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European cities characterization as basis towards the replication of a Smart and Sustainable Urban Regeneration Model

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Abstract

This paper aims at describing the methodology implemented in the REMOURBAN (REgeneration MOdel for accelerating the smart URBAN transformation) project for the characterization of European middle size cities which allows identifying their potential characteristics and adverse conditions as starting point for addressing their sustainable urban transformation. The methodology comprises a selection of a suitable set of indicators for each application domain identified in the project (both technical - energy, mobility and Information and Communication Technologies (ICTs)- and non-technical –people, governance, finance), benchmarking of the data available at city level in the selected data sources and the utilization of statistical methods for clustering cities with homogenous characteristics. This study has been applied to 41 European cities from 18 countries and two complementary clustering methods were used in order to determine the clusters. In addition, for a better interpretation of the results and a more accurate classification of the cities, a detailed analysis was performed in each domain to conclude with a global analysis which groups all the indicators and domains. The paper describes the overall approach of the REMOURBAN Sustainable Urban Regeneration Model, to focus then on the methodology applied to characterise the European cities as basis for the replication of this model. After the identification and discussion of the main results obtained through this characterisation, the future works are presented.

Keywords: replicability; smart city; characterisation; regeneration; clustering

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1. Introduction

Energy, transport and ICT sectors are essential for the day-to-day of the city. These sectors are widely considered as potentially appropriate to achieve economic and societal benefits, becoming a key towards improving the quality of life of the citizens, and representing most of the interrelations between people and technology. A big challenge to offer new interdisciplinary opportunities to strengthen the potential to become smarter and more sustainable cities is still open in the common area where energy production, distribution and use; mobility and transport; and information and communication technologies work together [1].

To deal with these challenges, Sustainable Urban Regeneration Models are needed, defining an integrated and holistic process to transform the city ecosystem with a jointly focus in the fields of sustainable buildings and districts, sustainable urban mobility, and integrated infrastructures and processes. This is where REMOURBAN [19] is working to provide a replicable model which delivers solutions in both technical and non-technical related fields addressing the temporal goals, the main Smart City enablers within the transformation process –towards a more sustainable and smarter environment–, and innovations in the priority actions of energy, mobility and ICTs.

As a first step towards ensuring the replicability of the model, and aiming at understanding the main cities' characteristics as drivers for replication, REMOURBAN has analyzed a wide set of European cities to identify their main features in the application domains of the Urban Regeneration Model and their potential for replication. This analysis, based on the identification of their current status against certain indicators in the interesting fields of the transformation strategy, will allow the adaptation of the model to ensure its replicability across Europe.

This research paper introduces the concept of the integrated Urban Regeneration Model to focus then on the characterization methodology used to analyze the targeted cities. After the discussion of the main results obtained, a set of conclusions and further steps to complete the Urban Regeneration Model are provided.

2. An Integrated Urban Regeneration Model

The toolkit of solutions and methods needed to transform cities into smarter and more sustainable ecosystems, and integrated through a Sustainable Urban Regeneration Model, is designed with the capability to be adapted and implemented in a wide range of European Cities, focusing on their specific goals and targets, and the boundary conditions that characterize their environment.
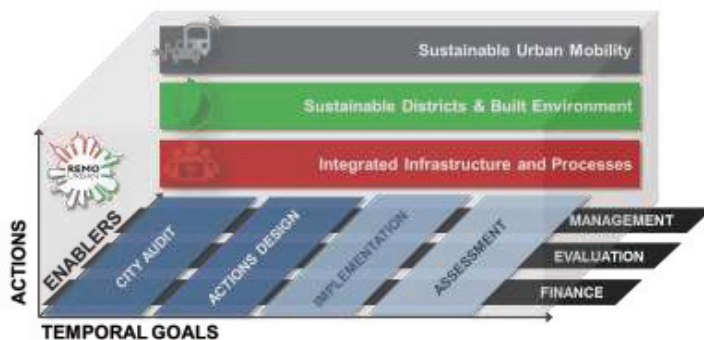

Fig. 1. Sustainable Urban Regeneration Model.

2.1. Urban transformation temporary goals: defining the phases

The Urban Regeneration model covers the four main phases of the city transformation process, which are linked to the specific actions and the Smart City enablers. These main phases are:

- City audit is the first phase of this model, aiming at implementing a set of integrated existing methods and tools that can support the evaluation of the current conditions of the cities in which the Sustainable Urban