinbergen Institute, Amsterdam, the Netherlands

³ Tinbergen Institute, Amsterdam, the Netherlands and A. Mickiewicz University, Poznan, Poland

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Abstract. Along with the increasing pace of globalization, recent decades faced a dramatic increase in international migrant flows as well. Compared to the flows of trade, capital and knowledge, we observe that contemporaneous complex institutional differences, historical backgrounds, and individuals' diverse socio-demographic characteristics make the migrant workers' choice of destination arguably much more uncontrollable. This study shows that migration is intertwined with culture, networks and language in a complex way, (i) by reviewing related studies on the barriers of culture, networks and language in international labor mobility, and (ii) by exploring missing gaps and prospective avenues for research. Nowadays, the migration pressure on Europe and the United States has created substantial challenges, leading to an urgent need to address the economic assimilation and social integration of migrants. Against this background, we emphasize that these non-economic factors have played an increasingly critical role in shaping international migration and its future socio-economic consequences for destination countries.

JEL classification: F22, Z10, Z13

Key words: migration, culture, networks, language

1 Introduction

Our life changed drastically with the pace of globalisation. For centuries, traders travelled far along the Silk Road through Asian regions, to exchange for exotic goods, culture and knowledge. Nowadays, cars are assembled in the United States with important parts coming from Japan and Germany, the Standard Chartered Bank initiates its management trainee programmes and hires graduates from all over the world, and global news networks such as CNN are broadcasting internationally and have a much broader audience than ever before.

There are countless examples that fit the four basic concepts of globalization: trade and transactions, capital and investment movements, migration and movement of people, and the dissemination of knowledge (IMF 2000). The swift expansion of transport networks

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and the prevalence of ICT use have helped to facilitate trade flows, capital flows and knowledge flows in a more or less systematic and organized manner. *Labor flows are, however, a far more complicated phenomenon to study.* On the one hand, labor flows are fundamental to creating a global economy, and the interplay among trade, capital and knowledge relies heavily on the mobility of workers (Chang 1999, Freeman 2006, Poot, Strutt 2010). On the other hand, the complex institutional differences, historical reasons, and individuals' diverse socio-demographic characteristics, make the migrant workers' choice for destinations much more uncontrollable (Massey et al. 1993, Poot 1996). Moreover, migrants' adjustment to the host society is still a heavily debated issue—both in research and the society at large. Finally, opposite to other flows, migration has a significant impact on the host society as labor force composition, consumptions patterns and even the type of commodities may change.

Social integration involves various multidimensional barriers: culture, networks and language are of particular importance. First, adjustment to a new culture and changes in identity might cause multiple stresses (Bhugra, Becker 2005). The current economic approach to cultural integration is mainly the analysis of individual incentives in forming a new cultural identity (Kónya 2007, Nekby, Rödin 2010) and in transmitting values and beliefs across generations (Bisin, Verdier 2000, 2001, Kónya 2005). Second, developing new networks at the destination facilitates economic adjustment (Edin et al. 2003, Munshi 2003, Lancee 2012a). Migrants usually start developing networks of their own ethnic group, in turn limiting social interaction with the native population in the destination as time goes on. Third, overcoming language barriers is an essential step towards social integration, which not only brings economic benefit but also increases social welfare (Lazear 1999, Florax et al. 2005, Chiswick, Miller 2015).

Therefore, the objective of this paper is to review the existing literature on migrants' location choice and adjustment to the host society, and explicitly focuses on the barriers that culture, networks and language sometimes raise. To do so, the next section first deals with a general discussion on migrants' location choice and adjustment to the host society. Subsequently, Section 3 deals with the impact culture, networks and language have on these questions. In addition to reviewing the literature, Section 4 identifies remaining research gaps. The last section summarizes shortly.

2 People on the Move

To understand workers' migration behavior, a solid (microeconomic) theoretical foundation is necessary. In this respect, four seminal studies are worth mentioning as a starting framework. Sjaastad (1962) is the first to apply human capital theory to understanding migration, where he treats migration as an investment increasing the productivity of human resources. This cost-benefit calculation is conceptualized into monetary costs, non-monetary costs, monetary returns and non-monetary returns. Katz, Stark (1987) further take into account the information asymmetry in the model. When employers are unable to detect the ability of potential migrant workers, there would be adverse selection discouraging high-ability workers to migrate. Later, Chiswick (1999) designs a human-capital model of investment in migration, and presents scenarios when the favorable selectivity of migrant workers would occur. We note that the models in the previous three studies apply to migrants who mainly move for economic opportunities. Besides economic migration, migrants may move for 'non-economic' reasons, such as tied movers¹ and refugee migrants. A more sophisticated analysis is provided by Mincer (1978), who explores the effects of family ties relevant to migration decisions on the probability of migration, on consequent changes in employment and earnings of family members, and on family stability.² To further understand barriers and filters in migration decisions, we

¹Tied movers are typically associated with family migration and reunification, where one spouse is moving for economic reasons and the other spouse moves for family-related reasons (the tied mover). In many cases, migration leads to an increase of total family income but a decrease in income of the tied mover

²The theoretical studies elaborated here are far from an exhaustive review of the (economic) migration literature. Though the entry barriers are different for domestic migration and international migration, there is no theoretical distinction. We refer to Bodvarsson et al. (2015) and Kondoh (2017) for a broad

need to review first a general framing of migration behavior.

First of all, migrants choose their destinations for a variety of reasons. A strand of migration literature tackles specifically the direction of labor flows and the attractiveness of regions. To summarize, three dominant factors play a significant role in affecting the migrants' choice of destination: the local characteristics of the destination, the gravity force between origin and destination, and the individual characteristics of migrants. First and foremost, employment opportunities are frequently seen as the most predominant pull factor (Hicks 1932, Greenwood, Hunt 1984). Besides the economic aspect, quality of local governance, public goods and services also increase the regional attractiveness for future residents (Tiebout 1956, Glaeser et al. 2001, Ketterer, Rodríguez-Pose 2015). Equally important is the value of local natural amenities, such as topographical, water or climate-related features. This is implicitly incorporated in the wage level and the housing price, and turns out to be another attractor for incoming migrants (Graves 1980, Roback 1982, Rappaport 2007, Dorfman et al. 2011, Rodríguez-Pose, Ketterer 2012, Cai et al. 2016). Second, the pull from origin to destination includes many terms: high income differentials, shorter physical distance, closer cultural atmosphere, linguistic proximity, and larger flows of people between origin and destination. These factors could significantly increase the migrants' probability of choosing a specific region or area (Greenwood 1975, Bartel 1989, Epstein, Gang 2006, Bauer et al. 2007, Fafchamps, Shilpi 2013, Adserà 2015). Third, some individual characteristics might affect migration patterns as well. For example, older people have higher preferences for favourable weather (Scott 2010). On the other hand, younger and highly educated households tend to move towards places with higher quality business environments (Chen, Rosenthal 2008).

Another intriguing issue which is of paramount importance to both migrants themselves and the host society, is the migrants' post-arrival adjustment, where the key question is how migrants adjust to the host society. With regard to economic assimilation, Chiswick's pioneering study with US census data shows that the earnings gains of foreign-born men are the greatest in the initial years upon arrival, tapering off with time in the destination country (Chiswick 1978). It initiated an avalanche of subsequent studies on the pattern of immigrants earnings assimilation in Canada, Australia and some European countries (see, e.g., Bloom, Gunderson 1991, Baker, Benjamin 1994, Chiswick et al. 2005, Izquierdo et al. 2009, Clark, Lindley 2009, Algan et al. 2010, Kaushal et al. 2016). The accumulation of destination-specific human capital, such as post-arrival schooling, language skill acquisition, and on-the-job training, is seen as the main instrument to realize earnings growth and occupational mobility. Nevertheless, social integration of migrants should go hand-in-hand with economic assimilation (Tselios et al. 2015). As Dustmann (1996) briefly puts it, 'one should expect that social and economic adjustment are to some extent correlated.'

Lastly, and perhaps what the host society is most concerned about, is the short-term and long-term impact of migration flows on society itself. For example, do they fulfill vacancies which could have been filled by natives with the same labour characteristics, and exert an income distributional effect (Van Dijk, Folmer 1986, Greenwood, McDowell 1986, Lalonde, Topel 1997, Borjas 2005, Zorlu, Hartog 2005, Hartog 2008)? What are the impacts on the population composition and the corresponding fiscal balance (Lee, Miller 2000, Dustmann, Frattini 2014)? And do they affect the social cohesion of the host society (Alesina, La Ferrara 2005)? The public continuously addresses these questions with the aging of early cohorts and the incoming of recent cohorts.³

As mentioned above, this review on migration is conducted in the niche of migrants' locational choice and adjustment, with a particular focus on the barriers of culture, networks and language. Figure 1 summarizes the topics discussed above. In the next section, we will review some related studies on the three specific topics (culture, networks and language) in the migration literature, and thereafter discuss the current missing gaps and prospective avenues for research.

review of migration theory.

³We refer to Nijkamp et al. (2012) for an exhaustive review of migration impact assessment as a tool to map out the relevant effects.

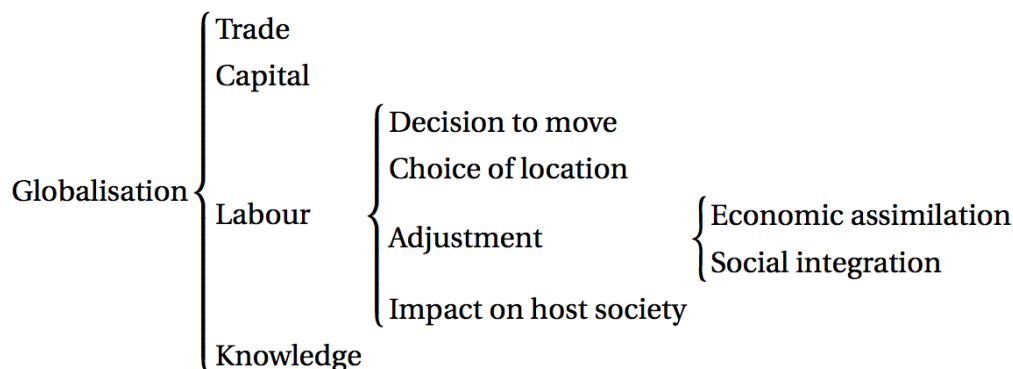


Figure 1: Niche of Research in this Review

3 Barriers of Culture, Networks and Language

3.1 Introduction

Culture, networks and language all three play an important but complex role in migration decisions, assimilation and integration in the host society and as well in the impact migrants have on the host society. Culture and language similarity facilitate assimilation and integration and yield larger bilateral migration flows (see as well Table 1 below). However, language dissimilarity (e.g., English and Mandarin Chinese) could yield higher economic returns for the migrant as the specific language skill is scarce. Moreover, as strong migrant networks could be seen as harmful for integration, it might actually be beneficial for the migrant in the short-term as (psychological) migration costs are lowered. Finally, these three barriers are highly related with each other. For example, strong migrants networks may yield lower native language proficiency leading to persistent cultural barriers between native and migrant communities.

A summary of some previous studies on international migration and the barriers of culture, networks and language is shown in Table 1. As determinants of migration decisions, there are mixed insights and evidences about the role and strength of these barriers. Ethnic networks in a potential destination would be very likely to attract more migrants, but the effect might vary with individual portfolios. Cultural proximity and linguistic proximity are significant in some studies, but in most cases they are not more important than economic determinants. In the following three subsections, we review the recent literature and its main findings for all three types of barriers separately and deal with some of these mixed insights.

3.2 Culture

Typical migrant destination countries (such as the United States) are a melting pot of people with different cultural backgrounds. Here, culture must be regarded very broadly as it could constitute social norms and values, religion beliefs, family structures and so forth of groups of people.⁴ With respect to cultural diversity, the perspective of assimilation theory has dominated much of the sociological thinking for most of the twentieth century (see, e.g., Gordon 1964, Sandberg 1974, Alba, Nee 1997). According to this perspective, the minority group's adoption of the cultural patterns of the host society typically comes first. Indeed, Algan et al. (2012) concludes for some European countries (France, Germany, Switzerland, etc) that immigrants' values converge to the local context within a generation.

⁴Widely accepted definitions of culture are difficult to give. The one that comes closest is the one of Hofstede (1982). Culture is "the collective programming of the mind that distinguishes the members of one group or category of people from others".

Table 1: Previous Studies on International Migration and Barriers of Culture, Networks and Language

Reference	Countries and Years	Results
Bartel (1989)	The United States in 1980	The main determinants of the recent immigrant's location choice is the percentage of his ethnic group that resides in a standard metropolitan statistical area.
Gross, Schmitt (2003)	OECD countries from the mid 1980s to the mid 1990s	the existence of similar cultural communities attracts new immigrants. However, the effect is not homogeneous for all types of source and destination countries.
Bauer et al. (2005)	Mexican migration to the United States	Enclaves (networks) negatively affect the language proficiency of migrants. Migrants choose smaller networks as location as their English proficiency improves.
Clark et al. (2007)	The United States from 1971 to 1978	The attraction force of networks and language are strong.
Pedersen et al. (2008)	OECD countries from 1990 to 2000	Network effects are strong, but vary between different groups of welfare states and between countries according to the type of immigration policy being applied.
McKenzie, Rapoport (2010)	Mexican migration to the United States in 1997	There is a positive or education-neutral selection in communities with weak migrant networks but a negative self-selection in communities with stronger networks.
Mayda (2010)	OECD countries from 1980 to 1996	Network effect imply that the bilateral migration flows are highly correlated over time. It could be driven by both supply factors and demand factors. The impact of a common language is not statistically significant.
Grogger, Hanson (2011)	OECD countries in 2000	Emigration is greater toward destinations that share a common language with the source. The pull of an existing migrant stock in a destination is stronger for less-skilled migrants.
Beine et al. (2011)	OECD countries in 1990 and 2000	Diasporas increase migration flows and lower their average educational level. Diasporas also explain majority of the variability of migration flows and selection.
Belot, Ederveen (2012)	OECD countries from 1990 to 2003	Cultural barriers do a much better job in explaining the pattern of migration flows between developed countries than traditional economic variables such as income and unemployment differentials.
Caragliu et al. (2013)	EUROSTAT 2002-2007 & OECD 1998-2007	Trust, financial, and institutional distance exert a negative effect on migration flows, but results results are sensitive to alternative choice of distance measures.
Adserà, Pytlikova (2015)	OECD countries from 1980 to 2010	Migration rates increase with linguistic proximity and with English at destination. Softer linguistic requirements for naturalisation and larger linguistic communities at destination encourage more migrants to move.
Wang et al. (2016)	European countries at the NUTS1 level in 2010	Cultural diversity increases regional attractiveness, while the average cultural distance between the natives and immigrants at the region greatly weakens attractiveness.

Nevertheless, various barriers to assimilation have more or less preserved the migrants' cultural character over time. With the increasing diversity of origins in contemporary migrants, more researchers start paying attention to the economic benefits reaped from similar or distinctive sets of values and beliefs. [Ottaviano, Peri \(2005\)](#) and [Suedekum et al. \(2014\)](#) both find a positive effect of cultural diversity on local productivity, and then on wage and employment density of native workers. [Ozgen et al. \(2013\)](#) and [Brunow, Blien \(2014\)](#) demonstrate positive economic impacts of cultural diversity on productivity and innovation at the firm level. [Niebuhr \(2010\)](#) shows that the difference in knowledge and capabilities of workers from diverse cultural backgrounds enhances the performance of regional R&D sectors. [Rodríguez-Pose, Hardy \(2015\)](#) found that diversity amongst highly skilled workers exerts the strongest impact upon start-up intensities. Note that the measurement of cultural diversity measured is a decisive and complicating factor when the impact on the local economy is examined. See [Nijkamp, Poot \(2015\)](#) and [Arribas-Bel et al. \(2016\)](#) for a summary and extensive discussion of cultural diversity measurement.

The policy debate over to what extent the immigrants should adapt to the local cultural values and beliefs is often tense. The answer 'yes' or 'no' is never a satisfying remedy for social integration.⁵ It calls for more research that touches upon the quantitative measurement of cultural adoption, and interdisciplinary studies on the subsets of cultural traits or beliefs to be transmitted and integrated. [Desmet et al. \(2017\)](#) defined culture as traits reflecting norms, attitudes and preferences, and showed that the variation within an ethnic group is larger than that between groups. Ethnic diversity differs from cultural heterogeneity. Several novel attempts have been made in this direction as well, as a proper measure of cultural composition should reflect the degree to which key human values are shared in society between one country and the other country. Different dimensions of cultural values, beliefs and attitudes are linked to various economic outcomes (see, e.g., [White, Tadesse 2008](#), [Beugelsdijk, Maseland 2011](#), [Beugelsdijk, Klasing 2016](#), [Wang et al. 2016](#), [Tubadji, Nijkamp 2015](#), [Ginsburgh, Noury 2008](#)). Another interesting measure created by [Constant et al. \(2009\)](#) reflects the degree of ethnic identity (the ethnosizer) by combining information on language, culture, societal interaction, history of migration, and ethnic self-identification, which enables researchers to classify immigrants into four states: integration, assimilation, separation, and marginalization. This measure quantifies migrants' commitment both to the origin and to the destination, and can be linked to explain a number of immigrants' economic and social behaviours.

3.3 Networks

The topic of social networks seems to be quite a full-fledged field in migration research.⁶ Apart from the role of social interaction in relation to fertility, smoking, crime, friendship, etcetera (see, inter alia, [Kohler et al. 2001](#), [Soetevent, Kooreman 2007](#), [Bernasco et al. 2017](#), [Xu 2017](#)), economists, psychologists and sociologists have conducted especially a number of studies on the importance of social networks, especially, for labor market performance, as social networks might facilitate finding a job in the migrant community but could harm acquiring skill necessary for finding high-skilled jobs outside the migrant community (see, e.g., [Rees 1966](#), [Granovetter 1974](#), [Lin et al. 1981](#), [Montgomery 1991](#), [Ioannides, Loury 2004](#), [Wahba, Zenou 2005](#)). Recently, a growing area of literature has emerged, which focuses on the distinction between the co-ethnic network and the inter-ethnic network for migrants ([Putnam 2000](#), [Munshi 2003](#), [Kazemipur 2006](#), [Patacchini, Zenou 2012](#), [Lancee 2012b](#), [Tselios et al. 2015, 2016](#), [Chiswick, Wang 2016](#)). It turns out that contact with natives yields unambiguously positive returns, because it provides immigrants with

⁵An interesting finding in [Rodríguez-Pose, Von Berlepsch \(2015\)](#) shows that the economic legacy of mass migration in the United States is less linked to the national origin of the migrants than to the migrants' preserved self-selective character.

⁶There is a related field dealing with herd effects. Network effects are not exactly the same as herd effects as the latter is related with signaling ("I will go where I have observed others go, because all those who went before me cannot be wrong, even though I would have chosen to go elsewhere." [Epstein \(2008\)](#)). So, herd effects might lead to ethnic clustering and thus network effects with respect to integration and assimilation in the the host society. But, in migration destination choices herd effect and network effects are different from each other. As herd and network effects are difficult to discern in migration choices and herd effects matter less for adjustment in the host society, we do not consider herd effects in this review.

information on higher quality job offers and assistance in assimilation. However, the economic returns of co-ethnic contacts are less clear-cut. Socializing with co-ethnics provides assistance in job information and initial settlement. Yet, while embedding into co-ethnic networks enhances ethnic solidarity, it retards contact with the host society. This may hamper upward economic mobility.

Still, there is a missing gap in this field. To fully utilize social networks to integrate, it is necessary to investigate the network formation process. Glaeser (2001) calls especially for more work on the causes of social capital. 'Indeed, the weakness of this research is not in either the theory or the empirical work on the effects of social capital. The real weakness is the lack of both theory and empirical work focusing on the causes of social capital. If we are going to change the level of social capital, we must have a coherent model of the formation of social capital and a body of empirical work that we trust about the formation of norms and networks.' While Jackson, Wolinsky (1996), Bala, Goyal (2000), Brueckner (2006), and Currarini et al. (2009) model network stability on the basis of cooperative game theory, few studies have looked at the meso-level determinants of individual social networks, such as local labor market conditions. If any, Roskrugue et al. (2012) tried to explain individual social capital formation by the local expenditure on social infrastructure; Wang (2016) positioned immigrants' social capital formation in local labor market conditions; Zenou (2015) and Sato, Zenou (2015) related social network formation with local job-destruction and job-information rate.

3.4 Language

Language skills are considered as major economic assets for individuals, as they facilitate communication on the job and are a major determinant of economic gains in the host country. Indeed, a frequently found result and widely accepted fact is that adult male immigrants with a fluent level in the local language earn a wage premium in the range from 5 % to 35 % (see, e.g., Carliner 1981, McManus et al. 1983, Grenier 1984, Chiswick 1998, Chiswick, Miller 2002, Dustmann, Fabbri 2003, Budria, Swedberg 2012, Beckhusen et al. 2013, Chiswick, Wang 2016). A unified methodology in most of the studies is to employ a human capital earnings function (Mincer 1974). Two cumbersome issues lead to biased estimates in the regression: misclassified language indicators (Dustmann, Van Soest 2001), and endogeneity between language and earnings (Chiswick, Miller 1995). Refined datasets, valid instruments, and using longitudinal feature of dataset, could all increase the precision of the estimates.

Besides, a number of studies look at foreign language (other than the local language) skills (Grin 2001, Fry, Lowell 2003, Henley, Jones 2005, Christofides, Swidinsky 2010, Williams 2011, Ginsburgh, Prieto-Rodriguez 2011, Toomet 2011, Isphording 2013, Di Paolo, Tansel 2015, Stohr 2015, Chiswick, Miller 2016). Although acquiring a foreign language skill is not compulsory for migrants to integrate, mastering a foreign language skill has its economic value and is well appreciated in the labour market in most cases (European Commission 2008).

It should be noted however, that the reward patterns for natives and migrants are not necessarily the same. For low-educated group of migrants, they do not seem to benefit from using a foreign language (Wang et al. 2017, Lang, Siniver 2009). Under the circumstance that migrants are not fully fluent in the local language at the destination, they have to choose which type of human capital to invest in to maximise their future earnings.

The conventional models (Lazear 1999) need to be extended by incorporating multiple linguistic skills, where benefits of each language should be clearly weighed. The cost of acquiring a language, on the other hand, is associated with its degree of difficulty, which is closely correlated with the linguistic distances between one's mother tongue and the new language. Chiswick, Miller (2015) and Ginsburgh, Weber (2014) have summarized some methods to compute linguistic distances up to date, namely, (1) language Ethnologue, (2) lexicostatistical distances, and (3) the Levenshtein distance. More interestingly, recent cross-country studies by Chen (2013) and Roberts et al. (2015) have related the structure of people's language (e.g., the use of tense) to decision making, where the linguistic contents contributed significantly to explaining peoples' economic behavior. Whether the

language structure is also associated with the effort to acquire a linguistic skill, remains an empirical question to be tested.

4 Future Research Agenda

The dynamics of the regional or urban demographic and cultural fabric and its continuing attractiveness for incoming migrants is a fascinating field that deserves to be thoroughly studied. The regional cultural composition is more often studied in a static setting. In reality, however, the regional cultural composition keeps evolving, with the inflow of migrants and with the evolution of cultural integration. Consider how the Dutch culture in the 17th century transformed with the inflow of migrants from Flanders and the Portuguese and Spanish Sephardi Jewish community in the 16th century, and the French Huguenot community in the 17th century. Clearly, the contemporaneous world is becoming more and more globalised. Moving between countries will likely become for many people much easier in the future with the sharply decreasing cost of travel. Physical barriers (such as borders and distance) are in many cases no longer the predominant factor that prevents the labor flow. In the meantime, more and more temporary migration decisions take place due to the emerging trend to move frequently for studying or working reasons. In that case, migrants might trade off their preferred cultural composition for higher productivity and wages in a specific region. It is of course interesting to study regional culture integration over time in combination with the pace of a region or city that is continuously absorbing immigrants over time. Is there a steady state for regional cultural composition in terms of specific values and beliefs? And what are the evolution paths for cultural evolution?

The social network formation and the dynamics of social networks evolution are thus worth being studied as well. Few studies focus on how the network is formed in the beginning if two identical migrants were to be exposed to different groups, *ceteris paribus*. The evolution of initial network composition might be closely correlated with individuals' life-cycle behavior and local labor market conditions in later stages. Is there a lock-in effect for immigrants who have developed a dense co-ethnic network upon arrival? Can it cause a social status trap? In reality, we do see that path dependency exists in many cases. For example, ethnic segregation influences migrants' choice of schools for their kids. It is highly likely that their kids are still getting substantial exposure to their own ethnic group. If so, how to trigger immigrants to reach out to the native people? There are some life-cycle behavioral elements that might play a role here in facilitating the formation of native networks, which deserves further attention. Events such as fertility, employment and job changes could to a large extent affect their network composition. In that case, how stable would the network be? And on the meso-level, how does this contribute to social cohesion of the local society? In the meantime, bridging this topic to the urban economic literature will supplement the missing elements in the current model, i.e. urban amenities, environmental sustainability, housing price, cost of living, etc. The interdependent relationship with the urban characteristics and social interaction deserves much more attention, with the decreasing cost of communication, and the increasing use of networks in job activities.

With regard to language, a promising extension may be fundamental research on human capital investment, both regarding local language and foreign language skills for migrants. Given the limited time for human capital accumulation, a comparison between the economic payoffs from the local language and another foreign language needs to be incorporated into conventional language acquisition theory. The cost function of acquiring a specific language then should be associated with the linguistic distance from one's mother tongue. This has, so far, not yet received due attention in the migration economic literature. Second, given that the prevalence of English is quite common in various (e.g. Nordic) countries, it remains interesting to investigate the deterring effect on migrant workers of foreign language proficiency at work on local language proficiency. This might well fit the pattern of a substantial share of high-skilled workers in Europe who use English only, and in the meantime are well integrated into the host society. A third strand of future research could be focused on the social benefits of acquiring

local language proficiency and foreign language skills. For the majority, speaking a common language reduces the cost of communication on the meso-level, and implicitly works as a channel to increase transactions and to promote regional economic growth. A fourth extension is a further merging of current individual data with firm data, in order to provide a more thorough analysis of the heterogeneous labor market returns to different languages. The firm data record the specific tasks of workers, and details on the requirements (communication, technical skills, etc). With the increasing accessibility to international databases nowadays, this is foreseeably a new and promising direction in the literature.

Finally, an area that received less (empirical) attention but is arguably becoming increasingly more important is out-migration (and then specifically of migrants). Nowadays, migrant destination countries face student migrants, temporary labor migrants, and even retired migrants desiring to return to their country of origin. This might lead to (human) capital skills flowing back to origin countries, as the inverse of a brain drain. In all likelihood, these migrant flows become larger in the near future and is an issue that definitely deserves more attention.

5 Concluding Remarks

Migration is nowadays high on the political agenda in Europe due to the recent influx of migrants from the Middle East and North African countries to Europe. The alarming rise of migrant arrivals has created substantial challenges for Europe, which is facing an urgent need to address the economic assimilation and social integration of migrants and refugees. This long-term process requires gradual steps, given that many migrants are very different from natives in terms of economic situation, skills, and cultural background. It is, therefore, essential to know how strong the barriers are for incoming migrants to live in a new country, and what the economic payoffs are once they have overcome the barriers.

We have demonstrated that migration is in a complex way intertwined with culture, networks, and language. Geographic proximity does not necessarily mean cultural proximity, nor does it mean linguistic proximity. Many precise measurements of these definitions are nowadays being developed with contributions from economists, sociologists, geographers, linguists, etcetera. Many more studies still need to be undertaken to link them to regional economic growth or individual economic progress. Clearly, this review paper offers by no means an analysis of the complete range of topics related to barriers of culture, networks, and language for migration. Its modest task is to achieve the goal of providing informal insights into the significant role of migration barriers and the necessity to overcome them from a socio-economic perspective.

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Urbanisation in Developing Economies: Building cities that work*

Anthony J. Venables¹

¹ University of Oxford, CEPR and International Growth Centre

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Abstract. This paper reviews recent work on the economics of fast growing developing country cities, with a focus on Africa. It sets out some of the broad facts about African urbanisation and summarises two recent pieces of research work. The first argues that coordination failure can create multiple equilibria and divergent paths of development, some in which cities are internationally competitive and able to create jobs, others in which cities are stuck in a ‘non-tradables trap’. The second is a dynamic model of city growth, calibrated to changing patterns of land-use in Nairobi; the calibration suggests a very high cost of inefficient land use in the context of urban slums.

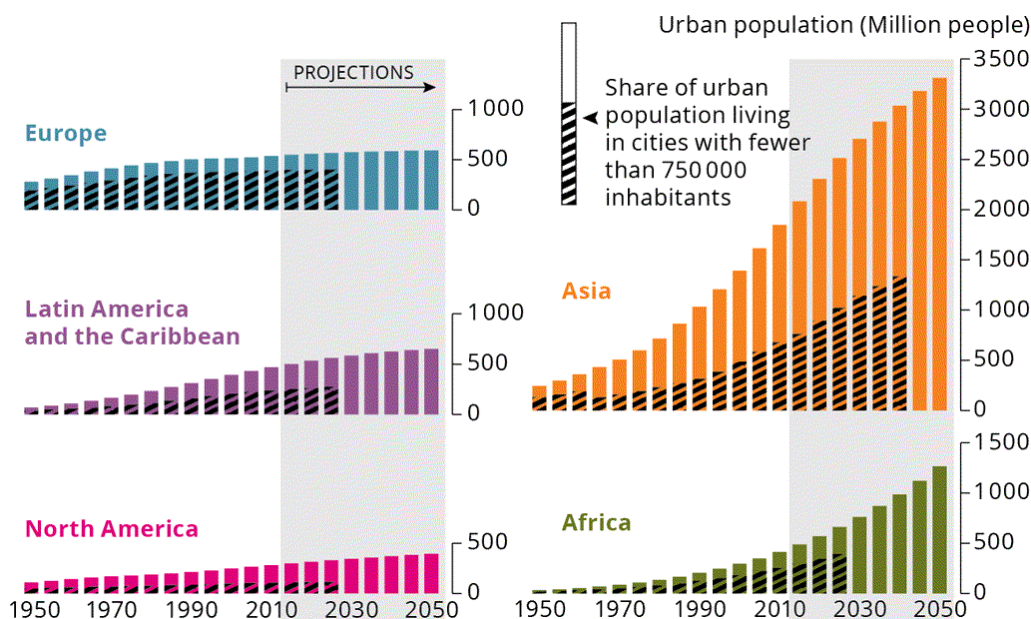
JEL classification: O18, O55, R0, R5

Key words: Urbanisation, development, Africa

1 Introduction

Urbanisation is part of the structural transformation that lies at the core of countries’ economic and social development. Cities offer the promise of high productivity and job creation on a massive scale, but they can also continue to grow without delivering these benefits. They are complex environments requiring both functional market economies and extensive policy involvement. Yet our knowledge about patterns of growth and ‘what works’ in developing cities is quite weak. What does it take to enable a city to undertake investment – in houses, firms and factories, and in infrastructure – that keeps up with population growth and can deliver both liveability and productivity? How should public policy meet the numerous challenges that are faced? The experiences of East Asia and of Africa over recent decades illustrate how quite different paths can be followed. East Asian cities have, by and large, delivered productivity, jobs, and the housing and service provision that make cities liveable. African cities have left a large majority of their populations without either formal sector jobs or formal housing.

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Source: <http://www.eea.europa.eu/soer-2015/global/urban-world>

Figure 1: Urban populations

Projections indicate that in the next 40 years the urban population of the developing world will increase by 2 billion people. Most of this increase will be in Asia, but much the largest proportionate increase will be in Africa. As indicated in Figure 1, Africa's urban population is set to nearly treble by 2050, adding 800 million people. This increment is as much as the current urban populations of Europe and North America combined. Even though urbanisation to date in Africa has been problematic, over the coming decades the continent needs to build at least twice the urban capital stock that it has built over the whole of previous history.

These observations motivate the case for better understanding urbanisation in developing economies and for using research to build the knowledge base needed to inform urban policy. A joint programme of work by researchers at the LSE, Oxford, and the World Bank has been working towards this goal for the last three years, and this paper draws on some of the work done on the project. Its focus is Africa (sub-Saharan), and principally on intra-city economics. What is going wrong, and what can be done about it? In this review we start by outlining some of the 'stylised facts' of African urbanisation and then focus on two particular pieces of work undertaken in the project. The final section of the paper draws out some of the main messages that, we think, should underpin policy choices in these cities.

2 Some stylised facts

Urbanisation and development. Urbanisation is an inherent part of economic development, and is an unstoppable process, regardless of what government does. Causality between urbanisation and development runs in both directions and through multiple channels. The relationship between the two is however different in Africa than in the historical experience of other regions. Urbanisation in Africa is occurring both more rapidly and at somewhat lower income levels than has been the case elsewhere. Urban population growth has been around twice as fast as was European growth at an equivalent stage of urbanisation, and around 2 percentage points higher than Asian urban population growth. There is also some indication that urbanisation is not driving the demographic transition as fast as happened elsewhere, and most of the increase in Africa's urban population is natural increase rather than rural to urban migration (Jedwab et al. 2017).

Housing and the residential capital stock. African cities are short of capital of all sorts, not least in the residential capital stock. Across the continent more than 60% of the urban population lives in slums, generally single-story shacks, some crowded in town centres, some sprawling on the fringes of the city. In countries such as South Sudan and the Central African Republic, the slum proportion exceeds 90% (UN-Habitat 2016). A key element of the housing stock – formal, private sector, low-income housing – is largely absent from large cities (Collier, Venables 2015). There are multiple reasons for this; land rights are often unclear and contested, deterring the construction of long-lasting structures; land markets are imperfect, so land is not held by those who value it most; inappropriately high building regulations which cannot be met are simply ignored; financing is difficult as capital and mortgage markets are weak or absent. These features all compound the fact that, urbanising at low income levels, only a low standard of housing is affordable. They mean not only that housing conditions are squalid, but also that land – the ultimate scarce factor in cities – is inefficiently used.

Jobs and the productive capital stock. Just as much of the housing stock is informal, so too is much employment. Estimates of the proportion of the urban labour force with informal sector jobs (i.e., working outside a registered or incorporated enterprise) range up to 80%. A feature of the African situation has been described as ‘urbanisation without industrialisation’ (Gollin et al. 2016). This refers to the fact that manufacturing production in African cities is much lower than in cities in other regions at a similar stage of development. The share of employment in manufacturing in large Asian cities is typically 25-30%, while in African cities it is in the range 5-15%. Most of this is in ‘non-tradable’ sectors producing for the local market. Internationally tradable manufacturing sectors are largely absent, a point we will return to later in the paper.

Infrastructure and the private sector. There are many estimates of the African infrastructure deficit. Annual spending needs have been estimated at around \$90 billion, amounting to 15% of African GDP, while actual spending is running at less than 2/3rds of this (Foster, Briceño-Garmendia 2010). The largest elements of this are power, water and sanitation, and connectivity. In each case the urban component is large, totalling perhaps 10% of GDP per annum sustained over many decades.

Collectively these financing needs – for residential, business, and infrastructure capital, not to mention human capital – typically peak as urban population growth peaks. Africa is not yet at this point, but financing needs might easily amount to as much as 40% of GDP per annum. East Asian countries have achieved these rates of investment financed by domestic saving. Domestic saving in Africa, typically running at around 15% of GDP, is unlikely to do so.

Urban governance. Government has an essential role to play in the urban environment. The urban downsides of congestion and contagion mean that provision of infrastructure and public goods and services is particularly important. Effective and appropriate regulation is needed for land, building, and public health. And the formation of a city requires a coordination process that cannot fully be resolved by the market. Uncertainty about the future development of the city – for example, about what areas will become future employment centres – will deter private investment. In order to reduce this uncertainty, expectations of future city development need to be coordinated around common knowledge of where development is likely to take place. This can be done through the provision of credible city plans or, if plans are incredible, through commitments of infrastructure and other public investments.

African cities are severely constrained in their ability to play these roles. Financially, most African cities are dependent on central transfers for more than 80 % of their operating revenues, and local government revenues have been estimated to account for less than 1 % of GDP (Foster, Briceño-Garmendia 2010). City administrations in most major African cities are controlled by national opposition parties, reinforcing

long-standing central government beliefs that cities are threats rather than assets. To be effective, the authorising environment of city government needs to have broad functional, spatial, and temporal ranges. Often, they have none of these things, with functional responsibilities fragmented across central government line ministries, spatial fragmentation as cities have grown faster than administrative boundaries have been adjusted, and short run political imperatives dominating longer run decision making.

3 The research agenda

The city is, from the economic perspective, a general equilibrium system. Millions of different economic agents – households, firms and the public sector – take decisions coordinated largely, but not entirely, by the market mechanism. All parts of the system are inter-dependent meaning that the city, and policy within the city, have to be viewed in the context of the entire system and not just element by element. The benchmark model is that of a monocentric city with workers commuting to the centre to work and residential areas spread around the centre, with density, building height, and rent declining with distance from the centre¹. This model is useful, but it requires modification in at least three ways if it is to be usefully applied to low income and fast-growing cities.

First, a broad set of market failures and frictions have to be added. These include the issues in the land, housing, and construction markets that were sketched above, and which impede building on land and the efficient allocation of land between alternative uses. They extend to the regulation of firms (for example, obstacles and charges to formalising a productive enterprise) and in the labour market.

Second, the standard model and virtually all the developed country urban literature is static, failing to model the growth process within cities². We have already seen that financing costs will be largest during the most rapid period of urban growth when investment in structures and equipment is at its peak. Incorporating dynamics adds further difficult issues, particularly since buildings (in the formal sector at least) are long-lived and their construction incurs sunk costs. The current state of the city is therefore determined by past actions, so mistaken or delayed decisions have persistent effects, a point we will explore later. It also means that expectations about the future development of the city – and hence the future behaviour of other investors – matter for each individual deciding on an investment.

Third, a useful analysis must incorporate complementarities between different parts of the city system. Many urban interactions create positive feedbacks and hence cumulative causation processes, leading to either ‘virtuous’ or ‘vicious’ circles of development. This can occur through many channels. Agglomeration economies are the most direct. The productivity advantages created by scale, density, and consequent intense economic interaction are well-researched for developed, and now also some developing, countries (Glaeser, Xiong 2017). These arise because of positive externalities, either technological (e.g. knowledge spillovers) or pecuniary (i.e. through interaction in imperfect markets). They are generated between different firms (forward and backward linkages in the language of old development economics, e.g. Myrdal 1957), between firms and workers, and between firms and consumers. We know that their effect is substantial with a doubling city of city size raising productivity somewhere in the range of 4%–5%.

This productivity gain is one of the reasons why cities exist, and it has a further implication that is particularly important in a fast-growing city. Agglomeration economies mean that it is difficult to start activities in new places. This is the first-mover problem; if a firm were to move out of an established centre to a new place it would forego the productivity advantage of agglomeration. In a situation of dynamic change, it follows that movement to new places will be delayed, unless they can be coordinated as collective movement by a large number of firms and households, something that is very hard to achieve. If movement to new places is delayed then the city system will tend to exhibit excess primacy; the largest city will continue growing as it is privately (although not

¹The model Alonso-Mills-Muth model: see Duranton, Puga (2015) for a modern statement.

²But see Desmet, Henderson (2015) for a review of growth of city systems as a whole.

socially) unattractive to set up in secondary cities. Within an existing city, it may be difficult for new sub-centres to form, and difficult to attract new sectors of productive activity, this accounting in part for the high levels of informal unemployment that are observed.

Agglomeration economies are not the only mechanism that creates positive feedbacks. Another is the fiscal system. Functional cities require infrastructure, but funding this requires a tax base which is present only if the city is functional. In a dynamic setting where the capital is required at an early stage of development this requires borrowing on the strength of the expected future tax base of the city – something that African cities are likely to find hard to do.

These are just some of the issues that need to be in the research agenda. Analytical thinking on these topics needs to be accompanied by empirical work to build an evidence base on city performance and on the effects of policy³. The following two sections of the paper turn to a discussion of two of the pieces of analytical work that have been done in the course of the LSE/ Oxford/ World Bank project, looking first at a model of Africa's difficulty in establishing tradable manufacturing sectors, and then at land-use inefficiencies in a growing city⁴.

4 Breaking into tradables⁵

A summary way to think about the general equilibrium of a city is as the balance between two forces. One is urban productivity, saying that larger cities generate higher productivity. The other is urban costs per worker, increasing in city size and consisting of commuting and congestion costs, and also land rent paid by workers in the city⁶. Equilibrium city size is where workers' productivity minus urban costs is equal to the productivity of workers outside the city. At this point there is no incentive for workers to migrate either to or from the city.

The standard diagram illustrating this is Figure 2a, where the horizontal axis is city size (the number of workers) and the vertical is labour productivity, equal to wages. The labour demand curve is the amount firms are willing to pay for workers, so is equal to productivity; it is drawn upward sloping because of agglomeration economies. The labour supply curve is what workers need to be paid to take a job in the city. The wage outside the city is w_0 , and workers incur a package of urban costs, increasing in city size as illustrated. The equilibrium is at point E and – in the simplest case – urban land rents are the area below the dashed line and above the labour supply curve.

This simple case rests on many assumptions, one of which we now relax. In reality the city will contain many different productive activities, in some of which productivity is increasing in employment or city size, while in others it is decreasing. Critically, it is *value* productivity that matters, and this is equal to physical productivity per worker times the price of output. For goods that are internationally tradable the price faced by any one city is constant. However, for 'non-tradables', i.e. goods that are sold only in the local or national market, the price will decline with the volume sold. Thus, we expect such sectors to exhibit overall diminishing returns to scale, as price effects dominate any physical increasing returns that may be present. The productivity schedule in the figure will therefore contain both a diminishing returns segment, and a segment with increasing returns to scale.

This case is illustrated on Figure 2b. The labour supply curve is as before, but labour demand now contains two sections. The downward one is labour demand from non-tradables production, downward sloping because falling output price outweighs any physical productivity gains from expanding output. The upward sloping section is

³Empirical work on the effects of place-based policy is notoriously difficult for three reasons. The context specificity of particular projects and places, and hence the difficulty of generalising. The identification of causal effect. And, given the possibility of displacement of economic activity, the difficulty of finding a meaningful set of control locations.

⁴See Lall et al. (2017) for a review of other parts of this project.

⁵This section is based on Venables (2017).

⁶Rent is a cost to workers but, since it is paid to landlords, is not a real resource cost as are commuting and congestion.

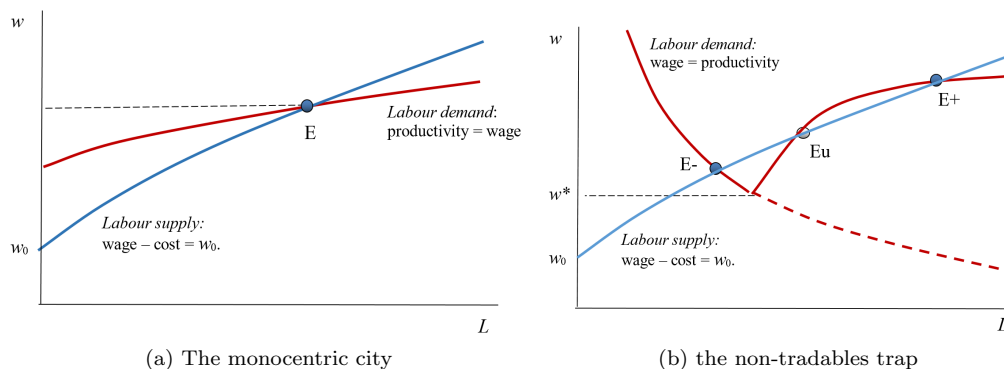


Figure 2: Equilibrium city size

employment in tradable activities, where the price is fixed on world markets and there are agglomeration economies. Details of the construction of the figure are given in Venables (2017) and here we simply draw out its implications. As illustrated, there are three intersections of the productivity schedule with urban costs. The two with solid circles, labelled $E-$ and $E+$ are stable, while that with the hollow circle, Eu is unstable (since if L is slightly greater than this then urban productivity is greater than costs, so the city will expand away from this point until it reaches $E+$).

Equilibrium $E+$ has production of both tradable and non-tradable goods. The city is large, with high productivity, high nominal wage, but high urban costs, land prices, and rent. As well as creating many jobs, the city yields a large economic surplus as rents, the transfer to landowners, are high. In contrast, at point $E-$ the city has only non-tradables, supplying the city itself and its local hinterland. This point is an equilibrium because if any one (small) firm were to establish tradable production its productivity would be w^* , i.e. productivity in the absence of agglomeration economies from other tradable sector firms in the city. This is less than the going wage at $E-$, so the entrant would make a loss. Entry is profitable only if productivity in tradables exceeds the going wage at $E-$ and this, in our simple story, requires coordinated entry by a mass of producers in the tradable goods sector.

We learn several things from this simple example. First, although two cities might have very similar or identical fundamentals, an urban dichotomy can emerge. One city booms, with tradable production and employment at $E+$. The other is stuck in a low-level equilibrium at $E-$. Second, the low-level trap is more of a risk if demand for non-tradables is high, this shifting the downward sloping section of the productivity curve to the right. This in turn is likely if the city or its hinterland is spending a lot from income received from other sources, possibly natural resource rents or foreign development assistance. This is an example of the ‘Dutch disease’ whereby foreign exchange from natural resource rents crowds out other foreign exchange earning activities.

What about policy to get out of this low-level trap? Efficient land-use and provision of infrastructure and public services will shift the cost curve downwards. This lowers the nominal (but not the real) wage in the city, moving intersection point $E-$ downwards and to the right. However, costs have to drop low enough for this point to cease to be an equilibrium, occurring when the wage drops below that which triggers tradable production, w^* .

One final point comes from this analysis. In a fully specified model which included housing construction, the two equilibria would have quite different housing stocks and urban density. At $E+$ land rents are high so land is used intensively, e.g., by building tall; this is not the case at $E-$, and this makes the low-level equilibrium trap more severe. Essentially, at $E-$ the city is optimised for small-scale local production, while at $E+$ it is optimised for the scale associated with both non-tradable and internationally competitive tradable production. A city in which construction is optimised for $E-$ is going to look even less attractive for potential entrants in the tradables sector. This point emphasises the depth of the coordination failure and the role of expectations. It is

not just whether firms in tradable goods production expect the tradable sector to grow to a high productivity level. It is whether or not builders and developers build in the expectation of the city growing to this scale. If they do not then their expectations can be self-fulfilling, as the city they construct is low density and thereby offers poor connectivity so is unable to attract these sectors.

5 Building the city⁷

The second paper that we discuss focuses on the dynamics of city growth and the long-run implications of inefficient land-use. It contains two parts, the first setting out a full dynamic model of a growing city and the second calibrating the model to Nairobi and calculating the efficiency cost of patches of land near the city remaining in slum use, as exemplified by Kibera, Nairobi and Africa's largest slum.

In order to focus on land-use and the way in which the city is built, we assume in this paper that there is an exogenous process of urban productivity growth that is attracting population to the city and causing the price of housing at each point in the city to grow at a constant exponential rate. How is land used and what gets built where and when as this process continues?

Land can have three types of use. One is that it is outside the city, earning a constant rent in agricultural use. The second is that is a slum, occupied by informal sector buildings. These buildings have several key characteristics. They are cheap to construct, but cannot be built tall (typically being made of mud or sheet steel). High density per unit land can be achieved, but only by crowding, this reducing floor space and the well-being of residents. And the building material is malleable (like lego or meccano) so buildings can be readily reshaped and reconstructed. It follows from this that there are no sunk costs and hence future expectations are unimportant in construction decisions; when circumstances change, the building gets changed.

The third type of land-use is formal sector building. This is more expensive and can be built tall. Thus, the margin for increasing density is height, not crowding. The cost of achieving density is therefore not loss of amenity, but increasing unit construction cost. Furthermore, these structures are not malleable; once built they cannot be reshaped, although they can (and will) be demolished and rebuilt from scratch. This means that expectations of future prices and rents are crucial to the way they are constructed; if the city is expected to grow fast, with rapidly increasing rents, formal sector buildings will be constructed taller in order to deliver greater density and capitalise on expected future rents.

As the city develops land-use goes through phases, as illustrated on Figure 3a. This figure has distance from the city centre (CBD) and time on the axes on the horizontal plane, and building volume on the vertical. To interpret the figure, take a given distance from the CBD (e.g., a distance of 10) and trace the development of this point through time (moving up and right across the figure). Initially land at this distance from the CBD is rural, i.e., outside the city with building height and volume of zero. It then becomes informal settlement, which initially is not very dense, although density increases as the city grows and the lego blocks are reconfigured to deliver more density. At some date land is formalised, and this brings a step up in density. Once built, formal structures cannot be changed so building volume remains constant for a period of time $\Delta\tau$. Rents are increasing, and the volume constructed is based on perfect expectations about this future growth in rents, and hence about the date of redevelopment. This is the next step upwards, occurring at the date at which it is efficient (and profit maximising) to demolish the first generation formal structure and redevelop with a taller structure, giving more volume per unit land. These cycles of redevelopment repeat through time as the city continues to grow.

The figure can also be read by slicing in the opposite direction, i.e., looking at a cross-section of the city at a particular date. The centre is built dense, (it has been through several waves of redevelopment), while further out is less dense formal, then

⁷This section draws on [Henderson et al. \(2016\)](#).

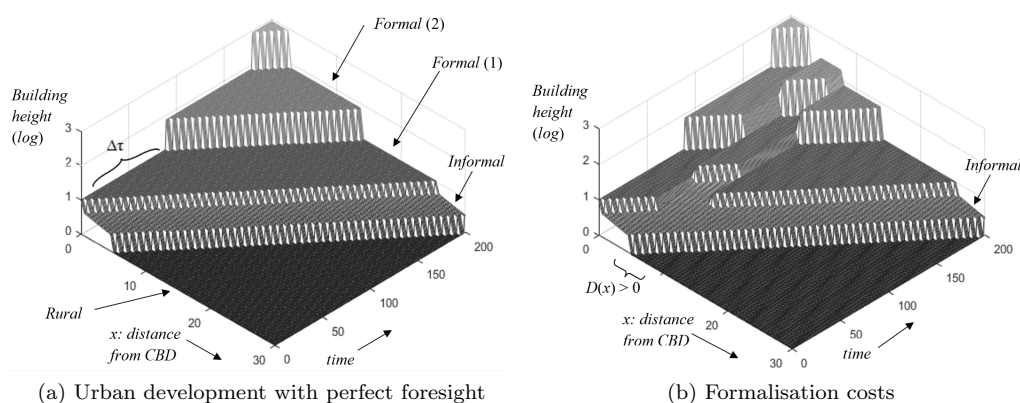


Figure 3: Phases of land-use in city development

informal, then rural. Notice that young cities are relatively flat, while more mature cities exhibit much larger volume and density gradients.

This gives the dynamics of city growth in the absence of any imperfections. In this perfect environment formal sector developers have perfect foresight (i.e., self-fulfilling expectations) about the growth of the city. Making expectations more pessimistic than this has the effect of delaying first development and shortening intervals between redevelopment; developers ‘under-build’ as they under-estimate price and rental growth.

The paper focuses on a different imperfection, namely the presence of obstacles to formalisation, the conversion of land from slum or informal use to formal. There are many such obstacles, typically created by unclear land rights, the difficulty of moving slum residents and, in cases such as Kibera, the power and political connections of ‘slum-lords’ who are earning rents on the settlement. Figure 3b recomputes Figure 3a but with a range of land in which such obstacles are present. As expected, formalisation is delayed. This also has the consequence that when formalisation occurs it is denser (recall that land prices and rents are rising steadily through time), and this echoes through the timing of subsequent redevelopments. If obstacles to redevelopment vary across different places, then the city becomes a ‘hodge-podge’, with neighbouring pieces of land developed to quite different densities, and the possibility that slums persist in central areas for long periods of time. This gives the familiar image of developing country cities, with slums adjacent to high rise buildings. Central area slums are much denser and more crowded than those on the edge, and have higher land rents.

The second part of the paper calibrates this model to Nairobi. The calibration is based on five distinct types of data. Aerial photography for two points in time, from which the footprint of every building in the city is traced: lidar data (available only for one time period), giving the height of structures: the asking price of vacant land at precisely known locations, scraped from the web: survey data on rentals and aspects of building quality in both the formal and informal sectors: and finally, there are also maps giving the location of areas classified, by previous on-the-ground studies, as slums.

The data reveals very high rates of demolition and redevelopment in the city, these running at around 30% per decade, compared to less than 10% in a typical US city. The data validates elements of the model, for example density decreasing steadily with distance from the centre, this taking the form of decreasing height with constant ground cover in the formal sector, while in slums it is decreasing ground cover or crowding, at constant height.

The data also allow calibration of the model, recovering all the key parameters used in the theory. With the model calibrated, we can conduct counterfactual experiments, the main one being to calculate the real income loss of land remaining in informal (slum) use beyond the date at which efficiency suggests it should have been formalised. We find that, in a slum area relatively close to the city centre, such as Kibera, the cost of delayed formalisation is high. The present value real income loss from never formalising, relative for formalising today, amounts to around \$17,000 per household, even if full

compensation were paid to slum-lords, in a context where average household rent is around \$700 per year. Of course, this is only one side of the equation. Redeveloping a slum incurs dislocation costs and the disruption of communities. Nevertheless, the calculation provides an indication of the potential gains from ensuring that timely redevelopment takes place.

6 Achieving productivity, managing costs

The urban equilibrium balances urban productivity against urban costs. There are multiple reasons why the market mechanism does not – and cannot – do this in a perfect ‘first-best efficient’ way. The policy challenge is both to manage and contain urban costs, and to create and coordinate the environment that enables the private sector to achieve productivity. In the urban environment far more than in other contexts, this requires smart and well-motivated public policy. There are numerous aspects to this, and we conclude with a few of the main ones.

Urban costs are brought down by using land efficiently. Labour and capital are in elastic supply to the city, and it is land that is the scarce factor. Securing efficient land-use requires that markets work well – the rental market, the land market, and markets for complementary activities such as mortgages, building materials, and for skilled construction labour and firms. While effective markets are needed, achieving this is not simply a matter of deregulation. The institutional and legal systems need to support clear and enforceable property rights. Building regulations are essential to control potential externalities such as fire risk and to fill informational gaps; the foundations of a house cannot be inspected every time it is traded, so need to be guaranteed by regulation. Provision of decent low-income housing in cities is always problematic and generally requires public investment in the housing stock.

Provision of public services and infrastructure also brings down urban costs. Human well-being is raised by the provision of clean water, sanitation, and public amenities and services, essential to counter the negative externalities of close human contact. The direct benefit of providing these services to households and workers translates into a lower supply price of effective labour to firms, thereby bringing down employment costs and improving competitiveness.

Achieving high productivity requires that firms have access to required inputs, to markets for their output, and to the scale and density of economic interaction that supports agglomeration economies. This can be summarised in the word ‘connectivity’, and has two distinct elements. One is density which, as we saw in sections 4 and 5, requires expectations that encourage building formal structures in timely manner. The other is transport infrastructure to mitigate the acute congestion problems of many African cities.

A key point about each of preceding three paragraphs is the need to see the city as a whole. Improving liveability for workers reduces costs for firms. Clarifying land markets leads to better building quality, and hence also to higher density that facilitates agglomeration. The placement of infrastructure, firms, and housing developments are crucial in securing connectivity. Most investment decisions in the city, as elsewhere, are coordinated by markets but we have seen the interdependence of private investment decisions and the role of expectations in shaping such lumpy and long-lasting decisions. If investors do not know which part of a city is most likely to develop as a sub-centre then they will hold back, not investing at all. A coordinating agent – the city government – needs a way of credibly signalling where the new sub-centre will be. This could be through city plans, although often these have no credibility, so signals need to take the concrete form of investment in infrastructure and other structures. The plans drawn up by architects and city planners too often fail to recognise the challenge of attracting jobs; it is easy to plan a future city, but the challenge is to ensure that there is a path to populate it, with firms as well as with people.

Of course, city governments face numerous constraints in playing these roles. Political constraints mean that city governments do not have the breadth of authority to act effectively, or the time horizon to make the long-term investments that are needed. The financial constraint is generally acute with little revenue raised from local taxation and

dependence on grants from a not always willing central government. Recognising the fact that there is an urban surplus, and that much of it accrues to land owners is crucial. Taxing urban land is equitable, is ethical (land appreciation is due to its location, not the effort of whoever happens to own it) and economically efficient. It is a fiscal resource that is too often under used. And there is a knowledge constraint. Little research has been done on Africa's urban transformation (compare it with the amount of research on rural activities), little of the stock of what we know has been disseminated to policy-makers, and still less has been communicated to the citizens who will shape the future of these cities.

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The Mediterranean Diet and the Increasing Demand of the Olive Oil Sector: Shifts and Environmental Consequences

Bruno Neves¹, Iva Miranda Pires¹

¹ Universidade Nova de Lisboa, Lisbon, Portugal

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Abstract. Mediterranean countries play a crucial role as olive oil producers and consumers compared to other world regions. In particular, the Northern Mediterranean countries, where Spain, Italy, Greece and Portugal alone represent 68% of the world's olive oil production and 43% of world consumption. Nevertheless, aspects such as communication with emphasis on the benefits of the Mediterranean diet - which is a distinctive characteristic of the Mediterranean culture and identity and where olive oil plays an important role - the Slow Food Movement, the International Olive Council campaigns, and the successive Common Agricultural Policies, have triggered production, trade and consumption around the world. Such increases and stimuli brought and are still bringing changes to the olive oil sector such as a shifting tendency in production modes as well as modernization of the sector and new plantations, in response to consumers' increasing demand. But these shifts are creating a paradoxical situation in the sense that the promotion of a healthier diet is having a perverse environmental effect as the production of olive oil is shifting to more intensive production systems and monoculture plantations which are changing landscapes and are referred to as environmentally harmful to the ecosystems. These issues are here debated and illustrated with case study examples, referring to the Mediterranean countries, particularly in the Iberian Peninsula.

JEL classification: Q18

Key words: Agricultural Policies, Environment, Mediterranean Diet, Olive Oil

1 Introduction

The Mediterranean Diet plays an important role in Mediterranean societies given the large scope of its meaning and what it represents. Its relevance led to a joint application from multiple Mediterranean countries, comprising Cyprus, Croatia, Spain, Greece, Italy, Morocco and Portugal, to submit a nomination to the United Nations Educational, Scientific and Cultural Organization (UNESCO) for the recognition of the Mediterranean Diet as Intangible Cultural Heritage of Humanity.

As it can be read on the Nomination File No. 00884 from UNESCO (2013b), the Mediterranean Diet is a way of life, involving a set of skills, knowledge, rituals, symbols

and traditions, and it respects crops, harvesting, picking, fishing, animal husbandry, conservation, processing, cooking and, foremost, the act of sharing and eating the traditional cuisine together at a table, where knowledge floats from generation to generation. It encompasses a strong social sense transposed to the cultural spaces, festivals and other celebrations associated to the Mediterranean, emphasizing values of mutual recognition and respect, hospitality, neighborliness, conviviality, intergenerational transmission and intercultural dialogue.

The Mediterranean Diet was inscribed on the Representative List of the Intangible Cultural Heritage of Humanity, a decision that was made during the Eighth Session of the Intergovernmental Committee (8.COM) held in Baku, Azerbaijan, from Monday 2nd to Saturday 7th December 2013, and can be read on the “Decisions” document, released with all decisions taken at the 8.COM, namely the Decision 8.COM 8.10 concerning to the Mediterranean Diet (UNESCO 2013a, p. 36-37).

This recognition of the Mediterranean Diet by UNESCO highlighting the above-mentioned aspects gives it a broader range and influence not only in the region itself but worldwide. The benefits of the Mediterranean Diet have also been recognized by other institutions such as the Food and Agriculture Organization (FAO) of the United Nations, the International Olive Council (IOC), and the European Union, amongst others.

If UNESCO recognized added value in the Mediterranean Diet through its set of skills, knowledge, practices and traditions, the FAO recognition was more concerned to its relevancy to greener economies and development in regions of small-scale tourism and agriculture. Such recognition was previously highlighted by FAO through the inclusion of the Mediterranean Diet in the group of the most sustainable diets in 2012 (Moro 2016), which is defined as “*those diets with low environmental impacts which contribute to food and nutrition security and to a healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources*” (FAO 2010, p. 7).

Other institutions highlight food products associated to the Mediterranean Diet that may be referred to in groups, representing a pyramid of the optimal Mediterranean Diet or mentioned as a list (Huang, Sumpio 2008).

The IOC website has a webpage dedicated to the “Mediterranean Diet Pyramid” and the food products are presented by categories in a descending order of recommended quantity and frequency. The classification is presented as follows: (i) grains (bread, pasta, couscous and rice); (ii) fruits and vegetables (in-season products. Fruits eaten as dessert); (iii) legumes and nuts (chickpeas, lentils, haricot beans, pine kernels, almonds, hazelnuts, walnuts); (iv) olive oil and olives; (v) dairy products (cheese, yoghurt and other dairy products, although milk is not specially mentioned), and; (vi) fish (seen as first-class protein). On the top level of the pyramid, and therefore, the least advised food products, are red meat, sweets and pastries. Wine (preferably red) is advised to be consumed with moderation during meals and no more than two glasses per day (IOC nd). Out of the food products, regular physical activity is also recommended (Huang, Sumpio 2008, IOC nd).

In literature when food products related to Mediterranean Diet are mentioned, often health benefits are revealed, forming an inseparable association (Huang, Sumpio 2008, Pires, Neves 2013). In Moro (2016), Mediterranean Diet is described as a “healthy system of living and feeding” along with a list of food products similar to the above listed. Huang, Sumpio (2008) refer to the inhabitants of the involving regions surrounding the North and South of the Mediterranean Sea to have a longer life expectancy and lower risk of chronic diseases, in comparison with other world regions. Mediterranean Populations’ diet and lifestyle are believed to have led to decreased rates of cancer, diabetes and heart diseases.

Independently of the scope of institutions or sources of information about Mediterranean Diet (e.g. cultural, social, environmental, health, and food products) in this paper we are focusing on olive oil, the fat (of choice) associated with the Mediterranean Diet.

The olive oil market is characterized by a period of considerable stability during the 1970s, a situation that would change in the following decades. In the 1980s, the olive oil sector registered a growth due to changes introduced in dietary patterns and increasing

demand in non-producing countries, an answer that had to be given by producing countries. Despite the increasing and continued demand registered since the 1980s, it is the shifting to the 21st century that sets a breaking point in which olive oil shifted from being an expensive niche commodity to an everyday product. These changes became evident and acquired more visibility in Europe. Food stores started having more brands and varieties of olive oil than other cooking or edible oils, reducing their importance in the market (Neves, Pires 2013, Scheidel, Krausmann 2011).

The next section discusses how communication emphasizing the benefits of the Mediterranean Diet in general, and olive oil in particular, the Slow Food Movement and campaigns such as those being promoted by the IOC, and the successive Common Agricultural Policies (CAP) have been stimulating an increasing demand and subsequently changing the olive oil industry and its practices towards intensive and super-intensive modes of production in order to meet that demand. Then, in the following session, we discuss how those stimuli have been environmentally undermined and we illustrate those situations with Iberian Peninsula case study examples.

2 Olive Oil Stimuli in a changing Industry

2.1 *The International Olive Council campaigns*

Olive oil has been part of the populations' diets in the Mediterranean region for thousands of years (de Graaff et al. 2008), its advantages being well known, scientifically studied and proved. It has been presented as a healthy natural product that contributes to a more balanced diet, a fundamental good that contributes to a healthier lifestyle (Neves, Pires 2013, Pires, Neves 2013).

The marketing generated around olive oil would, in fact, take over the healthy tags linked to olive oil and supported by the benefits of the Mediterranean Diet. It followed the wine industry, presenting fine design of bottles and creative labels introducing gourmet versions for high-end segments, such as extra virgin olive oils (Pires, Neves 2013).

Founded in 1959, with the objective to support and promote the olive oil production, trade and consumption, the IOC saw its objective accomplished by emphasizing precisely the health benefits of olive oil. Back then the underlined health benefits were associated with anti-aging, cardiovascular diseases, pregnancy and obesity (Huang, Sumpio 2008, Scheidel, Krausmann 2011). With a total budget of approximately 10 million Euros, IOC was spending half of its budget in promoting olive oil worldwide (Scheidel, Krausmann 2011).

In 1986, the European Union started to support the IOC with an annual budget of five million Euros, that lasted until 2002 and was considerably reduced afterwards to half a million (Scheidel, Krausmann 2011).

2.2 *The European Union campaigns*

Even though the "partnership" between IOC and EU dates from 1986, the EU promotion campaigns started earlier. In 1981, the EU was starting olive oil promotional campaigns only in producing countries. The objective at that time was clear, to replace other edible oils, commonly designated as cheaper, in the market by olive oil. In 1991 the EU widened its campaigns to non-producing countries, and, as it was already mentioned, since 1986, the EU was co-funding the IOC promotional campaigns (Scheidel, Krausmann 2011). According to the same authors, it is estimated that the total amount spent in olive oil campaigns from 1985 to 2002 exceeded 150 million Euros.

Around this time, the campaigns started shifting their messages, indicating a change in objectives and ultimately the discourse around olive oil. The goal was no longer to replace other oils in the market but instead to promote olive oil as a healthy commodity in line with the Mediterranean Diet benefits discourse. Despite the scientific basis supporting these EU campaigns and highlighting the health benefits of olive oil, it was not consensual, and therefore, there were some critics around the motto of the campaigns (Scheidel, Krausmann 2011).

2.2.1 The Common Agricultural Policy (CAP) campaigns

Within the CAP there were two periods worth mentioning: the 1998 CAP reform, initially set from 1998 to 2001, and extended until 2004, in which the EU was supporting products and producers through market-based policies, and at the same time, improving production systems and infrastructures through structural policies. In 2003, the EU introduced a PAC reform with the main objectives of encouraging productivity, market stabilization and protecting rural livelihoods (De Gennaro et al. 2012, de Graaff et al. 2011, Scheidel, Krausmann 2011, Stoate et al. 2009).

The first trend of market based policies was justified by the relevance of olive oil production and consumption in specified regions and was thus provided as aid to production and consumption. Along with it came price support and trade barriers imposed on third countries, avoiding cheap olive oil imports. As a result, the large amounts of aid provided by CAP led to an increase and intensification of the olive oil sector, being this aid proportional to the amount of olive oil produced. Production aid was initially set to last from 1998 until 2001, however, the Regulation Nr. 1513/2001 of the European Community extended it until 2004. With the end of the production aid, new mandatory environmental rules were introduced to agricultural practices. These changes reflected environmental concerns related to further intensification in production modes and it was expected that such measures would reduce the erosion rates that arose, a consequence of such reforms (European Commission 2003, de Graaff et al. 2010, Scheidel, Krausmann 2011, Stoate et al. 2009). The new policy was more concerned with qualitative aspects, such as product quality, food safety and environmental aspects rather than with the quantitative aspects inherent to previous policies (Costantini, Barbetti 2008, Türkekul et al. 2010).

The actual CAP (2014-2020) is raising some concerns due to the downward trend that has been occurring in the allocation of funds to the agricultural sector. In 2007, 50% of the EU budget was allocated to CAP, decreasing to 42% in 2013, and to 35% of the total budget in 2020 (Mylonas 2015, p. 13). Nevertheless, CAP continues to be the largest segment of the EU total budget, allocating 408.31 billion Euros, through two main Pillars (First Pillar 308.73 billion Euros and Second Pillar 99.58 billion Euros in EU funds), during this CAP period. Pillar I provides 'Direct Payments' to farmers guaranteeing farm revenues stabilization and aiming to diminish inequalities in funds attribution among member states. Pillar II supports for long-term 'Rural Development', attempting to modernize the sector, becoming more competitive, maintaining quality and environmental concerns (European Commission 2013, 2016), aiming to more greener and sustainable agriculture, which was not yet achieved (Matthews 2013).

2.3 The Slow Food Movement

In Rome, Italy, in the 1990s, fast food restaurants began to gain a prominent place in the market. In response to the spread of fast food restaurants, a movement arose. The Slow Food Movement started by promoting healthy diets in which olive oil had an important role. This movement soon started to outgrowth convening an international extent and becoming a philosophy of life, encouraging local and sustainable agri-food systems and local food traditions, adjusting food in view of its cultural, social, economic, geographical and environmental contexts through alternative food networks (Ferreira 2009, Goodman, Goodman 2007, Neves et al. 2013). Values that are consistent with the principles of the Mediterranean Diet.

3 The Olive Oil Market

Edaphoclimatic characteristics confine world olive oil production into two zones, between 30 and 45 degrees latitude from both the North and the South hemispheres. Nevertheless, olive oil is produced outside these regions, and production is rising (Pires, Neves 2013).

In the last 25 years under analysis the world production of olive oil has more than doubled (IOC 2015d). The Mediterranean region encompasses the core of the olive oil production (Table 1), which plays an important role in social, economic and environmental terms (Avraamides, Fatta 2008, Muktedirul Bari Chowdhury et al. 2013, Salomone,

Table 1: Olive oil production

Olive oil Production	2015/16		1990/91	
	Tons	P(%)	Tons	P(%)
Mediterranean countries	2,861,000	95.73	1,400,700	96.40
Europe	2,060,500	68.95	999,200	68.77
European Union	2,049,500	68.58	994,000	68.41
Africa	601,500	20.13	307,500	21.16
Middle East	237,500	7.95	102,500	7.05
South America	42,500	1.42	10,500	0.72
Oceania	18,000	0.60	N/D	N/D
North America	14,000	0.47	1,000	0.07
Other producing countries	14,500	0.49	32,000	2.20
World production	2,988,500	100.00	1,453,000	100.00

Source: IOC (2015b,d)

Ioppolo 2012, Türkekul et al. 2010). This region alone produces 95.7% (2,861,000 of 2,988,500 tons) of the worlds' olive oil, a share that was slightly reduced with the expansion of the production market. In 1990/91, Mediterranean countries were producing 1,400,700 out of 1,453,000 tons, corresponding to 96.4% of total production (IOC 2015d). European Union countries in the North Mediterranean region are the largest producers worldwide with nearly 3/4 of total production (European Commission 2003, Türkekul et al. 2010), a slightly reduced share, given the emergence of other producing countries (Neves, Pires 2013). Currently, European Union is responsible for nearly 69% (2,049,500 tons) of the olive oil production (IOC 2015b).

Spain is the country that produces the most worldwide and since it joined the EU together with Portugal in 1986, olive oil production has experienced a substantial growth. CAP reforms have led to an increase in new plantations and a rise in productivity. This was accomplished by improving growing techniques such as replacing old trees with new ones as well as increasing the number of trees per area (intensive modes of production) and by introducing irrigation to the olive groves production system (Türkekul et al. 2010).

In 1990/91, Spain was the worlds' most productive country with 639,400 tons, 44% of total production (1,453,000 tons). Today, Spain is still the leading producer and has more than doubled its production. With 1,300,000 tons, Spain produces today 43.5% of the worlds' olive oil, a total of 2,988,500 tons (IOC 2015b,d).

Portugal has benefited from the same CAP-EU reforms as Spain, which allowed it to modernize and expand the olive sector, and similarly introducing intensive and irrigated modes of production (INE 2010, Neves et al. 2013, Pires, Neves 2013). Portugal is today the eighth largest producing country of olive oil worldwide and occupies the fourth place within the EU with 82,000 tons. Portugal increased its production more than four times (20,000 tons) since 1990/91 (IOC 2015b,d).

Consumption rose significantly from 1990/91 (1,666,500 tons) until the present time (2,989,000 tons) and, although it mostly occurred in producing countries, it is more widespread than production (Table 2; Figure 1). The Mediterranean region is responsible for about 2/3 of the total consumption of olive oil. In 2015/16, in the Mediterranean region, consumption was expected to represent 65.8% of the world's consumption, which is 1,966,800 of a total of 2,989,000 tons. A much different share compared to 1990/91. At that time 86.7% (1,445,100 tons) were consumed in the region (IOC 2015a,c).

The EU alone was responsible for about 73% of total consumption in 1990/91 (IOC 2015a,c), a share that is becoming lower with the current market's tendency (Figure 1). In 2007/08, slightly more than 2/3 of the total share of olive oil was consumed in the EU (Türkekul et al. 2010). Today it represents just 54% (1,615,000 tons) in relation to total consumption (IOC 2015c). Although the rates are presently lower due to the spreading of markets, consumption is much higher and the general tendency points to a continuous growth in consumption (IOC 2015a,c).

Despite its leading role as world producer, Spain is not the country that consumes the

Table 2: Olive oil consumption

Olive oil Consumption	2015/16		1990/91	
	Tons	P(%)	Tons	P(%)
Mediterranean countries	1,966,800	65.80	1,445,100	86.71
Europe	1,645,500	55.05	1,223,400	73.41
European Union	1,615,000	54.03	1,214,500	72.88
Africa	436,000	14.59	175,500	10.53
Middle East	242,000	8.10	87,000	5.22
North America	346,500	11.59	98,000	5.88
Asia	120,500	4.03	9,000	0.54
South America	94,500	3.16	21,500	1.29
Oceania	37,500	1.25	13,500	0.81
Other prod. countries	11,500	0.38	21,000	1.26
Other non prod. countries	55,000	1.84	21,000	1.26
World consumption	2,989,000	100.00	1,666,500	100.00

Source: (IOC 2015a,c)

most. Italy holds the first place as olive oil consumer for decades. In 1990/91, in Italy, 540,000 tons (32.4%) were being consumed, followed by Spain with 394,100 tons (23.7%). Today, Italy is still the largest consumer worldwide and it is still followed by the world leading producer, Spain, with 580,800 tons (19.4%) and 490,000 tons (16.4%), respectively, of the worlds' consumption. In 1990/91, Portugal was in tenth place consuming 27,000 tons and ranked fifth amongst the EU countries. Today, consumption more than doubled in the country. The 74,000 tons being consumed at present time contributed to the country's rise to the ninth place as world consumer, maintaining the fifth place amongst the EU countries (IOC 2015a,c).

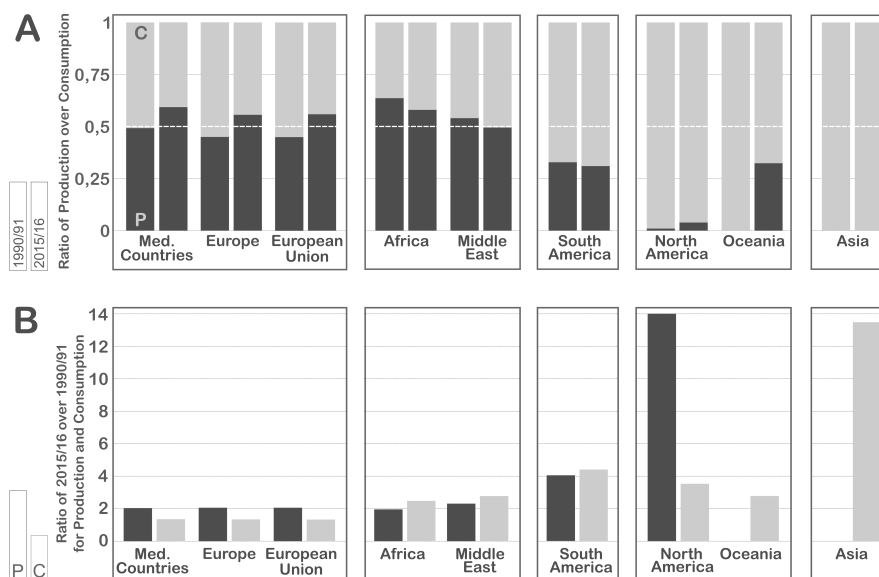
Outside the Mediterranean region, new markets are emerging. The USA is the most prominent while Australia, Brazil, Canada, China, Japan and Russia are also notable markets (European Commission 2012, Salomone, Ioppolo 2012, Türkekul et al. 2010). It is precisely non-producing countries that are consolidating their position in the market as olive oil consumers, explaining the increase in production. Therefore, non-European producing countries in the Mediterranean basin are reinforcing their market share, in some cases, by doubling production in the last 25 years, taking advantage of the stimuli provided by the olive oil sector (IOC 2015d, Mylonas 2015). Despite this, the EU is still responsible for about 2/3 of the world exports and wants to secure that position (Rossi 2017), being the olive oil sector one of the most privileged by CAP, compared to other products such as wine, fruits or vegetables (Mili et al. 2017, Ozden, Dios-Palomares 2016). In 2010/11, exports to third countries reached 447,000 tons, with Spain and Italy contributing the majority share, selling 225,000 and 160,000 tons respectively (European Commission 2012). At the same time, the actual CAP is raising concerns and negative consequences may arise due to expected cuts in subsidies until 2020 (Mylonas 2015, p. 9).

4 Environmental Consequences

While traditional olive groves were once characterized by natural value agricultural systems, recent changes due to the introduction of intensive modes of production have led to negative environmental consequences (De Gennaro et al. 2012, de Graaff et al. 2011, Muktaadirul Bari Chowdhury et al. 2013, Ozden, Dios-Palomares 2016).

In Neves, Pires (2013) these consequences are systematized as follows: (i) loss of diversity and landscape modifications; (ii) soil erosion, and; (iii) water consumption and contamination.

Olive trees are highly adaptable to climate in the Mediterranean region (Scheidel, Krausmann 2011) allowing its cultivation in marginal soils, with low fertility (Huang, Sumpio 2008) or in terraces using very low quantities of fertilizers, herbicides and pesticides, characteristic of the traditional olive groves' system (de Graaff et al. 2011,



Notes: Notes: P = Production; C = Consumption. Countries in the IOC 2015a,b,c,d were merged by 'region'. Regions were grouped in five blocks according to the following criteria (from left to right): (1) production grew more than consumption; (2) consumption grew more than production; (3) identical production and consumption growth; (4) emerging producing regions that do not yet meet consumers' demand; (5) purely consumer regions.

Figure 1: Dynamics of production and consumption by world regions. (A) Relative weight of production over consumption in 1990/91 and 2015/16 and (B) relative growth in 2015/16 over 1990/91 of production and consumption

Neves, Pires 2013) where spacing between trees (an average of 100 trees per hectare) allows a second crop or pastoralism to be part of a biodiverse landscape (Avraamides, Fatta 2008, European Commission 2012, Ferreira 2010).

Biodiversity loss is highly associated with any crop intensification which adds additional pressures to the environment (Metzidakis et al. 2008). These issues were added to olive groves by shifting farming practices to more intensive modes of production (which can exceed even 2,000 trees per hectare), leading to a transformed landscape with shortened biodiversity (Costantini, Barbetti 2008, Scheidel, Krausmann 2011, Weisteiner et al. 2011).

Intensive monocultures are equally associated with erosion (de Graaff et al. 2011, Salomone, Ioppolo 2012), and according to Beaufoy (2001), the shifting of olive groves to more intensive modes of production not only contributes largely to erosion but it can lead to desertification. Contrary to traditional olive groves that, normally, are not irrigated, intensive and super-intensive olive groves are irrigated. This brought about significant changes in water consumption since these practices are very water-intensive (Avraamides, Fatta 2008, de Graaff et al. 2011).

Environmental problems are not only related to water consumption but also to the high inputs of fertilizers and herbicides used in these intensive modes of production which, in turn, are associated with air, soil and water bodies' contamination (Neves, Pires 2013, Roig et al. 2006, Stroosnijder et al. 2008) and create an encouraging environment to pests and diseases resulting from the excessive use of water (Metzidakis et al. 2008). Rivers in the Mediterranean region have been subject to uncontrolled discharges of olive mill waste (Roig et al. 2006). Dumping olive mill waste was a common practice until the end of the last century, despite its prohibition in the early 1980s. To overcome these issues, new uses have been given to olive mill wastes, such as fertilizer or for the production of bioenergy (Muktadirul Bari Chowdhury et al. 2013, Scheidel, Krausmann 2011). Olive oil extraction systems have also been subject to technological changes. Presently, most olive mills are already equipped with the so-called two-phase olive mill waste. It is more environmentally friendly and needs considerably fewer amounts of water in the olive oil extraction process

(Roig et al. 2006). This technology is now being used in several Mediterranean countries. Spain, which for decades has had serious environmental problems related to olive mill waste, have now 75% of its mills equipped with such technology (IOC 2012).

5 The Iberian Peninsula and reported environmental problems related to the olive oil sector

Olive oil production in its intensive and super-intensive modes of production are related to high rates of erosion in low fertility soils that are now losing biodiversity and introducing great landscape transformations (Vanwalleggem et al. 2010).

Andalusia, Spain, is the most productive region in the world concerning olive groves (Mili et al. 2017). Between 2000 and 2003, the region produced on average 39% of the world's olive oil and 24% of table olives (Gómez et al. 2009).

Today, the Andalusian autonomous community alone, is responsible for 75% of the Spanish olive oil production, which is about 35% of the global production. Despite the region shifting to more sustainable olive oil farming production modes, especially integrated and organic (Mili et al. 2017), it is still facing major problems related to soil loss (Scheidel, Krausmann 2011). In a 2002 study carried out in the Andalusian region, reported topsoil losses in olive groves were on average around 62 tons per hectare/year. Although, in certain areas of the region topsoil losses reached 92 tons per hectare/year. The lowest rate of topsoil losses was estimated at 36 tons per hectare/year. Such rates are considered to be very high compared to soil regeneration rates presented for the region, which vary from one to 12 tons per hectare/year (Scheidel, Krausmann 2011). This issue brought major concerns to the Spanish local government that resulted in the implementation of the National and Andalusian Action Plan against Desertification, meant for the application of good farming practices (Neves, Pires 2013).

In order to better understand the results of the study mentioned above, one must return to the beginning of the 1990s. The region of Andalusia at the beginning of the 1990s was facing periods of droughts and, at the same time, the EU was providing incentives through CAP to increase yields. These constraints and opportunities led to the development of Research and Development programs in a joint initiative from the Andalusian board and private olive producers in 1992. The outcome was the development of a drip irrigation and fertilizer (fertirrigation) system. This system irrigates and fertilizes according to the seasonal needs of the crop. Such technological development is responsible for the increase in productivity and the expansion and intensification (raising the number of trees per hectare) of the olive sector not only in Andalusia but throughout Spain (Scheidel, Krausmann 2011, Vanwalleggem et al. 2010).

Presently, erosion and desertification issues associated to crops' intensification, affect not only the Iberian Peninsula countries but also other Mediterranean countries, namely Greece and Italy (Costantini, Barbetti 2008, DGOTDU 2006, Gómez et al. 2009, Roig et al. 2006). Olive groves' intensive modes of production are being referred to as the most problematic crops concerning these issues (Beaufoy 2001, Neves, Pires 2013, Vanwalleggem et al. 2010).

These environmental problems highlighted an emergent need for solutions. Spain, the world's largest producer, has again and somehow succeeded to properly manage the problems here mentioned. One issue relates to the fact that Spain had exceeded quotas for olive trees and olive oil production, a problem that found an easy and favorable solution among the cross-border regions with the Portuguese territory, namely from the regions of Andalusia and Extremadura. Because Spain had exceeded quotas, the EU was financing the removal of olive trees. At the same time in Portugal, EU was funding the plantation of olive trees. That was done by a considerable number of Spanish olive oil producers. The compensations from removing olive trees from a certain area with exceeded quotas gave them the income necessary to invest in farms in Portugal to plant olive trees and be remunerated for an activity that they are very familiar with. These investors highlight the fact of existing available land and water, particularly in the Alentejo region. A region with high water availability since the construction of the Alqueva dam in 2002, and particularly since it reached its maximum level in 2010. Besides, water, land as well as

labor are mentioned to be of lower cost in the Portuguese region comparatively to Spain. These are considered attractive and boosted investment in a time of repealing constraints due to the cross-border situation (Pires, Neves 2013).

By having the biggest artificial lake in Europe, with 250 Sq. km, the Alqueva dam made it possible for the region of Alentejo to expand and transit from traditional to irrigated intensive and super-intensive modes of production. The transition began in the late 1990s, and with the Alqueva irrigation perimeter completely infrastructured and operational today, the olive groves' area is expected to double, and production to significantly increase. Investment is also expected to increase from Andalusia, where water and land resources are pointed as the main reasons (Pires, Neves 2013).

The Alentejo region holds 51% (173,392 hectares in 2011) of the total olive production area, with more than half of the national olive oil being produced here due to the high productivity rates (1,873 kg per hectare), 24% higher than the national average (Neves et al. 2013). Also, note that this region is the second at the EU level with the largest holdings, only surpassed by the Andalusian region, with an average of 7.2 and 8 hectares per holding respectively (European Commission 2012).

6 Discussion and Conclusions

The values associated with the Mediterranean Diet led to its inclusion to the Representative List of the Intangible Cultural Heritage of Humanity. The Mediterranean Diet is, in fact, a way of life with knowledge, traditions, and a remarkable social sense, amongst other values and traditions, visible in many aspects of everyday life of Mediterranean cultures. But this recognition had a “perverse” impact in the sense that the valuation of olive oil, as one of the components of this diet, led to an unprecedented increase in demand in the last decades and, consequently, to its appreciation in the market. This appreciation has stimulated an increased production that was mainly accomplished through agriculture intensification.

The transition from a traditional production mode to intensive and super-intensive modes has altered the landscapes of the Mediterranean olive groves, namely in the Alentejo and Andalusia regions, introducing monotony (large extensions of kilometers only of olive groves) where before existed biodiversity and, above all, having negative environmental impacts in the medium and long terms. Therefore, olive oil should not be reduced to a commodity that is part of a list of consumer products, distinctive of the Mediterranean Diet, which presently is being produced in such a way that few or none meets the values or meaning emphasized by UNESCO.

The same way, the FAO's recognition of the Mediterranean Diet as one of the most sustainable diets can be used to promote olive oil. First of all, it refers to sustainability. As it can be read on their definition, a sustainable diet with low environmental impacts, contributing to a greener economy and respectful of biodiversity. Foremost, olive oil production is not restricted to intensive and super-intensive modes of production, even though, that is the current tendency, which at the same time ends up marginalizing small producers with no ability to compete in the market.

Such tendency benefits from the most recent achievements by FAO and UNESCO based on the Mediterranean Diet, but also from all the previous mentioned campaigns by IOC and EU (namely through the successive CAP) that led to significant changes, reflecting a valorization of olive oil especially in the world market, and raising its demand. A rise that has stimulated production intensification, generally in Northern Mediterranean countries. The intensification in production modes was followed by its mechanization, irrigation and increase of farms' dimensions. Consequently, in the 25 years in analysis, olive oil production has doubled and expanded worldwide and in the Mediterranean region in particular.

Again, one must remind that the current modes of olive oil production are being challenged considering its sustainability. This is particularly accurate in the Iberian Peninsula countries where environmental issues have been here stated and debated. In addition to that, the CAP aims to reduce the direct support to olive oil production, increasing the challenges for the sector.

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Rehabilitation and Renewal of Mediterranean Structures. The Utopic Landscape of Algarve

Carlos Bragança dos Santos¹

¹ Universidade do Algarve, Faro, Portugal

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Abstract. One of the remarkable features of Mediterranean landscapes is the terraced land frame, usually supported by dry stone walling. The terraces, property division walls, pathways and traditional paths design a network compartmentalization that defines landscape identity. The informational content, aesthetic quality, ecological and cultural values allowed by this articulated construction are particularly important at coastal zones with intense human impact. On the Algarve, the hills displayed by such structures form the backdrop of an urban-touristic system. This paper aims to interrelate ecological, aesthetic, symbolic, socio-economic and political aspects that influence the spatial distribution and image of the terraces. The values that local people may assign to their landscapes will determine the acknowledgement of the structural elements under analysis, but the role of tourists must be seriously take into account. Beyond nostalgic solutions, one must prospect the future of the dry stone walling structure into the diversity of possible solutions for a sustainable landscape development, which enhances the living part of an inseparable unit that includes the densest urbanized areas with less ecological functions. We call such a unit the urban-touristic region of Algarve and, therefore, we try to use landscape as an instrument of knowledge and acknowledgement of regional spaces.

JEL classification: Q56

Key words: Terraces, Landscape, Urban-Region, Mediterranean, Algarve

1 Introduction

In the Mediterranean context, the landscape is the outcome of a very long building process. “Landscapes are never completed. Rather, they are constantly being built and rebuilt through people’s engagement with their inner images and with their physical environment.” (Backhaus et al. 2008).

In order to understand the dynamics of a complex system such as the landscape, under a systemic approach, the first thing to do is to combine its structural aspects to reach a model of the system’s functioning. However, in the case of landscape, we need to surpass the mechanist trends on approaching the biophysical and aesthetic features as merely observable and measurable objects, as if they were outside of ourselves. Thus, we will try to get closer to a mesological meaning of the landscape –landscape as a mediatory function between people and the environment (Berque 1986).

Under this perspective, in addition to the relationship with other structural elements of different dimensions, cultural, ecological, sociopolitical, economic and spiritual, a structural feature of landscape can never be outside of individuals, as human subjects and, most of all, as a society. Therefore, the involvement of all relevant dimensions underlie the way we will seek to frame the analysis of dry stone walling structure at the barrocal¹ of the Algarve region. In fact, we focus on a very representative structure modeling of the mountains and hills that fit the skeleton of many Mediterranean landscapes (Braudel 2001).

We begin with a short description of the main features of Mediterranean environment, as a distinctive broad region, in both biophysical and socio-cultural terms, in which the Algarve is included. The role of dry stone structure on terraced landscapes as hard work done by many generations that carved a regional hallmark is a very important aspect. In that sense, some functions and building aspects of dry stone walling will appear as an explanation of accumulated knowledge. However, one can only reach the real significance and the future of such distinctive structures by emphasizing the construction of landscape as a process.

Indeed, it appears obvious that the prevailing ideas of the world guide the general process of landscape construction. One cannot detach the evolution of the landscape and the actions that transform the places, from the ideas and the strategic framework derived from beliefs, either religious or philosophical. For instance, the rapid landscape changes that we are witnessing nowadays, usually leading to well-known unsustainable territories with no apparent solution, are a consequence of a prevailing dualism inherited from the Aristotelian logic.

Such an absence of solutions compels us to display positive utopias to prospect the evolution of landscape as both a common good and a place with enough biological activity to withstand large urban concentration. Therefore, we explore the idea of an urban-tourist region at the Algarve as the scenario of the various activities most likely to influence the future of the landscape structure supported by dry stone walling. The focus on a regional approach to landscape counteracts the idea of landscapes as closed entities, eventually with an optimal condition or climax state (Backhaus 2011), thus allowing its complete control. Rather, we agree that landscape evolution must comprehend constant negotiations about possible trajectories. In that sense, we present a method as a platform to facilitate communication and encourage public participation, essential to legitimize real options.

In brief, our general methodology comprehends the following steps: 1) a short prospect of the geographical environment of the Algarve's terraced landscape, enhancing perceptual features, hidden aspects and the real tensions; 2) a general description of socio-cultural relationships of the terraced landscape, building techniques, main functions, limitations and threats; 3) a search for alternative strategies on landscape reconstruction as a process, thus suggesting the utopia of an Algarve urban region; and 4) an exploration of the four poles method for the interpretation of landscape. Our goal is to discuss and design a process of knowledge and acknowledgment of a structure that shapes the character of the 'Algarvian' landscape and not necessarily to present finished solutions.

2 Geographic Overview of the Algarve

The Algarve region is located in the Gulf of Cadiz, practically in the vestibule of the western entrance of the Mediterranean Sea, known as the Hercules Columns. Mediterranean influences are present, at the climate level, in the vegetation cover and even in people's traditions. Then, one can observe many characteristic features of Mediterranean landscapes, like the terraces of barrocal hills, a distinctive factor of Algarve's landscape.

¹'Barrocal' could be understood like clay (barro, in Portuguese and Spanish) plus lime (cal, idem), meaning –in real physical terms– a fine layer of clay –mostly 10 to 20 cm of clay– over an extensive mass of lime rock. It is a zone where water infiltration is very important and leads to a progressive dissolution of limestone; a karstic process takes place, forming big aquifers with various depths, normally reaching hundreds of meters (Costa et al. 1985). Nevertheless, according to a famous dictionary of Portuguese language (Machado 1991), the term barrocal comes from barroco meaning an isolated big rock or a place full of big rocks.



Source: Adapted from [Oteros \(2014\)](#)

Figure 1: Ecological niche of the potential olive tree distribution

These terraces, supported by dry stone walling structures built over generations, play a decisive role in the conservation of traditional agrosystems, not only as cultural and ecological values but also in aesthetic terms.

2.1 *The Mediterranean context*

The first issue to clarify is the integration of the Algarve in the Mediterranean geographical context. According to [Forman \(1995\)](#), the microclimate and the socio-cultural pattern are the two broad characteristics for defining a region. In fact, the Mediterranean climate extends a little beyond the shores of Mediterranean Sea, embracing at least the south of Iberian Peninsula. One could say that the Mediterranean region, extends until the doorway of Hercules Columns, “[the region] contrasts mightily with the Sahara area to the south, temperate Europe to the north, and a cool, dry region to the east. The Mediterranean Region is distinctive in both physical and human terms.” ([Forman 2008](#), p. 11). As the Portuguese geographer, Orlando Ribeiro used to say, the Mediterranean influence goes until the last olive tree (Figure 1).

Throughout the Mediterranean coastal regions, the omnipresence of mountains is very characteristic. “The Mediterranean space is devoured by mountains. They are present until the seafront, abusive, leaning against each other, inevitable, like the skeleton and the background of landscape.” ([Braudel 2001](#), p. 19).

It is true that the mountain ranges of the Algarve are not as visually impressive as in other Mediterranean coastal areas. The low elevation of the hills –less than 400 meters– and the progressive abandonment of traditional agricultural activities coarsen the perceptual field and the ‘sense of mystery’ can only be revealed when the beholder come closer. In fact, a façade of limestone hills, with an alignment roughly parallel to the coastline, is omnipresent as the backdrop of most urban concentrations. The geometric disposal of mountains shapes a sort of amphitheater opened to the sea. A second line of shale Mountains, the ‘Serra’, behind the limestone hills, reinforces the protection from the inconvenient cold north winds and makes the prevailing of meridional influences in all the littoral and part of the barrocal (Figure 2).

2.2 *The backdrop and the ‘skeleton’ of the landscape*

Despite the evident presence of a backdrop, the truth is that the strong urban growth along the coast created a considerable distance between people and their landscape, leading to several situations of loss of attractiveness and even degradation. However, under sustainable conditions, landscapes can tell their stories again in a way that people may

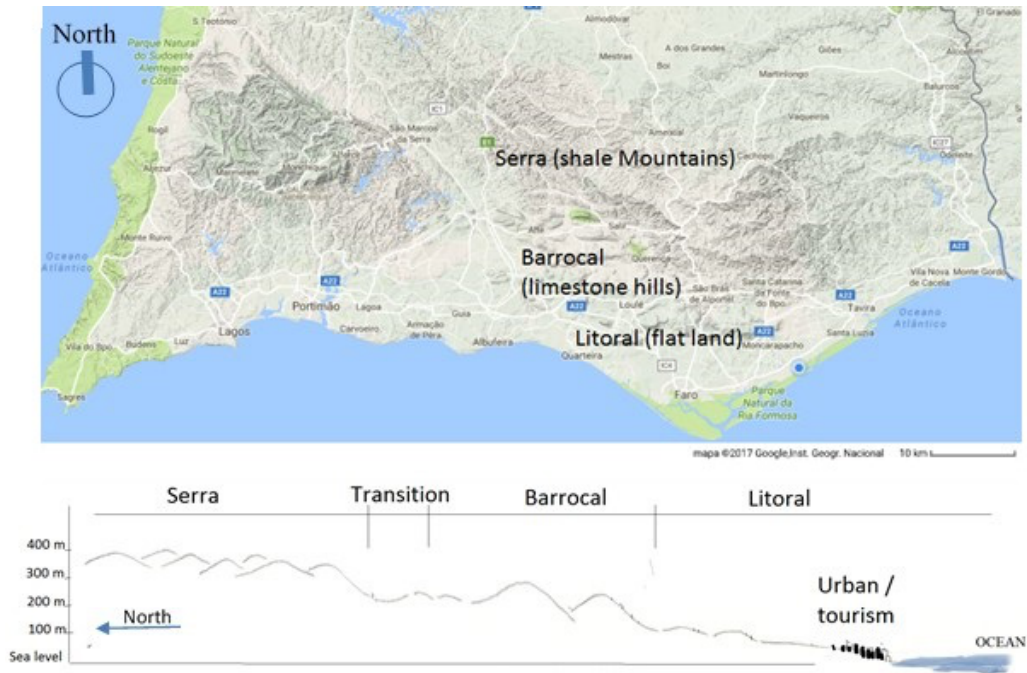


Figure 2: The different types of Algarve relief: Top: digital terrain model (adapted from google maps, 2017); Bottom: profile sketch from North to South

appreciate their narrative and poetic qualities² again (Nohl 2001). Once the perception of many hidden aspects is not evident, the consciousness of sustainable conditions is often difficult to achieve, especially for outside observers. For that reason we empathize some concerns about critical biophysical functions and intrinsic tensions.

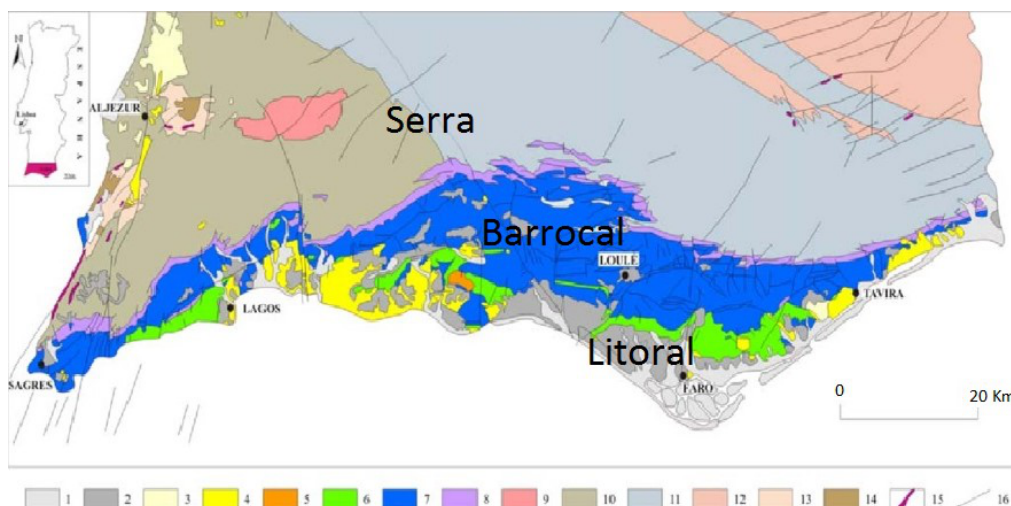
In fact, the barrocal exactly matches that homogeneous zone in terms of soil (chalky) and climate features, formed by the hills mentioned before. Here prevails the unirrigated orchard agrosystem, developed on terraces that constitute the hallmark of the Algarve rural countryside (Feio 1983). Much of this zone is, in fact, the background of the landscape perceived from the urban-tourist concentration along the coastline, which was spreading from the 1970s, like in many Mediterranean coastal areas.

Given that the geological bedrock of the barrocal is mostly from the Jurassic period (Figure 3), then one must take into account that the limestone dissolution generates a complex set of aquifers interlinked in the underground (Costa et al. 1985). Most of these aquifers have a high productivity and good water quality; until nowadays they were poorly exploited and provided the urban water supply up to the end of the 1990s. Then, after the year 2000, a system of dams ensured urban water supply, thus increasing the risk of eutrophication, and underground water has become more intensively used for irrigated agriculture.

Moreover, this irrigated agriculture, developed just above the largest regional aquifer, matching the northern part of Jurassic bedrock, with obvious consequences for the degradation of groundwater quality, which was partially financed by EU funds (Bragança 2006). In addition to this vital negative impact, the massive incidence of dryland transformation in irrigated land lead to a gradual substitution of part of the traditional terraced landscape. On the other hand, when soil sealing large areas of the barrocal or extracting large quantities of underground water, some disturbances can happen in the control of the salt wedge, leading to soil salinization at the littoral zone (Figure 4).

Like in other Mediterranean coastal regions, especially where the limestone relief dominates, the hydro-geological protection is undoubtedly an issue of great importance

²Nohl (2001) points out two close related aspects for landscape aesthetics: 1) the narrative aspects, related to perceptions and symptoms about the landscape functioning; 2) the poetic aspects, related to mood/feelings and symbols/meanings.



Source: Adapted from Carta Geológica de Portugal, scale 1:500 000, 1992

Notes: Typical cenozoic substratum of Litoral: 1 Holocene; 2 Pleistocene; 3 Pliocene; 4 Miocene; 5, Paleogene. Typical mesozoic substratum of Barrocal: 6 Cretaceous; 7 Jurassic. Transition Barrocal–Serra: 8 early Jurassic–Late Triassic. Substratum of Serra: 9 Igneous intrusive massive of Monchique; 10 Vestefalian, 11 Namurian, 12 Visean, 13, Tournaisian, 14 Famennian. Complementary information: 15 reefs, 16 faults.

Figure 3: Geological map of Algarve

(Fontanari 2008, Lasanta et al. 2013). Here, favoring infiltration, mitigating the effects of torrentiality and controlling the risk of erosion, improving soil quality, are significant considerations of such protection. All these features closely links with the spatial distribution and traditional building techniques using local materials. The materials that form the dry stone walling that supports the terraces platforms come from the work of taking some stones from the previously existing relief. The resulting dry stone walling assures an effective drainage of a greatest thickness of clay soil.

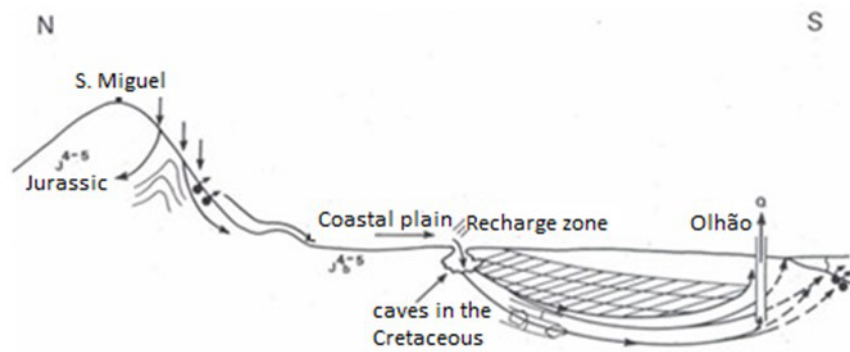
Urbanites and tourists hardly realize such features, as well as the historic-cultural background and the actual range of ecological functions fulfilled by the resulting traditional agrosystems. However, from an aesthetical standpoint, these land support walls, when combined with other property separation walls and paths limitation, define an extended constructive body, which design a kind of landscape calligraphy encompassing complex alignments and rhythms. One can easily perceive a compartmentation, which sustain the ecological diversity and defines the geometry of the entire space as well.

3 Traditional Building Structures

In fact, one must remember that Mediterranean landscape terraces are quite resilient. Throughout their history there were cycles with periods of building and expansion followed by stability and then declining periods with abandonment, before repeating a new cycle (Guerny, Hsu 2010). Moreover, evident social factors strengthened resilience, such as the nature of collective work and social organization needed for the construction process, but also the continuous surveillance and team organizations for quick repairs in case of great damages. On the other hand, these aspects cannot be isolated from traditional techniques.

3.1 Historical and socio-economic aspects

The dry stone walling, apparently simple in constructive terms, represents the work of many generations, whose origin is lost in time. According to Seva et al. (2005), the dry stone walls supporting small terraces appear, at least in eastern Spain, around the XVIII century B.C., with no direct relation to agriculture, and originally serving as shelter for shepherds in transhumance practices along the mountains. Moreover, for the Bronze Age,



Source: Adapted from Costa et al. (1985)

Figure 4: Detail of hydraulic relations between limestone hills and littoral flat lands, northeast Faro

slope terracing is very well documented for Eastern Iberian Peninsula, mostly with the purpose of extending the household area (Asins-Velis 2006). However, the development of terracing for agricultural purposes appears in the Iberian Peninsula during the Roman times, with evidence from the first century B.C., and was further extended during the Muslim Andalusies presence, VIII-XIII centuries A.C. (Asins-Velis 2006).

In the case of the Algarve, the terraced dry orchards mainly includes fig, almond and carob trees, allowing leguminous crops under the tree crown cover, such as peas and beans, which help to incorporate nitrogen into the soil. Apart from providing food products to the populations, through the fruits and leguminous plants, carob and fig leaves are hay substitutes, which allow livestock (Feio 1983).

The development of such structures, common in many Mediterranean landscapes, for agricultural purposes mainly in the last three centuries, allowed population growth. In fact, the last period of terraced landscapes expansion occurs during 18th and 19th centuries (Guerny, Hsu 2010). At the Algarve region, however, at least in the mid-twentieth century, terraces were still in full expansion, primarily because the production of the installed fruit trees was much higher, in monetary terms, when compared to the cereal production. Around 1946-47, the production of figs, almonds, and carobs represented an important part of Portuguese exportations. The origins of such production is very ancient, already in the twelfth century A.C., the geographer and Arab botanist Edrisi, mentioned that the figs of Silves, the capital of the Algarve under the Moorish domination, were exported to all Western countries (Feio 1983).

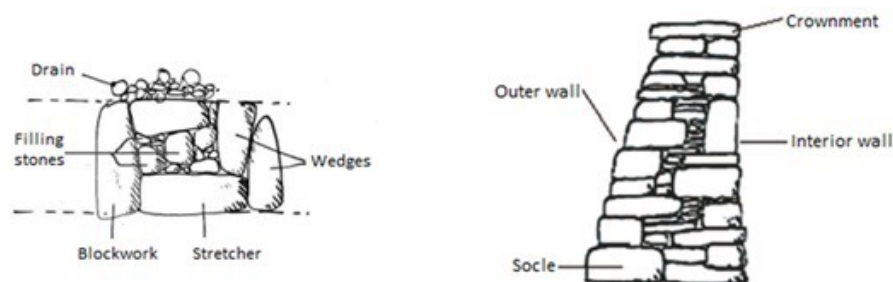
Beyond the socioeconomic and historical interests, this kind of built agrosystem is extremely adaptive and generated new environmental equilibria, still relying on a continuous human intervention.

3.2 Building techniques

The construction techniques closely relates with permeability settings, allowing to redirect the water circulation and to enhance infiltration. Hence, the integrated building structure of terraces and dry stone walling define new waterways and influences land flows in a very soft manner.

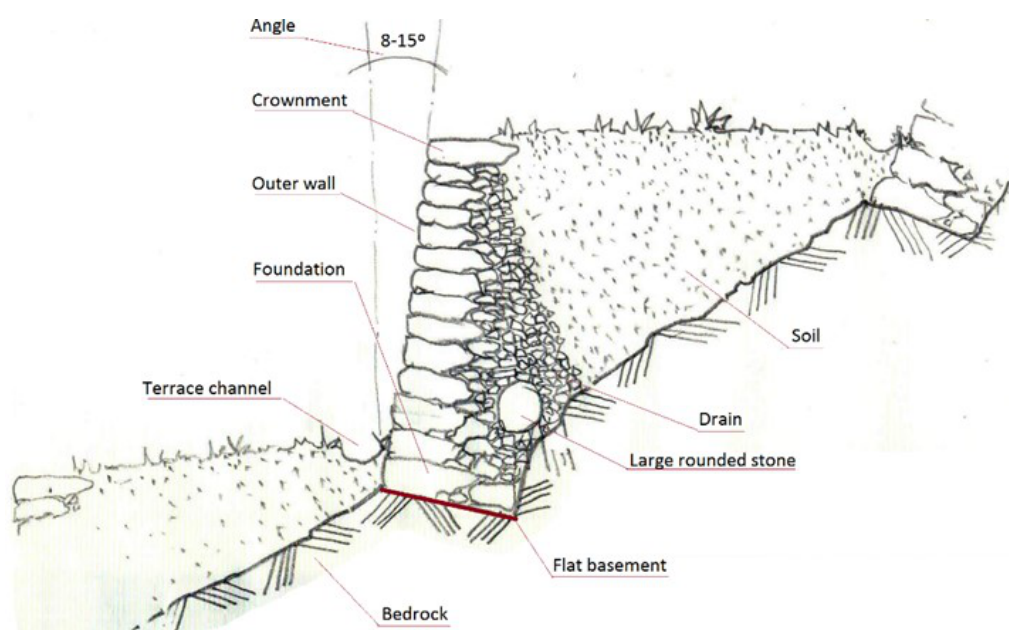
Despite its apparent fragility, dry stone walling allows conditions of resistance and stability comparable to more technically modern structures like concrete walls, gabions, etc. Even from an economic point of view, dry stone retaining walls are competitive when walls are less than three meters high and even higher, when all environmental costs are accounted (Colas 2009). As for stability, this kind of walls can be included in a category of weight-walls, in which the support function is granted by the weight of the body wall that balances the landslide forces (Colas 2009, Villemus 2004).

No systematic work was found on the specific techniques used at the Algarve region,



Source: Adapted from Colas (2009)

Figure 5: Building techniques. Left: Top view at the middle phase of a dry stone wall construction; Right: Cut view of a support wall



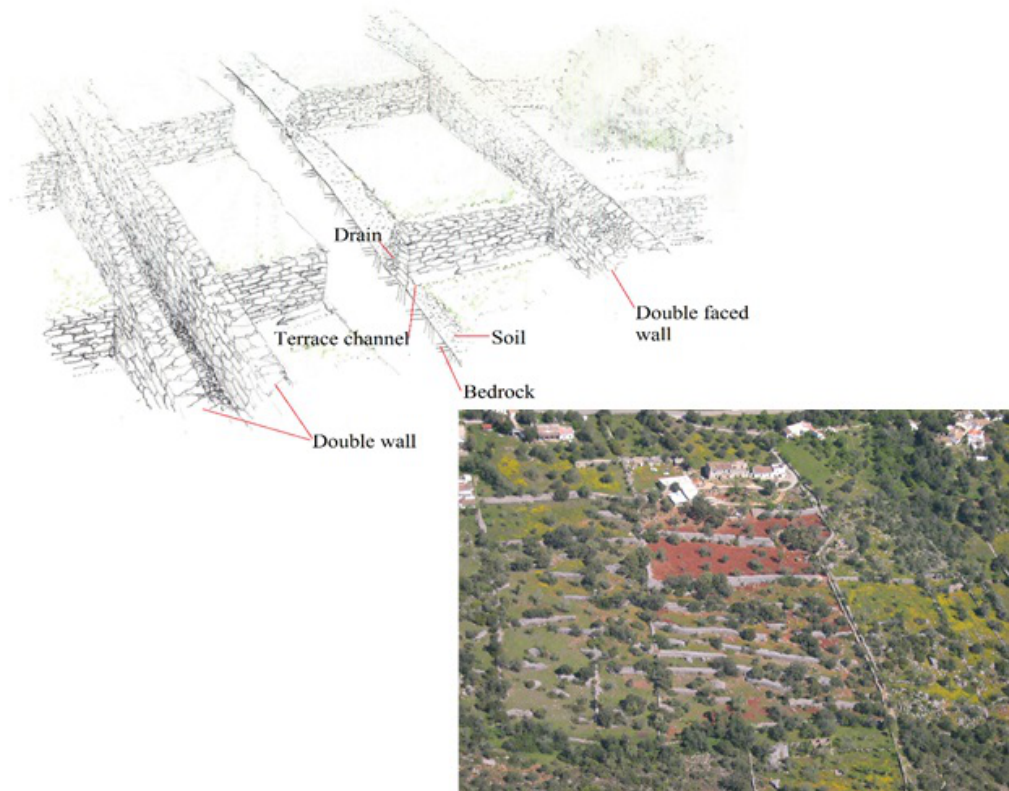
Source: Author's drawing, no scale, after Descazeaud et al. (2014) and Martini et al. (2004)

Figure 6: General scheme of a support dry stone wall

instead some field observations will be compared with documented studies for other Mediterranean regions. Although the great number of local variants, the basic technique is the placement of different types of stone in a way that they lock each other and fill interstitial spaces with thinner materials, thus improving drainage conditions (Figure 5, left).

A characteristic feature observable at the outer wall is the placement of hard materials on the basement, diminishing the size towards the top. As an indicative value but not a constructive rule, Martini et al. point to the following relation between width and height of the walls, in the case of Cinque Terre: 50 centimeters (cm) width of wall foundation for a maximum of 1,5 meters (m) height; about 70 cm width for 2-3m height and 80-100 cm for more than 3m. The outer wall has an inclination whose angle (fruit in French) will depend on its height, the type of soil and subsoil, rainfall and runoff (Figure 6). Colas (2009) references 8-15° for such angle, but other authors indicate 10-20° (Martini et al. 2004, Villemus 2004).

As stated by Larcena (2012), the walls work like a real sanitation network, letting the water pass over a kind of drain composed by smaller stones placed just behind the main body of the wall.



Source: Top left: Author's sketch, after [Contessa \(2014\)](#); no scale. Bottom right: [Bragança \(2006\)](#)

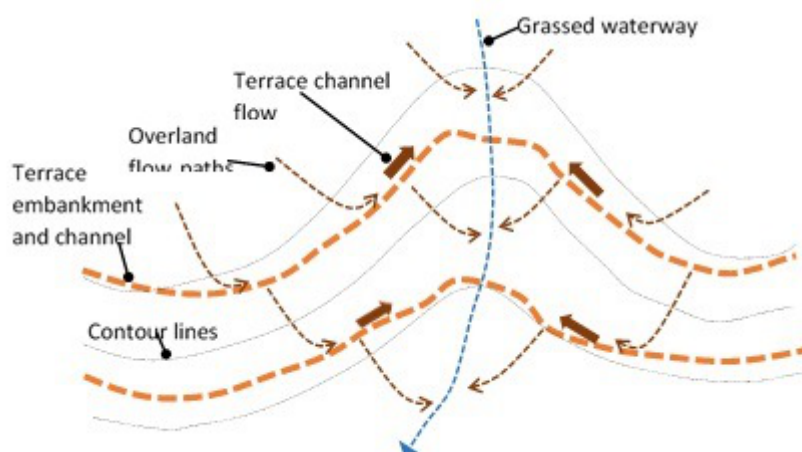
Figure 7: Drainage ditches. Top left: Drainage ditches in a terraced system. Bottom right: Photo near S. Brás de Alportel where double walling and other perpendicular walls are perfectly visible

The inherent fragilities due to the irregularity and the diminishing of resistance at the upper part of the wall lead to degradations over time and requires regular maintenance ([Martini et al. 2004](#)). However, drainage functions, particularly those assured at the lower part and even at the interior of the wall, guarantees the durability of most parts of the dry stone walling. For that reason, the wall basement prevents efficient drainage conditions, due to the concentration of large materials. Moreover, in some situations, the mixing of a few big rounded stones among smaller materials, just behind the basement, allows a better stability at the first row of the drainage process ([Martini et al. 2004](#)). In cases of more intensive rainfall, the definition of a terrace channel along the basement of the outer wall can happen, to help a better lateral runoff.

3.3 Hydraulic functions

A complex articulated set of walls shows a spatial modulation adapted to the preexisting relief modifies the natural water circulation, both in the vertical infiltration and the horizontal runoff. In fact, much of the water that infiltrates an upstairs terrace reaches the terrace downstairs, drained in the lateral sense, by a kind of micro channels carved under the walls ([Larcena 2012](#)). The definition of toe-channels is usual in areas of intense rainfall, but they are not evident on the barrocal of the Algarve region; however, some studies refer to a kind of channel with similar functions behind the crownment ([Antão 2010](#)).

Here, like in many other Mediterranean regions, the majority of walls present an alignment almost parallel to contour curves, but other wider walls cross them in a perpendicular or obliquous sense, allowing better stability and/or other functions. Such wider walls are double-faced walls, thus concentrating smaller materials inside.



Source: Adapted from Foster (2004).

Figure 8: Scheme of the overland flows in a slope with terraced frame

Most of these walls mark the properties' boundaries, but they appear to receive and/or drain part of the lateral runoff. In some cases, such walls separate the lateral runoff. Figure 7 shows a general scheme for a case of a wider wall separating the lateral runoff. However, a double walling structure frequently helps the lateral runoff, thus mitigating the negative effects of soil erosion.

In an effective way, by receiving the water from terraces, the articulate set of drains have three functions: a) they break the torrential current in case of intense rainfall; b) they allow silt or sediment directing and c) they help to catch water that can be used for irrigation (Larcena 2012). It is true that at the barrocal infiltration is very important, but when torrential rainfall occurs, a part of the water runoff ends in little creeks or grassed waterways (Figure 8). Then, the sediment load (Foster 2004) intensifies, thus allowing the concentration of soils with better quality and moisture content along the small valleys, where there are some walls with less extensive design platforms, similar to the terrace slope embankments.

The walling is then far from a random spatial distribution. Rather, it shows a close relationship between biophysical characteristics and human intervention according to the needs of people (Reynès 2000). Figure 9 shows the adaptation of terraced structure to the topographic conditions on the barrocal. The soil deposition (Foster 2004) can be perceived along the small valley, although the shrubs do not allow a detailed view of drainage conditions. Despite the abandonment of a significant number of plots, the walling structure persists and subsistence activities are still present.

As mentioned above, the natural favorable conditions of water infiltration generates a complex set of aquifers. Less deep deposits allowed a great number of traditional wells and water springs that provided fresh water for human use and irrigation of small areas, because once it was not possible to exploit deep underground waters with traditional techniques.

We can also find some cases where clear interrelationships between walling structure and land use of valleys or other flat zones are evidently present. It is the case of small scale integrated systems of water springs, channels, water tanks for irrigation and mills, as shown in Figure 10.

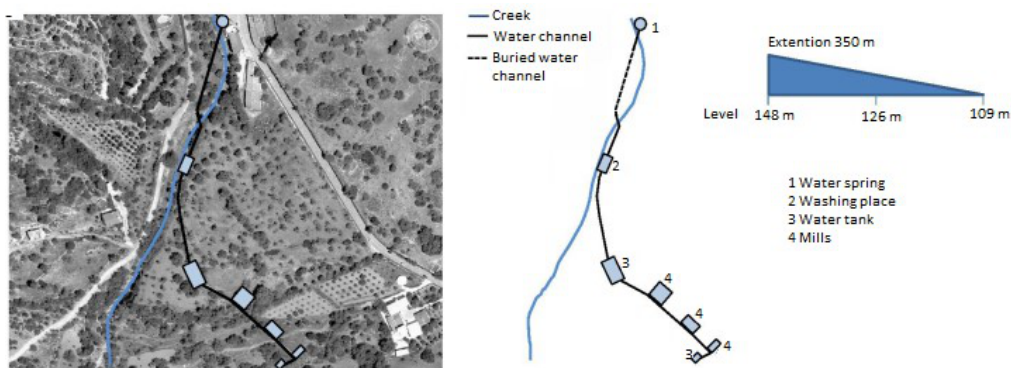
3.4 Limitations and threats

In general terms, there is a great variety of constructive forms along all the walling structure, very well documented for most Mediterranean regions but not sufficiently systematized for the Algarve, including different techniques of stone preparing, crown-finishing, buttresses, access to platforms, combination with other rudimentary



Source: Image from Google maps 2017

Figure 9: Image of a small valley near Cerro de São Miguel, Northeast Faro



Source: Adapted from Barão (2014)

Figure 10: Hydraulic multifunctional system at Alface creek, north Faro

constructions, etc.

In addition to that, the landscape evaluation needs more specific studies about the hydraulic functioning, which are difficult to find, and about the ecological network associated to dry stone walling, including specific types of vegetation and cultural values. All such features relate closely with perceptive and symbolic aspects, it is easy to agree with Nohl's argument that "... aesthetic perception involves extracting information, knowledge and stories from the landscape, as much as possible. The more a beholder is successful at this, the greater is his emotional and expressive benefit." (Nohl 2001, p. 227).

As for the threats, they are very similar for all Mediterranean terraced landscapes. Following a scheme similar to that of Varotto (2008), one can identify three types of threats for the Algarve terraced landscapes: 1) lack of intervention; 2) excess of intervention and 3) creation of compensatory wilderness.

The first one relates to abandonment, the lack of stewardship by farmers³ and the

³The Algarve follows the general trends registered at the national level: loss of more than 40% workers on agriculture in the decade from 2001-2011, as pointed out by the Instituto Nacional de Estatística. The situation gets worse at the case of terraces where the access is more difficult and the size of the plots hardly allows rentable farming.

disappearance of manual labor. Mechanized interventions are very difficult to develop when topographic characteristics are less advantageous. Then, the lack of intervention leads to the loss of large extensions of dry stone walling and terraces, affecting the set of complex interrelated functions. In the medium term, the domination of the garrigue⁴, composed by bushes and poor quality woods, will cause a biodiversity reduction and will enhance the risks of fire hazards (Guerny, Hsu 2010). The disturbance of hydrogeological equilibrium by the lack of the dry walling structure conservation will affect the stability not only of slopes but also of some areas located downstream. As for cultural values, the loss of large dry stone walling extensions deprives the knowledge of traditional techniques and environmental adaptation of people developed over centuries.

The second type, the excess of intervention, has to do with the implementation of industrial agriculture, mostly orange orchards, and, above all, with the spread housing. The expansion of orange orchards occurred mainly from 1980 to 1990, supported by EU funds. As mentioned before, this land use occupies large areas precisely over the larger regional aquifer. Ironically, the regional land management plan, legally approved in 1991, classified the area as “imperative” zone for underground water protection (Bragança 2006). This kind of action illustrates “the diktat of the productivity and the banalization of the terraced landscapes” (Varotto 2008), once the more apt areas for agriculture production, at the littoral, were progressively absorbed by tourism and urban growth. The other excess derives from the housing spread that invades the front hills of the barrocal, whose arrangement form the amphitheater facing the coastal zone. The search for good or even idyllic views result in a jealous privatization⁵ (Varotto 2008) of terraced landscape leading to the loss of identity and scenic attractiveness. Moreover, this contagious phenomenon has serious environmental and cultural impacts, not only by destroying or altering the dry stone walling, but also by affecting the quality and quantity of the underground water.

The ‘urbanocentric’ (Varotto 2008) perspective leads us to the third type of threats, the creation of compensatory wilderness. In fact, the metropolitan process of territorial organization induced by urban-tourism development, at the coastal zones, tends to spread artificialized spaces, which needs to be counterbalanced by establishing large areas for recreational use or encroachment of wilderness, normally with a positive meaning in ecological or romantic terms. As for the terraces, the concerns with protection for cultural reasons has been a common attitude between planners of some Mediterranean regions, without taking into account the complexity of its functions as a whole. It is not still the case for the Algarve, but there is a risk that the revision of the actual land management plans follow a similar practice of defining perimeters and establishing norms of conservation (Fontanari 2008).

4 Landscape’s Reconstruction

The gap between the urban structures and the landscape is a key factor for future planning. It is an indubitable fact that, nowadays, the great majority of people live in metropolitan or pre-metropolitan⁶ structures. This urban concentration tends to increase the distance between people and the surrounding places, which encompass a complex set of vital functions. As mentioned above, the involvement of people where they live is essential to design the sustainable conditions that can display new narratives and enhance poetic qualities of landscape (Nohl 2001).

⁴The garrigue comprehends scrublands developed from the progressive destruction of former persistent leaf forests on limestone hills. At the barrocal of Algarve, some of the most common shrubs and herbs are kermes oak (*Quercus coccifera*), rosemary (*Rosmarinus officinalis*), lavender (*Lavanda* sp.), honeysuckle (*Lonicera implexa*) pistachio (*Pistacia lentiscus*), some species of thymus and cistus.

⁵Terraces are private and, at the same time, community spaces. “The private property of the lands is strongly anchored to a collective system of maintenance and management that involves the structural, viability, hydraulic and productive aspects of the same.” (Varotto 2008). Urbanites buy plots for building their individual resorts like being jealous of traditional adaptation.

⁶There is a tendency to consider groups of municipalities as metropolitan areas, although they do not present enough population nor urban structure. For the Algarve, a region with less than 500 000 resident inhabitants, the “GAMAL” –Great Metropolitan Area of Algarve– was officially created in 2004: the statutes have been published the 29 April on “Diário da República n^o 101– III Série”. In 2008, this denomination changed to “Comunidade Intermunicipal do Algarve” and the statues published the 19 December.

A central issue in this case will be the acknowledgment of specific features and values associated with the landscape terraces. “Not only did terraces have an ecological-environmental role –serving to develop certain techniques of construction, to protect terrain and to offer a locus for biodiversity– but they also had a clear socio-economic importance. These latter must be understood if we are to identify the reasons why such landscapes went into decline, and thence understand how they might once again become viable economic assets within the modern world.” (Fontanari 2008, p. 10). Still, a crucial aspect of the landscape’s reconstruction as a value is the recognition of its aesthetic importance for people, normally associated with subjectivity. However, despite the subjective nature of values, aesthetic preferences are not completely arbitrary. “New aesthetic orientations occur, as a rule, when significant landscape changes have taken place and when there is a population group who have strong, but no necessarily aesthetic interests in the new landscape.” (Nohl 2001, p. 229).

4.1 *An alternative process*

At both a collective and an individual level, three main facets must be enhanced to understand the landscape and its evolution: perception, interpretation of the displayed scenery and the objective functioning of the visualized elements. Thus, the landscape construction is a process that involves both subjectivity, including social construction, and objectivity. Berque (1986) describes *trajection* as the intimate involvement of the subject (human) and the object (physical/biological), like being two halves of the same reality. This means that the perception of environmental features by some societies is crucial in order to define the landscape. “Trajection means that things exist according to how we grasp them by the senses, by the thoughts, by the words and by the actions” (Berque 2013, p. 63).

Such understanding, apparently ‘logical’, challenges the typical dualism of the scientific paradigm: on the one side is the human subject who must observe and measure any object; on the opposite side is the concrete object to measure, where what cannot be measured does not physically exist. Contrariwise, according to Berque (2013), the human subject includes a prosthesis of technical and symbolic systems, which are part of its very constitution, in an ‘eco-techno-symbolic’ body. Then, everything will be both objective, the ecological and the technical, as well as subjective, the symbolic. Further, as stated by Watsuji, the relationship between a society and his environment is “the structural momentum of human existence” (Watsuji 2011). One must note that the momentum has the sense given by physics of mechanics, i.e. the power rating generated by a combination of two forces, in this case, the individual subject on one side, and his/her environment as his/her other half.

Somehow, this change of perspective undermines the common notion of ‘natural landscape’. In fact, the ‘natural’ often arises as a reference for a visible and even imaginary nature that no longer exists, or that is succumbing to the constant aggression of a society that gradually broke up its ecological prosthesis. There is an illusion of fixing a standard unit, whereby one would measure the visible reality out of ourselves, hiding the effective conditions of degradation that is actually affecting all of us. However, as Bernard Kalaora points out, “contemporary nature cannot be conceived out of society, on the contrary it is grasped to all social phenomena” (Kalaora 1998, p. 17). Under this perspective, we will highlight an accordance of “global landscape” (Telles 1998) which embraces the interlinked urban and rural areas. These are the places where more people concentrate, with all the physical, biophysical, cultural, economic, and political environments that affects their own life.

Then, once the landscape is increasingly seen as a common good (Antrop 1999), the public participation in decision-making about the landscape evolution will be crucial. To this extent, a clear communication about the aspects involved in landscape transformation, leading to understand its complexity through soft models, will be essential, as will be referred to later.

4.2 *Historical and philosophical background*

For a better understanding of our perspective about landscape's evolution or reconstruction, we begin by a synthesis of some conceptual aspects, which regulate the meaning, the thought and the actions on landscape building in the professed Western world.

The Mediterranean environment, where Greek philosophy flourished, was the scenario of many metaphors and philosophical constructions. In the Greek world, the concept of city-region included all the space surrounding the human settlements. Such space supported and nourished the city itself, being part of the same unit that thrived as a whole. Thus, human communities depended on a space that fulfilled all their needs, not only food, lodging, but also aesthetic references, mental well-being, etc. Consequently, the space shaped by those communities, therefore being the matrix, like the mother, of the urban society, enclosed at the same time their print, like the son.

In a philosophical formulation of the world's organization, Plato in the *Timaeus*, proposed the term *chôra* to traduce metaphorically the reality of 'space - human community' relationships. He placed the term between the relative Being, genesis, which is born, lives and disappears and the absolute Being, idea, independent from time and space. Apart from the idea, the *chôra* feeds the genesis, which could not live without the *chôra*, both forming the sensible world, the *kosmos*. Thus, the *chôra*, i.e. the medium that surrounds the existent (Brisson 1998, Berque 2013), was both the one thing, the print, and its contrary, the matrix. Following Berque (2013), this was an *aporia* that Plato could not overcome, since he did not allow a third genus, *triton allo genos*, nor relative Being nor absolute Being, which he points out as the *chôra*.

The legacy of this *aporia*, which rejects the third genus, prevailed in the Aristotelian logic development and it is at the root of modern dualism with strong influences on Western thought. Indeed, this principle of 'the third excluded' still has a doubtful logical sense and influences the relationships between the human subject and his environment; individuals and society often consider their biophysical surrounds a perfect external entity. Then, according to Berque (2012), one ceases to relate the micro with the meso and the macro *Kosmos*, as intrinsic components of the human identity. Two classic references of modernism critics illustrate the dualistic approach: 1) in the view of Descartes thought, the environment would be considered a neutral object and 2) in Newtonian physics, an absolute object, homogeneous, isotropic and infinite (Naredo 1982). As a quick conclusion, the ontological foundations of modernism are referenced in the *Timaeus*.

The fact is that in modern societies, especially in metropolitan areas, where most people concentrate, the loss of a sense of *Kosmos*, derived from the ancient refusal of the third genus (*triton allo genos*), induces apprehensive 'alogeneic' conditions. Urban policies heavily exploit a landscape imagery that masks the propensity to ignore the human labor, which generated the real landscapes and direct attention to beautiful and ideal 'natures' (Donadieu 2012). From the perspective of Berque's mesological geography, the liberal capitalist economy takes advantage of the popular trend to copy the position of elites wagered on making the work invisible for society (Donadieu 2012).

Hence, we witness an individualism-based system, in which the human subject cuts the links to the medium that surrounds him, thus separating a physical/eco body from his eco-techno-symbolic entirety (Berque 1986). The loss of a human sense of the places where people dwell is a consequence of breaking such existential ties that bind people to an autonomous interpretation of the real landscape. In contrast, urban societies ends up conditioned by *fétiche* objects and spaces. This explains why people do not react to cities with unscaled architectures, social environments of increasing inequality, segregated and guarded urban life, unreliable food supplies, fictitious land management plans and environmental conditions constantly deteriorating (Donadieu 2012).

4.3 *Towards 'kosmic' or utopic landscapes*

It is difficult to ignore this globalized and virtualized world with no apparent way out, lacking real pathways towards more sustainable solutions. We are then compelled to agree on a philosophical 'back to basics' regarding the recuperation of a common sense of 'kosmos', now applied to actual urban structures. Such sense of 'kosmos' is the sense of

landscape. From this perspective, we place two main questions regarding the landscape evolution: 1) how can we take a step forward? and 2) how can we discover alternative ways?

In a common sense, dreams command life and, like in many other similar situations in the history humankind, utopias can be very useful. As [Donadieu \(2012\)](#) notes, utopias suggest virtual and rational worlds, they are not predictions nor forecasts, they just build a virtual society without having a geographical location. This author distinguishes two types of operational utopias, which try to move from dream to reality, both pursuing the common values for wellbeing, living and thinking: the chimerical and the realistic ones. The first type of utopias rely on dogmatic beliefs, specific to dualistic views and, when achievable, usually have a high price. History, not so distant, of National Socialism or regimes inspired by dogmatic Marxism provides significant examples. The second type, the realistic utopias, with no aporias nor social dramas, pursue the access to common wealth based on solidarity and mutual respect.

As stated by Petrella, “The object of the common good is the common wealth, i.e. the set of principles, rules, institutions and resources that promote and guarantee the existence of all the members of a human community. On the intangible level, one of the elements of the common good comprises the triptych recognition-respect-tolerance in relations with the other. In material terms, the common good is structured around the right to fair access for all to food, housing, energy, education, health, transport, information, democracy and artistic expression.” ([Petrella 1996](#), p. 13). According to this author, the Welfare State, already experienced after the great crisis of 1929, designates the aspiration to the common good based on solidarity, thus being an example of a realistic utopia.

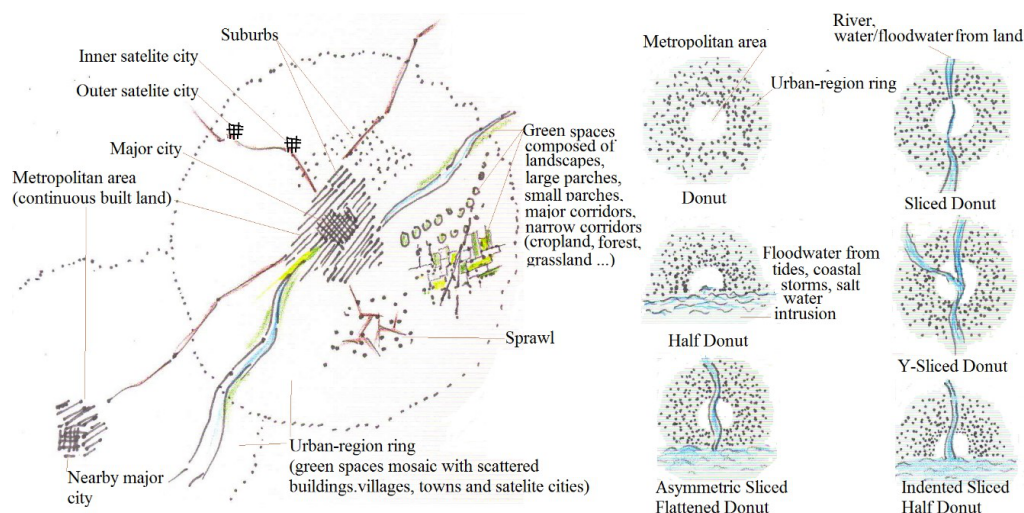
One may also look to sustainability and urban sustainability as realistic utopias, being the endpoint that we seek, but never reach ([Forman 2008](#)). However, the scale is actually one of the key issues to make a realistic utopia operational, in a way that people can have an effective participation with common goods management. The huge gap between the citizens and the decision-making centers, as well as the prevailing strategies based on the maximization of the investor’s profits, back to capitalism 1.0⁷, are strong barriers, and block new evolutions.

The search for a proper spatial and temporal scale where we are able to cause specific changes in order to move towards a better world will then face us with what [Forman \(1995\)](#) calls the management paradox: “Small spaces are easily changed, but inherently unstable. Large spaces are hard to change, yet have considerable stability.” ([Forman 2008](#), p. 316). When focusing on mid-size spaces, such as landscapes and regions, one’s improvement efforts achieves an effect that can be visible on the short term and can persist in the long term. Like trying to take care of our own garden, we should think, “Landscapes and regions are simply big gardens to be invested in and cared for.” ([Forman 2008](#), p. 316).

In that sense, [Forman \(2008\)](#) proposes the concept of urban-region, looking where best to focus efforts for an effective mesh of nature and people in and around cities. The intention is to apply the concept to the places in which more than 50% of world population currently concentrates. In the urban-region scheme, the part with less ecological functions corresponds to the hole of a donut, an empty space having several forms, and the part with highest bio-ecological potential and landscape value, corresponds to the ring forming the sugary mass of the same donut (Figure 11).

Based on an exploration of 38 examples of urban regions around the world, [Forman \(2008\)](#) reasserts some of the fundamentals already proposed by other planners of the early twentieth century, like Patrick Geddes, Fredrick Olmsted or Lewis Mumford. Such principles emerged from the need of restoring the interdependence between the urban

⁷Capitalism 1.0 is a first phase of capitalism system also known as free-market or ‘laissez-faire’, in which the politic power had a poor intervention; the interactions between governments and private companies were guided by the guarantee of military revenue and consequent protection of powerful interests. Some well-known facets of this period are the phenomenal economic growth, but also the cruel exploitation of workers and the environmental degradation. “. . . in the early capitalist era, land, resources, and places to dump wastes were abundant; aggregated capital was the scarcest factor. That’s why rules and practices developed that put capital above all else.” ([Barnes 2006](#), p. 24)



Source: Sketch by the author after [Forman \(2008\)](#).

Figure 11: Left: Concepts and terms for urban-regions; Right: Donut model

structure and the surrounding area that can support and feed the human settlements.

One can relate these concerns to the philosophical problem raised by Plato in the *Timaeus*, concerning the *chôra*. However, the unsustainable, even irreversible, state of big metropolises makes them the actual aporias, with no way out. [Donadieu \(2012\)](#), for example, states the unsustainable future of cities without close vicinity agriculture, thus inverting the aporias sense refused by Plato. This means that the future will depend on a third genus able to unify the matrix and the footprint of the existent human communities. In this sense, Donadieu conceives the 'Agropolia', an alternative urban world with agriculture and farmers, as a utopia similar to the urban-region proposed by [Forman \(2008\)](#).

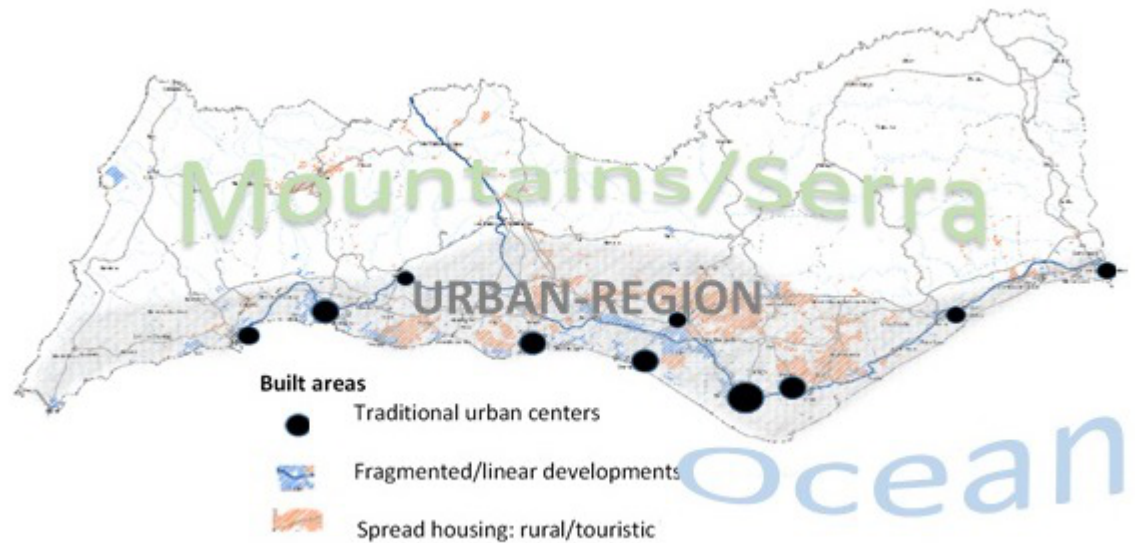
4.4 The Utopic landscape of the Algarve

To this extent, the implementation of the urban world's existential vision in 'Agropolia' must explicitly reach two fundamental aspects. On the one hand, the perception of landscapes and places must be free from imposed cultural patterns, allowing their display as they are, understood and admired to get a satisfaction beyond the amorphous comfort and aesthetic pleasure of spectacles. On the other hand, the development of the sensitivity is crucial to resume the ties that bind people to the environment in which they live and to overcome the fetish choices inculcated by experts that stimulate consumption.

In physical terms, the description of this imaginary region is as follows, "Agropolia is not an island, but an archipelago of Urban Spaces built among the fields, parks, forests and ponds. There is a free access by railways and highways, through ports and airports. Beyond Agropolia, the ocean extends on one side and, on the opposite side there is a barrier of wooded mountains intersected by rural valleys sparsely populated." ([Donadieu 2012](#), p. 285).

Such a description fits to the urban-touristic zone of Algarve (Figure 12), which is formally a polynuclear urban zone where we can identify the following basic components:

1. the donut hole of its urban region correspond to the continuous built mass formed by traditional urban centers and by urban settlements for tourism purposes;
2. the ring of the donut is the miscellaneous formed by urban sprawl, villages and little towns, green spaces (golf courses, wooded and agriculture areas, wetlands, etc.); and
3. the limit to the south is the Atlantic ocean and the northern boundary is formed by the shale mountains.



Source: Sketch by the author, no scale, using “peça gráfica 08, anexos volume 1” of the regional land management plan of Algarve (CCDRAlgarve. 2007)

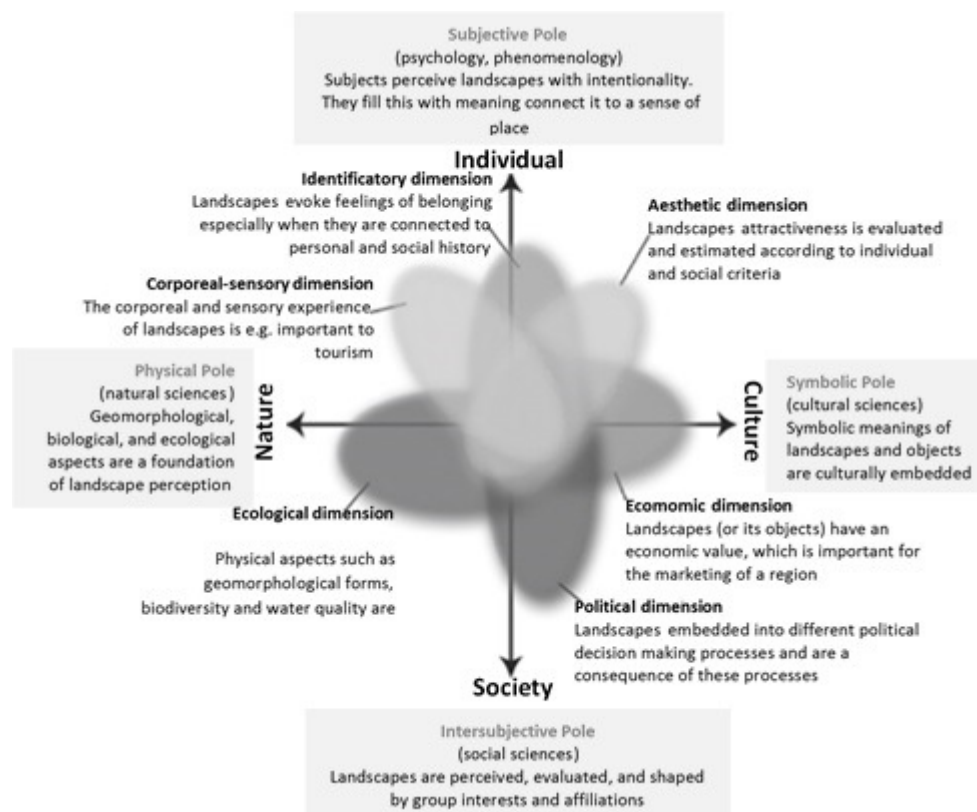
Figure 12: The urban-region of Algarve. Main components and barriers; spectral zone

Undeniably, the coastal zone of the Algarve, as well as its background area has plenty of problems such as urban densification, bad locations, stressed sensible areas, aesthetic disharmony, etc. Nevertheless, the focus on this utopic urban-region may allow us an adequate scale for improving the actual situation, thus overcoming the management paradox and considering the landscape as the second half of the communities that live there. This perspective is quite different from that of landscape units. Our approach intends to look at landscape far from a closed entity that eventually achieves an optimal state to which one could compare and measure the impacts of human actions. Rather, we intent to reach an agreement about landscapes as special regions, once “. . . landscape descriptions are always biased. Furthermore, it is not possible to accurately define this bias, because there is no neutral ground from which a bias (or its extent) can objectively identified. In a relational view, however, (potential) biases can at least be put in a relation with each other and can be negotiated. As a consequence, landscape planning and development must be based on and geared towards negotiations of different trajectories and between different notions and stakeholders.” (Backhaus 2011, p. 195).

5 Rehabilitation and Renewal of Terraced Landscape

It is under this perspective that we intend to prospect the future of dry walling as a structural element of landscape. Although we cannot witness a visual exuberance of the Algarve hills, the terrace frame, supported by the dry stone walling, can embody an aesthetical positive view for many perceptions. Furthermore, terraces are the base of an agrosystem with great ecological and cultural values. Hence, we try to reach the symbolic, aesthetic, cultural and ecologic values that the society needs to adopt.

The encouragement of public participation in a very effective way is crucial to prospect the ways for rehabilitation or renovation actions. Then, we need to support in a method that facilitates communication, to stimulate the citizen’s participation in landscape evolution. In fact, there is a need to communicate perceptions and conceptions of landscapes as clearly as possible, in order to raise awareness and initiate processes of participation, and thus serve as a contribution to ethical discourse on landscape development (Hansen 2001).



Source: Adapted from Backhaus (2011)

Figure 13: The four pole model with its six dimensions of landscape experience

5.1 Explanatory model of landscape

In that sense, we try to get closer to the guidelines of the explanatory model developed within the Swiss National Research Program 48 “Landscapes and Habitats of the Alps” (Backhaus et al. 2008), which includes a multidimensional approach, in which insights are shared and connected across the boundaries of disciplines. An important feature is to allow the location of different approaches of landscape perception.

The model’s structure follows two main axes connecting four poles⁸. Once landscape perception and experience occurs between nature and culture, the first axe goes from nature to culture, because the role of landscape in mediating between the natural environment and human activity depends on acquired rules, models, and cultural patterns. The second axe goes from individual to society, because each individual has their own perception of the landscape as a part of a society that organizes and manages the space appropriated by different social groups. “The field that stretches between these four poles encompasses different kinds of approaches to and perceptions of landscapes. While every access to landscapes includes aspects of every pole, certain approaches tend to be drawn towards one or another pole.” (Backhaus 2011, p. 196). Figure 13 sketches the two polarities and the six dimensions.

We then have four poles: physical, subjective, symbolic and intersubjective, which are described in detail below.

- A) The physical pole refers to what people generally first perceive when beholding a landscape: arable land, rivers, woodlands, settlements, roads, animals, machines; however, landscape perception do not happen per se, in an ‘objective’ way, rather

⁸More than the three layers of landscape stated by Berque (1986), the biophysical, the subjective and the social, the model introduces a fourth layer or pole, considering cultural and intersubjective as separate poles. The main reason is to offer “. . . the possibility of better showing where the socio-cultural tensions, rifts, and disruptions are that determine landscapes today.” (Backhaus et al. 2008, p. 134)

resulting from different points of view. In fact, the natural flows and complex relations between living elements reveals the existence of many invisible or hidden aspects; the release or acknowledgement of such aspects may change the experience of beholders (Backhaus 2011).

- B) The symbolic pole, at the opposite side of the axis, relates then with the cultural patterns, aesthetics and symbols that mediate people's perception and experience of the world and landscapes. Alterations of landscapes that oppose shared, often traditional, aesthetic notions are not easily accepted (Backhaus 2011). The art and media, for example, have an important role in transmitting patterns that are not merely instruments of perception but also systems of interpretation.
- C) The subjective pole comprehends, on the one hand, the subject as the center of emotions, sensations and perceptions. Subjects intentionally grasp their surroundings using not only the visual sense but also all the other senses. On the other hand, this same pole also comprehends the subjects referred to as individuals within a society, individuals choosing the aspects of landscape that arouse their interest.
- D) The intersubjective pole, at the opposite side of the axis, takes then into account the landscape as a product of social practices such as agriculture, trade, leisure, etc. Explicitly, landscape clearly involves economic factors such as the landscape as a resource with use value or market value, a sense of belonging and authenticity, a social history of representation, insiders and outsider's perspective, and political aspects like a political decision's impacts on landscape development.

We will explore some connections between these poles for the case of the Algarve urban region, as a way to detect some possible perceptions that can be useful for future discussions among stakeholders. In this sense, we expose some sketches used by Donadieu (2008) for terraced landscapes. Nevertheless, it will be necessary to pursue a more detailed fieldwork to explore the dimensions pointed by the four poles method and reach "... an ethical discourse that includes a mandate for the protection and shaping of landscapes" (Backhaus et al. 2008).

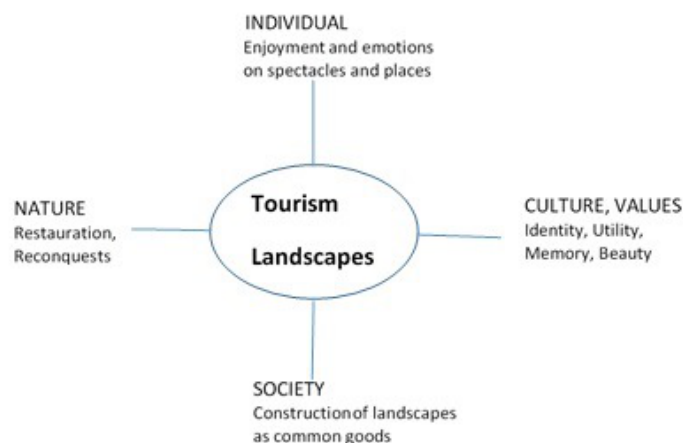
5.2 Main trends and possible evolutionary prospects

Following the Donadieu (2008) scheme, we point out two trends more or less pursued: the abandonment and the conservation of functionality. The abandonment, which occurs in most cases, has to do, on the one hand with the rural exodus to the cities and tourist centers and, on the other hand, the difficulties of modernization and agricultural techniques due to steep slopes, cost of hand labor, marketing alternatives. The conservation of functionality, increasingly less frequent, may be related with the Common Agricultural Policy (CAP) aids to subsistence agriculture, but also with maintained activity by traditional farmers, or even modern farmers in the case of some farms being economically sustainable.

At this point, we must search for three alternatives. Firstly, we may think about assigning a patrimonial value to terrace landscapes, under a statute of cultural landscapes. In such a situation, these landscapes are likely to fall into oblivion, 'collective amnesia', or stay as a souvenir object, 'anamnesis'. It might even happen through classification as world heritage sites, or inclusion in museum figurines of planet cultures.

Therefore, as a second possibility, it might be necessary to place landscapes into value through the image, i.e. by aestheticizing them, even if such landscapes do not exhibit any special attributes. This would occur within tourism interests, by artializing the landscape (Roger 1997) via image and text descriptions, then creating beauty, excitement and spectacle. With fewer chances, we would consider an enhancement through agricultural economy, shaping the landscape in order to make it more attractive, not only for the 'excellency' of the products obtained, but also for the aesthetics.

As a third possibility, one can consider to recover abandoned terraces or even to create new platforms. For the barrocal of the Algarve, we could think about unique branded goods such as 'unique Algarve orange', famous Silves fig, etc., like the Oporto vineyards in the north of Portugal or the Cassis vineyards in France. In a touristic environment like



Source: Adapted from: [Backhaus et al. \(2008\)](#) and [Donadieu \(2008\)](#)

Figure 14: The four pole model for tourism landscapes

the Algarve, the promotion of cultural and tourist circuits could be more plausible; once a change from linear developments to non-linear ones is not expected, a combination of several solutions would be necessary.

In short, we can have the following typologies: 1) landscapes of abandonment and ‘oblivion’; 2) patrimonial landscapes or ‘collective memory’; 3) cultural landscapes promoted by recognition/artialization of unique places, notable, or even common places 4) highly valued landscapes of individual economic profitability; 5) landscapes of ‘reconquest’, including the addition of types 2 + 3 + 4.

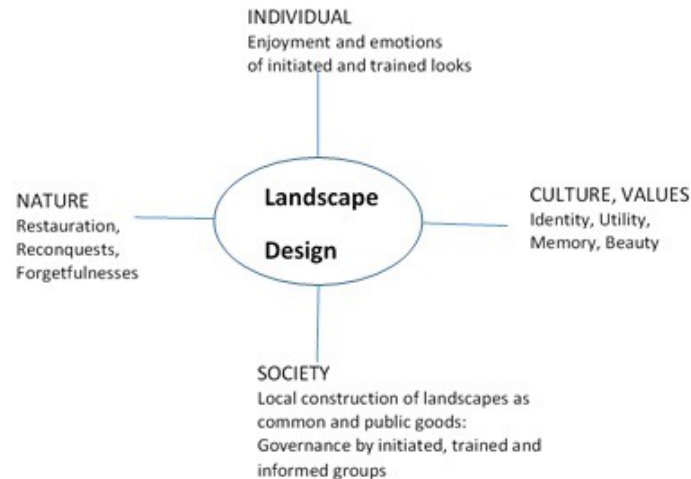
5.3 Tourism landscapes

Once tourism is the driving force of the Algarve land planning, the attraction for the future fate of this region will be to embrace the dynamics of tourism landscapes. Then, the main goal of the intersubjective strategy for the urban region, in which the barrocal is the ‘living’ part (ecologically speaking), lead by the interest groups linked to tourism, will be the construction of landscapes as common goods (Figure 14). Taking the other sense of the axis, the framework of individual perceptions of enjoyment and emotions on spectacles and places will conform the societal strategy of building the landscape as a common good, prejudging the individual demands of enjoyment and excitement. Therefore, rehabilitation and ‘reconquest’ should respect the cultural features and identity values that invoke collective memory and convey beauty.

When looking for practical possibilities of recovery, restoration or ‘reconquest’, a key question one should put, drawing inspiration from [Neuray \(1992\)](#), is to know exactly who the recipients of these landscapes are. It will be then imperative to take into account the various ways of looking at the landscape, within different sensitivities, learning and training. In that sense, [Donadieu \(2008\)](#) considers landscapes as:

1. The perceptions / ‘looks’ trained in relation to the beauty and landscape art, aestheticians, outsiders, exogenous, including here most of the tourists;
2. The initiated looks in relation to the rules of local life, which will be insiders, endogenous, including here much of the urban population;
3. The perceptions / ‘looks’ informed by material and immaterial production of landscapes, corresponding to scientific looks.

This does not mean that every way of looking corresponds to a specific type of local landscape, although some landscapes will appeal more to certain ways of looking than others. For example, the trained ‘looks’, usually attributed to tourists, tend to value



Source: Adapted from: [Backhaus et al. \(2008\)](#) and [Donadieu \(2008\)](#)

Figure 15: The four pole model for landscape design

scenarios with more formal splendor and contrasts –Machu Pichu in Peru, the rice field terraces in Asia, the Portuguese Douro valley vineyards, etc. However, a landscape with an impressive visual effect over a traditional compact city will have similar valuations by many trained looks from tourists, initiated looks from urbanites and farmers, and informed looks from agronomists, biologists, architects, landscape architects, etc.

Therefore, the local construction of landscape, sketched and promoted on a regional scale, will require a shared governance between initiated, trained and informed social groups. Taking the spectrum of the vertical axis (Figure 15), the individual perceptions based on the enjoyment and emotions of initiated and trained looks will integrate the intersubjective construction of local landscapes as common and public goods. The satisfaction of the various looks that will contemplate such planned landscapes must necessarily take into account the cultural values –identity, utility, beauty and memory. This will influence the several typologies of resulting local landscapes, according to the natural conditions under such cultural features; one must concretely think about designing local landscapes that can be rehabilitated or regained and, at the same time, imbalance those that will be forgotten, such as patrimony and ‘collective amnesia’.

5.4 Landscape’s governance

Then the following crucial question is about the real terms of governance to implement. According to [Donadieu \(2008\)](#), in the current situation, one can consider three essential facets:

1. The legislative injunction, top-down arising from the European Landscape Convention and the respective transpositions into national legislation;
2. The self-sustainable local initiatives ([Magnaghi 2000](#)), bottom-up;
3. The local governance landscape projects, bottom-up and top-down.

As for the legislative injunction, one can recall, for example, some articles of the European Landscape Convention:

- artº 1 a) [Landscape] “... an area, as perceived by people, ...”;
- artº 1 b) ““Landscape quality objective” means, for a specific landscape, the formulation by the competent authorities of the aspirations of the public ...”;
- artº 6 c) “Identification and assessment” 1 “With the active participation of the interested parties ...”.



Source: Adapted from: [Backhaus et al. \(2008\)](#) and [Donadieu \(2008\)](#)

Figure 16: The four pole model for landscape governance

The influence of public authorities on modeling the perception and the formulation of the aspiration of the public can easily happen, despite the call for the active participation of interested parties. In fact, for the Algarve region, we have detected many problems in terms of active public participation ([Bragança 2006](#)). Here the top-down practices prevailed in the conventional land planning and management processes, once decision-making fulfils a legitimacy ritual based on descending disclosure of information, consultation and conciliation attempt.

As a typical example of top-down governance for terraced landscapes, [Donadieu \(2008\)](#) mentions George Brassens Public Park in Paris, recreating terraced vineyards of XIX century, with non-commercial purposes. Similarly, it is easy to imagine a decision –from the central or local authorities– about the reuse of some terraced dry orchard of Algarve’s barrocal as merely recreational areas aesthetically designed for satisfying coastal urbanites and mass tourism.

Bottom-up governance implies a delegation of decisions to local communities, which have the autonomy and the chance to pursue a participatory local democracy. Hobby farming can provide some examples in this case. For the Algarve urban region one could imagine some associative initiatives of urban citizens that live in coastal cities, forming communities whose aim would be to enjoy farming on barrocal, thus reactivating traditional practices similar to permaculture. They would buy or rent some properties and explore the dry orchard products mainly for personal needs, including the conservation of their cultural identity.

Merging top-down and bottom-up implies to interchange information, co-decision making and involvement in management. It can be the case of some projects promoted by local or regional institutions satisfying the ambitions of local representative agents or communities, who actively collaborate in the promotion and continuity of such projects. One might imagine a project for promoting the ‘Algarvian’ almond or carob as products of excellence, unique, designed by the regional university and prioritized by the regional authorities, as the result of the lobbying exercised by a significant group of farmers and other social agents who are conscious of real dry orchards value. Such a project could easily take advantage of the possibilities provided by EU funds.

The options about the arrangement for landscape governance will derive from individual freedom of economic choices, framed by the legitimacy of public decisions (Figure 16). The cultural values of identity, utility, collective memory, beauty and justice guide the options for the management of physical, biophysical, material reality. Such values closely relate to the ethical patterns⁹ of insiders and outsiders that can reinforce the restoration,

⁹As noted by [Hansen \(2001, p. 247\)](#): “Ethical norms are usually associated with what values are to be realised.” Moreover, “To value something is to make moral decisions, and moral decisions build on ethical

‘reconquest’ and/or forgetfulness of local landscapes.

The restauration and renewal of dry stone walling structure will depend on numerous options sketched using the landscape as an instrument of knowledge and acknowledgement of the regional space. Even considering tourism landscape, our focus on the urban-touristic region of Algarve enhances the landscape as a common good. To that extent, one must overcome the nostalgic statement and try to redevelop landscape as a viable locus of a modern way of life (Fontanari 2008). Then, the looks of insiders and outsiders will condition the aesthetic features of regional landscape design, taking into account that “the principles derived from the recognized aesthetic values embodied by terraced landscape should be applied in the construction of new landscapes of which terraces are a crucial central component.” (Fontanari 2008, p. 12), once “local communities have certain “rights” over such local assets.” (Fontanari, Patassini 2008, p. 7). The three main types of local units that may emerge from designing the regional landscape are: 1) restoration; 2) ‘reconquest’ and 3) forgetfulness. They all entail governance systems derived from the negotiations between different notions and stakeholders; however, the bottom-up and mixed bottom-up and top-down styles seems to be more adapted to manage the future landscape.

6 Final Remarks

We actually follow a process of evolution in landscape policies that requires changes at social, cultural and individual levels (Backhaus et al. 2008). It is not easy to overcome the dualistic matrix that conditions the Western way of thinking and acting. In a progressive way, however, the current changes leads to incorporating more intangible aspects on landscape design and development. By rejecting the actual aporias of unsustainable cities and metropolitan areas, design processes necessarily face us with realistic utopias, both at local/regional levels and globally. As suggested by Forman (2008), we even can take ‘big pictures’, global sustainable scenarios, into account: “Think Globally, Plan Regionally, and Then Act Locally. Keep the globe in mind when making daily decisions. But most importantly, create a plan for every landscape and every region that provides sustainably for nature and people. Then with the broad plan in hand, make the important local changes and refinements that fit effectively into the big picture.” (Forman 2008, p. 317).

In the case of the Algarve urban region, which hallmark was its terraced landscape supported by a dry stone walling structure, the first step will be an effective knowledge of its physical presence and significance. For the physical aspects, we mean extension, adaptation to topography, forms and aesthetic combinations; for the significance, we mean symbolic, technological, ecological, economic values. Such aspects received a poor attention from the public institutions responsible for land planning and management, despite the cascade of plans that emerged in the last three decades. A second step will be to pave the way for more democratic forms of governance, bottom-up or merged top-down and bottom-up, encouraging collective actions or concerted design projects, thus overcoming the typical top-down mechanisms of conventional plans.

Unless the dry stone walling structure of the Algarve becomes part of a patrimonial set of the Mediterranean typical coastal landscapes, the lack of its spectacular appearance surely make difficult its recognition as a world heritage. This does not detract the importance of strengthening its cultural value by the people that coexist in this landscapes. In view of actual interest groups, it appears plausible that tourism can provide a valuable support towards an ‘artialization’ (Roger 1997), thus enhancing all symbolic values and making patrimonial value easier to be recognized. In that sense, many looks must be initiated, particularly among urbanites. It will then be possible to rehabilitate and renew a large part of dry stone walling of the Algarve urban-tourist region, despite the difficulty from learning how to forget and to reassign new values to the landscape that may display new narratives and enhance its poetry (Nohl 2001).

considerations. . . . By involving the public in general together with different types of experts and those who live in the landscapes in question, or who use them in different ways, these different groups will have opportunities to influence the ethical discourse by reasonable arguments.” (Hansen 2001, p. 252).

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