Ekistics
and the New Habitat
The problems and science of human settlements

SPECIAL ISSUE

Cities and Transport in the Mediterranean Region (Part 1 of 2)

Guest Editor: Prof. Dr. George A. Giannopoulos

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Ekistics and the new habitat: the problems and science of human settlements

The International Journal of *Ekistics and the New Habitat* is an online double-blind, internationally peer reviewed research journal. The journal publishes scholarly insights and reflective practice of studies and critical writing concerning the problems and science of human settlements. The field of Ekistics is mapped against a classification of settlement scale, from the remote village and rural township to global systems of dense smart cities, and increasingly the challenges of on-and-off world sustainable habitats.

In broad terms, papers in *Ekistics and the New Habitat* contribute to the scholarly discourse about the systemic nature of how humans design, build, link-up and transform their world. Articles examine empirical and non-empirical research and ideas that critique the necessary relationship between people, our human settlement designs and technological systems, and our natural and designed habitat. Models, case studies, rigorous conceptual work, design critique, smart-citizen education for smart cities, resource flows, network behaviour, and reflective practice are published in order to continually improve and advance the application of integrated knowledge that defines the epistemic telos of Ekistics.

History and back issue archives

Ekistics and the New Habitat: the problems and science of human settlements is the 2020+ online and revised continuation of the ground-breaking and influential ideas published throughout the preceding print version of the journal in *Ekistics: the problems and science of human settlements* 1957-2006.

- Back issues are lodged with our archive partners at JSTOR: https://www.jstor.org/journal/ekistics

Standard Call for Papers.

There are few scholarly journals whose papers archive the evolution of development and thought tracing back to 1957: *EKISTICS* is a rare exception. This background makes for an extraordinary historical collection of research and practices documenting how humans have colonised the planet and transformed our built habitats. The journal seeks papers from students, post-graduate candidates, academics and practitioners. We seek papers, typically of a cross-disciplinary nature that:

- Target any aspect of the *United Nations New Urban Agenda, in Habitat III*, including reference to the *Sustainable Development Goals* .
- Critiques *local, regional and global policy* of human settlement development, design and planning, and urban transformation
- Offers a critical description of the *core elements that define the liveability of human settlements* such as:

  NATURE: Habitat foundations. How settlements rely upon, interact with, alter, or produce living ecologies, biodiversity, and climate.

  PEOPLE: Physiological/biological and social-psychological needs and constraints. How settlements rely upon, interact with, or affect people's livelihood, safety, embodied and shared knowledge and skills, security and well-being – whether they are transiting visitors, settlers (citizens), or neighbours of settlements.

  SOCIETY: Social, economic, educational systems, fiscal and political organisation. How settlements rely upon, interact with, or are affected by governance and leadership, vicarious or present communities, groups, markets, cultures, beliefs and values.

  SHELLS: The envelopes that contain settlement functions. How the design, technologies and places created, altered or removed in settlements affect the functions and amenity of the settlement from the scale of personal shelter to the home, to urban business districts and precincts, to towns, cities or regions.

  NETWORKS: Node-to-node systems and flows of resources, waste, data, people and information and communication systems. How the design, technologies and transport of goods, waste, energy, resources, water, food, people and information affect a settlement's functionality, amenity and viability.

  SYNTHESIS: Combined, coherent design and knowledge. Physical design and planning; Ekistics theory expressed through evolving models and principles of habitat. How systems of systems may differ from small and remote, to large and urban-dense settlements and linked-up settlements in regions.

This journal invites and accepts three types of submissions, all double-blind and internationally peer-reviewed for their type:

*IMAGES: Must be in *. jpeg or *.png file format and upload as separate files with their submission and an optimised resolution clarity for web viewing and download. Authors assume responsibility for assuring they have copyright permissions and may be required to show proof.*

1. **Scholarly articles/reviews (full papers, double-blind review):** typically, with title, authors, institutional affiliations, abstract, keywords, body text (5000-7000 words), and APA 7th References at the end of the article. Body text typically includes:
   a. an introduction to a problem or topic outlining the need for or goals of the research,
   b. the key prior papers in Ekistics archives and other sources that best relate to the topic,
   c. the methodological or conceptual framework and methods used,
   d. a summary of key results or findings,
   e. a critical concluding discussion
   f. the Editor assigns papers to their best-fit classifications in the Ekistics grid index.

2. **Scholarly essays/extended abstracts (double-blind review):** typically, with title, authors, institutional affiliations, keywords, body text (1000-2500 words), and APA 7th References at the end of the article. These shorter submissions are well placed for academics and practitioners seeking to share a critical reflection of an issue, or for first-time students seeking to publish an academic submission (often co-authored with a mentor/supervisor). They may focus on a think piece style of critique, or a project in process, or a topic of interest for a geo-location or generic issue. Short ***Essays/Extended-Abstracts may be tested in Ekistics*** before a full paper version is submitted elsewhere.

3. **Practitioner, industry or citizen think-piece (short article only, peer review):** typically, with title, authors, regional/organisational affiliations, keywords, body text (500-1000 words). *A Citizen Think-piece* may be up to 3000 words. Where appropriate, APA 7th References at the end of the article may be included. These shorter submissions are well placed for practitioners, industry or citizens to raise provocative ideas to which we invite the research community to respond in subsequent issues.

We welcome book reviews. Submissions are copy-edited, normally 300-500 words, designed to share with the readership community interesting or provocative volumes, monographs, or edited books that may be of interest to scholars, practitioners and students of human settlements, Habitat III New Urban Agenda, and the Sustainable Development Goals of the United Nations.

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EDITOR'S DESK

THE POWER OF EKISTICS!

2020, Vol. 80, Issue 3

Welcome to the third special issue of the contemporary international journal *Ekistics and the New Habitat: The problems and science of human settlements*.

It is with a deep sense of purpose that, on behalf of the international board of editors, I introduce this special issue: *Cities and Transport in the Mediterranean Region (Part 1 of 2).* Led by transport planner, Prof. Dr George A. Giannopoulos, Professor Emeritus Aristotle University of Thessaloniki and Corresponding Member of the Academy of Athens, this issue of two Parts is testimony to the power of Ekistics to bring together a range of contributors whose extended abstracts and short papers focus on the Mediterranean region. It is rooted in a combination of perspectives that allow readers to clearly perceive the interconnected nature and shared concerns of the cities and transport networks in this region defined by its seas.

The significance of seaports comes to the fore in this issue. The use of Big Data in running the ports of the Adriatic, the role that Mediterranean seaports play in China's Belt and Road initiative, as well as the importance of data for the development and funding of national transport works are introduced as key issues influencing the transport networks of the region. The contributors thus remind us of the contemporary importance of ancient connections and the impacts of their reinvention in a digital age. At the same time, our attention is drawn to street-level concerns about mobility, safety, and the user-perceptions of improvements to transport networks.

These analyses of regional networks, understood in terms of their national and global functioning, combined with a focus on local initiatives and their impact on individuals' daily lives is precisely where the power of Ekistics lies: As contributors and readers, we are able to study problems not simply in terms of micro and macro analyses, but as points on the Ekistics scale that tracks the interrelation of these two forms of analysis over time. The global movement of goods, managed through seaports and their associated networks influences the viability of urban living, just as local transport networks enhance or degrade our mobility, safety, and sense of well-being within our cityscapes. Ekistics is important because it is based on the principle that solving complex problems requires understanding the interrelation between various fields at different scales of analysis.

I would like to thank Prof. Giannopoulos for putting together this special issue which enables us to think in terms of Ekistics and in turn, to discover new aspects of the pressing issues of our time.

Dr Ian Fookes
Deputy Editor | *Ekistics and the New Habitat.*

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2020, Vol. 80, Issue 3

Special Issue: Cities and Transport in the Mediterranean Region
(Part 1 of 2)

Guest Editor: Prof. Dr. George A. Giannopoulos

Transport Planner, Professor Emeritus Aristotle University of Thessaloniki, Greece,
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Editorial

Prof. Dr George A. Giannopoulos

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This issue is the first part of a two-part ensemble of special issues of the *Ekistics and the new Habitat* journal on the general subject of "Cities and Transport in the Mediterranean Region". It refers to current day problems, issues, policies and solutions that have been applied to the urban traffic and transport systems in the countries that border the Mediterranean Sea.

This is a region that can rightly claim the title of being "the cradle of western civilization" with many modern day firsts, such as being the no. 1 tourist destination in the world and the third busiest (maritime) transport corridor, but also with many problems and differences. In terms of national population size and density, demographic growth rates, systems of administration, economic management and development one can find many different arrangements and levels of development but overall, in terms of the urban traffic and transport situation we can see similarities in that all city administrations in the area are praising sustainability and decarbonisation and fighting traffic congestion, delays, pollution, noise, etc. It is therefore of general interest to see how these issues are tackled in the different urban areas and countries of the region and this is what this special issue of Ekistics (and its second part that will follow in a month or so) attempts to do.

In this first part of the two-part ensemble, the reader will find a diverse number of papers with analyses ranging from the sustainability of Spanish cities' transport systems to the impact of big data on land-based and maritime networks in the Adriatic, or the developments related to China's 'One Belt, One Road' initiative in the Mediterranean region. Further contributions address issues such as gender-related violence in the transport system of Egypt, the perception of mobility patterns on university campuses in the Mediterranean, and the challenge of defining objectives for national energy transport policies.

All papers have been prepared in the form of scholarly extended abstracts/essays raising issues, awareness or proposed solutions for the tackling of the problems facing traffic and transport in the urban areas of the Mediterranean countries. They may later give rise to full academic papers as their authors may decide, but for the time being we hope that they offer readers a good academic material to help them get a first picture of current problems and policies while at the same time giving them the chance to pursue further reading, if they wish, in the bibliography referenced in them.

Cities and Transport in the Mediterranean Region: Editor's Introductory Note

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Introduction

The Mediterranean region consists of 20 countries bordering the Mediterranean Sea with two of them being islands (see Figure 1). It is a region with many and distinct differences, not only in terms of national population size but, also in terms of national population densities, demographic growth rates, systems of administration, economic management and development. The region can rightly claim the title of being "the cradle of civilization" *a propos* its great ancient civilizations from which most modern scientific and ethical values have developed. It is also a great tourist destination in the world and a major transport corridor of global significance.

Transport has always formed a major part of the social and economic fabric of the region - effectively supporting activities in commerce and industry as well as recreational activities and cultural exchanges that affect the daily lives and well-being of the population in a multitude of ways. The Mediterranean Sea has been the connecting element between the populations and the civilizations that emerged in its various parts throughout the centuries. For these reasons, maritime transport has always been the core of the transport system in the Mediterranean area, even more so since the opening of the Suez Canal when the Mediterranean Sea became a major transport corridor of global significance connecting the countries of Central and Western Europe with the Middle East and Asia. This corridor attracts approximately 30% of global maritime traffic which is subsequently directed either towards the ports of Western Europe in the Atlantic Ocean and the English Channel, or increasingly to several world-level ports that have developed within the Mediterranean area. These ports are becoming maritime hubs of major significance to Europe and globally. Transport continues to be a major element of urban life in Mediterranean countries affecting both the quality of life and the economy in multiple ways. The urban transport and mobility system consists of infrastructures, equipment, and services that vary in terms of size, state of maintenance, and quality of service among the various cities of the region. In some cases, it is rather chaotic and in a disparate state of repair, while in others it is much more orderly and highly operational.

Urbanization trends in the region are characterized by high population dynamics that have already resulted in 2/3 of the population living in urban areas. There are nearly 30 urban areas of major size (i.e. more than 2 million

Fig. 1: The Mediterranean Sea region – countries and cities.
Source: Nations online Project (https://www.nationsonline.org/)

inhabitants) as shown in Figure 2. Two of these, Istanbul and Cairo, are megacities of some 15 million inhabitants. There are also hundreds of small or medium-size cities (i.e., in the range of 100 000 to 2 million inhabitants) and thousands of smaller cities and villages as well as countless historic places. Here, too, there are many and very pronounced differences between the urban areas of the Mediterranean region, including different levels of development, diverse systems of governance and public administration, varied political priorities and levels of stability. The more pronounced differences are visible between the cities on the northern side of the Mediterranean Sea and the cities on the southern and eastern sides.

However, in spite of their differences, Mediterranean cities still share some of today's main urban challenges. The more pronounced of these "common" challenges are the following: Environmental degradation (mainly pollution of air and soil); sanitary and public health conditions; daily economic life (income, employment, opportunities); quality of residential inventory; and the needs for mobility and transport (especially public transport services). Of increasingly universal concern are also the issues of security and climate change, especially the effects of sea-level rise (Woertz, 2018). The present special issue of Ekistics and the New Habitat deals with one of the major "common" urban challenges mentioned above: the provision of mobility and transport.

Sustainability and mobility: Two key preoccupations for the Mediterranean urban areas

The search for priorities and ways of facing the urban mobility challenges must go hand-in-hand with similar concerns for the rest of the challenges facing the urban areas in the region. In this sense, "sustainability" and "mobility" are two notions that should be considered together. Perhaps the best definition of "sustainability" and of "sustainable development" is the one given by Professor Chaline some 20 years ago (Chaline, 2001) in which "sustainable development" – especially in the urban scale – resembles a virtuous triangle the apexes of which are:

- A social environment ensuring fairness, cohesion, equal access to services and fair distribution of costs and profits
- A monitored economic environment governing economic, thought-out and efficient development
- A natural and urban physical environment whose qualities must be preserved, managing carefully the resources and potential.

Clearly, sustainability is the key overall framework within which the system of transport and mobility must operate, and with which it should be harmonized. This basic principle was very eloquently described some 60 years ago, by the founder of Ekistics, C. A. Doxiadis in his presentation of *Ecumenopolis* the global city of the future:

The systems of transportation and communications will be the circulatory and nervous systems of Ecumenopolis. More than anything else, they can unify the universal city or break its inhabitants. The question is often asked whether people in the cities of the future will fly, sail, drive, or walk. The answer is that they will do all these things, in a balanced way. The basic principle will be for man to walk over short distances (not losing this natural ability and what goes with it), to drive over the longer ones, to sail for pleasure, and to fly -- by new planes and rockets -- over the longest distances. The second principle is that the interconnections between the systems of walking, driving, sailing and flying should be such that no time is lost at all. The third principle is that the different lines of movement should not cross, except in the case of pedestrian paths; pedestrians are self-regulating organisms of the highest flexibility, and not only do they

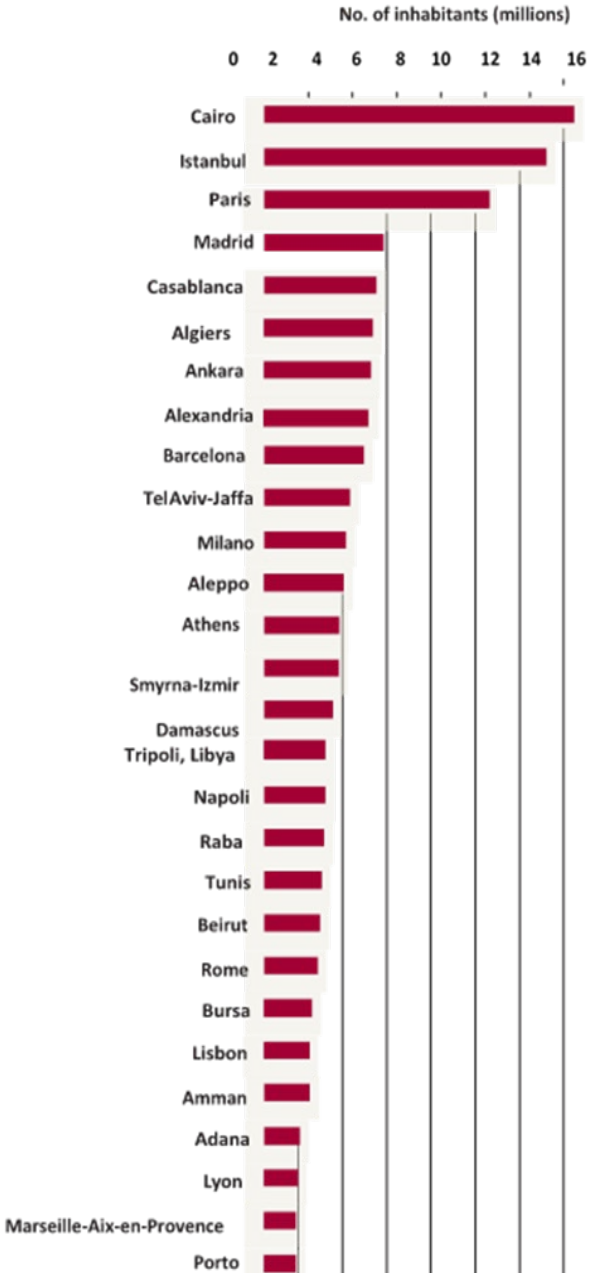

Fig. 2: Major cities in the Mediterranean region by size (2006 census data updated to 2020 with annual growth rates) Source: http://www.citymayors.com/statistics/urban_2020_1.html

find no need to avoid crossing each other's paths, they want to, for they are social animals.

In many urban areas of the Mediterranean region today, the development of new or the upgrading of existing urban mobility systems (for passengers and freight) is following Ekistics or similar principles. New and more environmentally friendly transport systems and technologies are being introduced, or are being planned to be introduced, and the well-known and tested legacy policies for the development of both the cities and their transport, systems give way to new ones influenced by the on-going fourth industrial revolution. For example, in fostering new clusters of urban economic activities based on the digital sphere or in developing the new electric and autonomous mobility systems of the future.

Sustainability and mobility are therefore two key preoccupations emerging for the system "cities and transport" in the Mediterranean region. Moreover, as the big urban areas increase in size, growing along major transport axes, we are witness to the unfolding of the "Ecumenopolis" in several areas of the region. In the south of France (Marseille-Aix-en-Provence region), in the north of Egypt (Alexandria – Cairo area), or in some parts of the northern Adriatic Sea (Athens-Piraeus area), Istanbul and its environs, and in some parts of the Levantine region. For these areas, the application of the principles of sustainability for transport as well as for the urban system as a whole is progressing to differing degrees but – overall – is still far from being realized (Bilbao-Ubillos, 2008). The current urban mobility patterns - especially in the countries of the south and the eastern sides - remain dominated by the private car. Despite the progress accomplished by manufacturers in terms of reducing the levels of pollution and Green House Gas (GHG) emissions from the conventional internal combustion engines (ICEs), cars are still the major contributors to urban air pollution. The congestion of urban traffic networks magnifies this now endemic problem. As a result, long queues of traffic, accidents, and increasing economic costs related to extended travel times are the norm. Estimates suggest that the current cost of urban congestion amounts to an average of 5-6% of the Gross National Product (GNP) per year (Cornago et al, 2019).

Relevant international cooperation initiatives

Achieving sustainable development and efficient, clean, mobility are two of the main goals of many international organizations and initiatives for the region. In 2012, the United Nations Environment Programme (UNEP) published the Mediterranean Action Plan (MAP), which provided a multilateral framework of cooperation for sustainable development in the region and included actions in the transport sector (UNEP/MAP, 2012). The Mediterranean Commission on Sustainable Development (MCSD) developed the plan that had been set up within the UN's Environment Programme. On the recommendation of the same Commission, the UN has supported the development of a number of "regional activity centers" which were established in a number of countries in the area. Two of them, the Blue Plan or Le Plan Bleu based in Marseille, France and the Priority Actions Program (PAP/RAC) have consistently supported the Mediterranean countries in improving their transport networks, urban mobility as well as the sustainable management of their coasts and port areas – all within the frame of sustainability and environmental preservation.

The European Union (EU) has eight member-countries in the Mediterranean region: Spain, France, Italy, Slovenia, Croatia, Greece, Malta, and Cyprus. They occupy most of the northern side. In all of these member-countries (like in all the rest of the EU) all urban areas with a population above 100 000, are obliged to develop and implement sustainable mobility measures and policies through the so-called Sustainable Urban Mobility Plans (SUMPs). The SUMPs generally promote low-carbon, network-oriented urban developments that rely on public transportation and use of new and sustainable transport services based on "clean" vehicles (e.g. electric cars and buses using "green" electricity, or other clean energy sources) as well as shared transport and other mobility services. In 2008, on the initiative of the EU, the Union for the Mediterranean (UfM) was developed. This intergovernmental organisation involves all member countries of the European Union and 15 other countries from the Southern and Eastern Mediterranean, whose mission is "to enhance regional cooperation, dialogue and the implementation of development projects and initiatives."

As the successor to the Euro-Mediterranean Partnership (EUROMED) launched in Barcelona in 1995, the UfM has created the Euro-Mediterranean Transport Partnership (EuroMed Transport) in order to promote specific actions and programmes in the transport sector. Its key priorities are still the promotion of transport safety, sustainability, and efficiency in the transport systems of all countries in the Mediterranean region. A comprehensive presentation of these priorities is included in the Barcelona Declaration of '95 that established the predecessor of the UfM (the EUROMED). The UfM's main financial instrument for attaining its objectives is the MEDA Programme. This programme provides financial support to implement the UfM's policies for a number of beneficiaries in the Mediterranean region, which include not only states and regions, but also local authorities, regional organisations, public agencies, local or traditional communities, organisations supporting business, private operators, cooperatives, mutual societies, associations, foundations, and non-governmental organisations.

Other EU initiatives directly relevant to and with impacts on Mediterranean region countries are the following:

- European Committee of the Regions (CoR) and its Euro-Mediterranean Regional and Local Assembly (ARLEM). An assembly of local and regional representatives from the European Union and other Mediterranean countries, the ARLEM was set up in 2010 in order to:
  - represent local and regional authorities politically
  - maintain political dialogue
  - promote inter-regional co-operation.

- European Neighborhood Policy, or ENP" As an "umbrella" foreign policy initiative, the ENP aims at building privileged relationships between the EU and a number of counterpart countries based upon the common values of democracy, human rights, rule of law, good governance, market economy principles and sustainable development. So far, the ENP

includes ten countries from the Mediterranean region. Part of the ENP focuses on urban areas and the development of sustainable transport. The main aim is to promote and explore synergies and cooperation between the EU and the participating countries. The ENP body charged with forming such synergies is the Global Task Force of Local and Regional Governments. Formed in 2013, this task force is active in four main areas: (1) good governance, democracy, rule of law and human rights; (2) economic development for stabilization; (3) security; and (4) migration and mobility (Woertz, 2018).

There are also a number of other major international organizations and initiatives promoting cooperation and development in the Mediterranean region (with a strong interest in sustainability and mobility as part of their agenda). These are the following:

- Council of European Municipalities and Regions (CEMR). This is an organization of European local and regional governments dating back to 1951. Today, CEMR includes approximately 100 000 local governments in 41 countries, including most of the countries in the Mediterranean region. It also has 60 Associations of local governments as members. CEMR is the European section of the world organisation United Cities and Local Governments (UCLG).

- Mediterranean network of cities or MedCities: MedCities was initially established in 1991 in Barcelona by 16 Mediterranean cities with the purpose of supporting environmental protection from a local perspective. By 2015, however, MedCities had become a large independent organization with more than 50 local authorities from throughout the Mediterranean basin. It currently focuses on helping Mediterranean local governments achieve their strategic priorities.

- Cooperation for Urban Mobility in the Developing World (CODATU). This is perhaps the most "transport related" Organization that was born from the world conference on urban transport, organized in Dakar in 1980. It is an association with an international vocation whose objective is to promote sustainable mobility policies through training activities and scientific exchanges on urban and periurban mobility. It has issued many documents and guidelines for urban transport and mobility in the Mediterranean area. It offers "guidance and recommendations for urban transport in the Mediterranean region", that provides practical insights with a high level of detail on a wide range of key areas, including transport institutions, planning, financing, and pricing. Since the early 1980's, these guidelines have served as a basic aid to taking relevant action for central and local governments in the region (CODATU, 2008).

Aims and rationale of this special issue

The great variations observed in the urban transport systems of the countries in the Mediterranean region make any exercise that reveals their problems and challenges a worthwhile exercise. Moreover, such research also uncovers good practices and success stories developed in response. The dissemination of these findings is an extremely valuable outcome that permits the ongoing improvement of mobility and transport in the region. The present special issue of Ekistics and the New Habitat aims to participate in this type of practical research that focuses on the challenges of human settlements and their solutions. In this respect, the present special issue can be understood as an exercise in reviewing the measures, policies, and success stories in applying modern concepts of sustainability and mobility in the urban areas of the different countries of the Mediterranean region. The success of which, can be determined by the idea that any transport and traffic related policy or measure in the urban context must be in harmony with the overall principles of sustainability and livability as expressed by Ekistics principles.

The title of the present special issue, "Cities and transport in the Mediterranean region" defines its scope. The articles presented focus on the cities and transport interaction of the region's urban areas and the relevant transport policies, technologies, and management measures currently in place (or that could be implemented) to ensure the efficient movement of persons and goods in harmony with the sustainable urban development and "livability" concerns. Of interest are special topics that address the development of urban transport networks and infrastructures as well as those concerning new and more efficient mobility services, as well as the relevant managerial and governance issues (at local or central government level) associated with them.

In the limited space available and for the minimization of the time between submission and publication, the call for papers specified that papers should be of limited length in the form of extended abstracts. They should focus on outlining the problems and the solutions and / or the best practices that the authors want to report, while avoiding lengthy analytics, state-of-the-art reports and the usual features of a full-length paper. Our main aim is to provide our readers with an initial, synoptic but authoritative look at some key existing or potential problems and issues in the area. Indeed, we are aware of hundreds of positive initiatives, solutions and policies that can serve as successful examples. By publicizing a number of them from large-scale international projects to local level applications and collaboration initiatives, we hope to incite and perhaps initiate a more consolidated intra-Mediterranean dialogue and cooperation in tackling these issues. Such a dialogue could then lead to the adoption of harmonized policies (suitably adapted and "localized" of course), with a direct impact on the lives of millions of citizens.

In preparing this issue, we hope that readers will find our approach useful, and that the papers published will provide sufficient depth in terms of information, methodological approaches, policy recommendations and initiatives to help them better understand the challenges facing the region and to develop the required solutions. It is further hoped that the authors will find in the publication of their papers here, encouragement to go on to publish full-length papers in this or other scientific magazines, explaining in more detail their research approach and its results.

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The Long Winding Road to Sustainable Mobility in Spanish Cities

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Abstract

Urban mobility in Spanish cities has been undergoing notable changes and transformations in the last forty years. This paper looks at the main characteristics of these changes under four headings corresponding to four main periods: "institutional reconstruction" (1979-1985), "cautious infrastructure expansion" (1986-1995), the "big-construction bubble" (1996-2007), and the "grumbling sustainability turn" (2008-2020). The all-important catalyser for change was the early institutionalization of public transport authorities and the multilevel governance structures based on consensus. The major moves away from the pro-car policies that occurred in the '80s and '90s and the corresponding re-allocation and re-design of the space preciously dominated by cars to create an attractive environment for residents and pedestrians was another characteristic.

In the current time period, Spanish cities are developing procedures and structures to effectively promote and implement innovation, to tailor decisions to each particular context, and to meet the challenges of air quality and climate change. Although financial resources remain scarce, the task ahead is being addressed by dedicating the energies and staff previously focused on large infrastructure developments to the preparation of innovative schemes in a new context of stronger public participation, based on co-creation and participatory budget processes.

Introduction

This paper reviews forty years of urban mobility policies in Spain, identifying four main stages in a process that, while delivering improved and more sustainable mobility conditions to citizens, has also raised new challenges. This is a story of heated debates, with some successes but also some missed opportunities.

One of the most prominent outcomes achieved by many Spanish cities has been the recovery and modernization of their public transport systems. This was due in part to the resources allocated for undertaking ambitious investments. However, it was the early institutionalization of public transport authorities (PTA) and of a multilevel governance structure based on consensus, which were primarily responsible for the amazing results - even during those periods of political polarization and scarce resources. It is also remarkable how some Spanish cities in the 1980s moved away from pro-car policies which had been extremely resistant to innovation, and how quickly some of the space dominated by cars was redesigned to create attractive environments for residents, and pedestrians in particular.

Some of the actions undertaken raised new challenges. As easier access to financial resources and quick economic development became the norm, professional practices and political visions began to focus too heavily on infrastructural solutions, ultimately leading to the consolidation of a "build-big" machine that spent much-needed public resources on expensive and poorly thought out infrastructure schemes. Another issue was bargaining between local governments desperate for funding and the developers that could provide it. A situation that gradually undermined or circumvented urban development regulations. Moreover, urban design was not always creative, and it could be argued that laziness led many architects and engineers to rely on copy-and-paste solutions, many of which used unattractive designs in spaces reclaimed from car use or featured oversized streets in new developments.

Private and professional lives are a mix of success, failure and something in-between. This short paper highlights how all of these outcomes took place in Spanish cities in the following four stages: (1) Institutional reconstruction (1979-1985), (2) Cautious infrastructure expansion (1986-1995), (3) the Big-construction bubble (1996-2007), and (4) the grumbling sustainability turn (2008-2020).

Institutional reconstruction (1979-1985)

After four decades of dictatorship, the first local democratic elections took place in April 1979. The newly elected mayors took office at a time when virtually bankrupt municipalities were suffering from high unemployment rates and poor living conditions. In the 1960s and 1970s, people were living in underequipped and overcrowded neighbourhoods surrounding the cities. The car had become the mode of transport of choice, though only a fraction of the population could afford it. Public transport had not kept up with the expansion of cities, and many of those living in the new high-density neighbourhoods often had to rely on informal transport networks. To make matters worse, the oil crisis and the global economic downturn in the early 1970s effectively stopped the existing (and slowly implemented) plans to create or expand metro services in the larger cities. Finally, although public transport fares remained artificially low to mitigate public unrest, this policy resulted in the steady deterioration of the quality of public transport services.
The reaction of the elected city councils was quick and generally effective. First, they negotiated with urban developers to provide the financing and implementation of

the most urgently needed facilities. Then they dedicated resources to the improvement of buses and other public transport services. Most significantly, however, they created the institutional and professional frameworks required to implement their actions. The traditional figure of the 'municipal traffic engineer' thus gave way to 'multidisciplinary teams' which were open to the needs of pedestrians and public transport users and interested in the quality of public space. As a result, dedicated professionals increasingly monitored the performance of bus and other public transport companies, while some metropolitan areas created public transport authorities, following best practice developed in other European cities. This was, in short, a time for institutional reconstruction. Mayors wisely lent deaf ears to those promising magic solutions such as the privatization of municipal bus companies and opted instead for a long-term strategy in which reinforcing the professional capacities of the municipal services played a central role (Arias, 2002).

The cornerstone of the new mayors' long-term strategy was the adoption of new local plans, defining land use and infrastructure development schemes for the next eight years and beyond. The drafting of Local Plans attracted a crowd of young professionals, which resulted in visionary yet realistic proposals focusing on re-balancing cities, giving priority to the provision of services, including accessibility to neglected high-density neighbourhoods.
Clear priorities guided the redesign and implantation of transport infrastructure projects In Madrid, for example, where new metro lines were constructed close to the surface, and with convenient connections among them, saying good-bye to the "build cheap" approach of the 1970s, with stations up to 50 below surface. Urban motorway projects were also cancelled in favour of urban boulevards, as was the case of the remaining section of the M-30 beltway in Madrid, which was renamed as *Avenida de la Ilustración* or Enlightenment Avenue. In other cases, authorities opted for compact designs, providing much needed public space and social facilities on the spared land (Barcelona's Ronda de Dalt y Ronda Litoral). (Aparicio, 1993).

Cautious Infrastructure Expansion (1986-1995)

During the 1980s, the economic situation was improving and the well-targeted investments in urban transport infrastructure had paid-off in terms of safety, through-traffic diversion, and more reliable mobility across all modes. While transport projects in cities continued to be implemented, local, national, and newly established regional governments were able to dedicate more resources to them. Once the most pressing gaps had been addressed, it was time to reflect on the long-term future of mobility in Spanish cities.

By this stage, some planners and a few politicians began embracing the then brand-new concept of sustainability. For others, the future had to be built (physically) upon the functional and political successes of the recent past. There was a strong public consensus on the expansion of transport infrastructure as a path to modernization, and the local building industry, which had grown rapidly and aimed to continue, was eager to deliver. The decade 1986-1996 was therefore one of increasing contradictions: On one hand, the planning tradition of cautious infrastructure expansion largely continued, completing the consolidation of the suburban railway networks and the expansion of the metro system in Madrid and Barcelona, as well as the planning and implementation of road bypasses in most urban areas. On the other hand, an increasing number of engineers, planners and politicians joined the "think-big" coalition.

In the wake of the Barcelona 1992 Olympic Games which had dramatically changed the face of the city and its infrastructure in an astonishingly short time, members of this coalition were largely favoured. More and more cities wanted to follow Barcelona's path to success, looking to the national government to contribute to the financing of new roads, metro lines and even tramways. These were times of increasing and interesting debates in professional and political spheres. The future of cars in Spanish cities was at the epicentre of these debates. Was the population ready to accept car restrictions and a decisive bet on sustainable transport? (Sanz, 1996; Aparicio, 1994, 1995).

For most decision makers, the answer was… 'Not yet'. There was still one final parking facility to build, one last road to enlarge, one more new tunnel to dig… And with progressive local governments largely in retreat, drivers joining the ranks of car-dependency, and cheap small diesel cars allowing people to enjoy the low-tax gasoil fuel thus far reserved for trucks, sustainable transport could not gain wider popularity beyond the realms of academics and professionals. Indeed, the following decade revealed just how far civil engineers could go in filling Spanish cities with ever more expensive pieces of transport infrastructure (Estevan & Sanz, 1996).

The Big-Construction Bubble (1996-2007)

The decade 1996-2007 was deeply influenced by the effects of the 1997 legal reform to facilitate the rapid urbanisation of rural land. The rationale of this reform was the fast-growing prices in the house market, and the naïve assumption that they were a consequence of the legal controls embedded in urban planning legislation that restricted new urban developments to designated zones. Significantly, the legal reform included provisions to increase the power of big developers to push forward their plans vis-à-vis small landowners. Moreover, the reforms also limited to a large degree the ability of the public sector to keep control of the urbanisation process.

The consequence was an acceleration of the already vigorous urban sprawl that had developed in the previous decade. Urban sprawl required transport infrastructure, and contrary to the 1960-1970s growth in which developers avoided the provision of such infrastructure, the new regulations requested developers to provide the required infrastructure in advance. In practice, however, this acted as an effective barrier to smaller developers, and facilitated an oligopolistic urban development market, at least in what referred to road access. The expansion of urban roads and motorways was nevertheless amazing, particularly in Madrid, where the motorway network practically doubled, with a new beltway - the M-50, an 85-km motorway entirely completed in 2004, except for a short 7.5-km section completed in 2007 - and 5 new radial motorways.

Metro networks were also expanded in Madrid and Barcelona, and new systems were opened in Valencia, Málaga or Sevilla. Meanwhile, medium-sized cities opened tramway lines, such as Coruña, Zaragoza, Alicante, Murcia or Santa Cruz. The frenzy of transport infrastructure construction peaked in Madrid, with a scheme to enlarge the capacity and partially cover the M-30 beltway. It completed in just 3 years at a cost of more than EUR 5 billion.

In many of these cities the future arrival of the high-speed train was seen as a unique opportunity to engage in ambitious urban redevelopment schemes targeting the rail station and its surroundings (Bellet & Gutiérrez, 2011). The additional cost of covering the rail lines and – in some cases - the entire station was supposed to be met by the profits associated with new urban developments on land owned by the railway company. Sometimes, as was the case in Zaragoza, these schemes were completed, eventually providing over-sized railway stations to the city. In other cases, however, like Valladolid, it ended with the heavily indebted municipality being forced to downsize the initial scheme (Observatorio Metropolitano, 2009).

During this period, pedestrianization schemes in touristic city centres became ubiquitous in a trend that followed the positive experiences of early adopters from the previous decade, such as Vitoria and Pontevedra. Regrettably, though, those in charge decided to keep just the external traits of those actions and forget about their substance. Most schemes did not aim at modal change and reduced car use, but rather, were designed to support the development of tourist-focused businesses in the city centre. In fact, in terms of modal split, this can be considered a 'lost decade', as heavy investments in public transport and pedestrian areas were insufficient and failed to reduce the modal share of private car use. Moreover, car use was in fact sustained not only by road capacity expansion, but also by the generalisation of a "city on the road" with housing, services and commercial activities increasingly sprawling to the city outskirts (López de Lucio, 2006; Sanz, 2005).

The implementation of Infrastructure-based policies was not without criticisms. As the magnitude of the projects' costs kept growing, and their purpose and functionality became more and more doubtful, critical voices could be heard. These were sometimes included in the first technical guidelines to prepare sustainable urban mobility plans in cities (Pozueta et al, 2006), or more significantly still, in official policy documents, such as the Guidelines on Urban Mobility developed within the Ministry of Transport and the Strategy on Local Sustainability published by the Ministry of Environment in 2007.

The grumbling sustainability turn (2008-2020)

This critical approach would eventually gain hegemony. Although it was more as a consequence of the sudden burst of the financial bubble and its ravaging consequences on local budgets, than as the result of decision makers becoming convinced of the virtues of sustainable mobility. Even so, for some cities the change of direction was a case of 'too little, too late', because they were already heavily indebted by the costly projects. Madrid was a notorious case in point, with a burden that would take decades to pay off at a time when public support was desperately needed by its less affluent citizens.

The new paradigm included three main components:

- The promotion of sustainable urban mobility plans by the national government (a new law, passed in 2011, made it compulsory for cities receiving national subsidies for public transport to produce a SUMP)
- The enforcement of the air quality law in cities (including the contents of the EU Air Quality Directive) - which implied the need to produce air quality plans for those cities not complying with air quality targets as defined in the Directive
- The growing influence of local grassroots associations lobbying for the improvement of the urban environment and for a more inclusive mobility system.

These three components built upon some valuable achievements from the past, notably the establishment and consolidation of public transport authorities, which had provided an integrating system in most of the big and middle-size cities in the country, as well as the ability to provide reliable technical leadership in times of economic difficulties and hard choices. Furthermore, in spite of the mediocre results achieved by the implementation of the first generation of SUMPs (Vega, 2016), they have served as a test field to a large community of municipal officials and professionals, ready to apply the lessons learnt with a new generation of decision makers, who are more sensitive to sustainability claims. Ironically, it could even be even suggested that the previous overspending in transport infrastructure led to the present opportunity to focus on sound management of the transport system as a whole, while seriously addressing car restrictions. Indeed, it has always been clear that sustainable transport modes can only grow to the extent that car use is actively reduced.

To conclude, mobility policies in Spanish cities today are pretty much about regulations and no longer about infrastructure. Spanish cities are developing procedures and structures to effectively promote and implement innovation, to tailor decisions to each particular context, and to meet the challenges of air quality and climate change. Although financial resources remain scarce, the task ahead is being addressed by dedicating the energies and staff previously focused on large infrastructure developments to the preparation of innovative schemes in a new context of stronger public participation, based on co-creation and participatory budget processes. Some cities are moving quicker than others in that direction, and there are, no doubt, some occasional backward steps. The process could probably be sped up with firmer support from the national and regional governments, not only in terms of improving local financing, but also through the setting up a more robust normative framework. In this respect, the Air Quality Act has shown that clear environmental targets can send a strong message to local decision makers. It is an approach which could be fostered in the future through regulations regarding the contents and scope of SUMP, cities' contributions to national

climate change targets, and the minimal mobility quality standards for vulnerable social groups. These examples highlight just a few areas in which most local decision makers would appreciate some guidance and leadership.

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Keywords

Spain, urban mobility, Spanish transport, Spanish cities, public transport, environmental planning

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Big Data Opportunities for the Port and Maritime Transport Sector in the Adriatic Region

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Abstract

Big data technologies offer new opportunities for the port and maritime industry in both freight and passenger transport. In order to ensure the success of a new big data project in a specific environment, it is essential to assess the benefits and the efforts required by its implementation. The present work addresses this topic for a specific area: the Adriatic region. Several relevant stakeholders from the selected area have been contacted to assess the relevance and deployment difficulties for a set of promising big data technologies. The study provides a picture of the current state and the future outlook for the Adriatic region, being useful for local operators and a valuable example to be replicated in other contexts.

Introduction

Recently the port and the maritime industry have been experiencing a radical change due to the introduction and application of several disruptive innovations leading to rapid digitalisation processes. These innovations, starting from being costly solutions which serve a niche, perform the so-called "disruption of the market" when they reach the mainstream market as a mass-produced product (Christensen, 1997). In the maritime sector, characterised by a large number of actors, early detection and development of the most promising technologies is essential to be more competitive in the market.

Among other such technologies, opportunities for the transport sector derived from big-data technologies have been studied in recent years (Grover & Kar, 2017). In fact, big data can provide positive effects in terms of economics and safety & security on port operations and maritime logistics (Mirović et al., 2018) as well as in the whole transport chain within the shipping industry (Zaman et al., 2017). The application of these technologies is foreseen also in the Adriatic region. In this specific context, a selection of the most promising innovations is underway (Mazzarino et al. 2019), to prepare the regional stakeholders to face future challenges.

The aim of the present work is to assess the relevance of the new opportunities related to big data in the Adriatic region. It is also essential to identify the issues which might hinder their deployment. The data here presented can help regional stakeholders in planning and managing their digitalisation process, fostering the introduction of big data technologies in the Adriatic region. Moreover, this case study might be of interest also in other similar contexts which are facing the same innovation processes.

Big data technologies tested

The technologies concerning big data for the transport sector have been selected according to Mazzarino et al., 2019 and are reported in Table 1. They refer to both passenger and freight transport and are briefly depicted hereinafter.

Data standardization and data management are essential when dealing with big-data projects. Usually, each private company defines its proprietary standards, but this can hinder the integration among different actors in the transport chain, thereby reducing the data collection capability. This is why some of the world's largest carriers are working on common standards within the Digital Container Shipping Association (DCSA). At the same time, port authorities, terminal operators and shipping companies are already leveraging data to intelligently plan

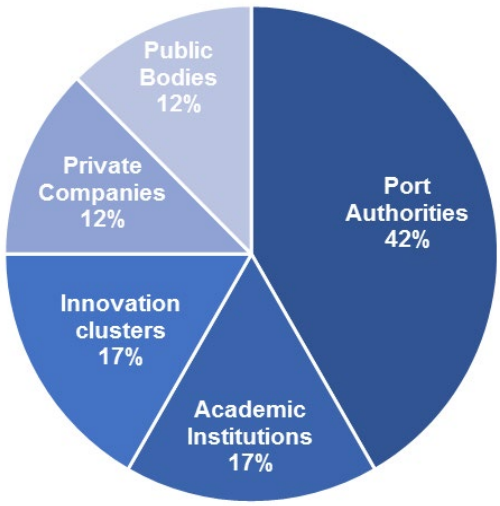

Fig. 1: Stakeholders involved in technologies ranking.

Technology	Sector	Description
Automatic detection of logistics' level of service	F	Forecast the performances for a consequent decision support and to improve the logistic efficiency based on data detection and management technologies.
Loading/unloading optimisation	F	More efficient loading /unloading procedures and planning of resources based on real-time Data and AI algorithms.
Big Data Analytics	P/F	Consolidated methods and techniques to collect and analyse "big data" in general.
Big data/data management	P/F	Make readily available to all the harbour operators accurate and reliable information, in order to improve every processes.
Data standardization	P/F	Definition of common standards for data collection and storing among different stakeholders.
Digital twin	P/F	A model capable to reproduce the state of an asset and its behaviour in reaction to external operating context.
Machine Learning	P/F	Algorithms to explicit historical data to make predictions or categorisation in current situation.
Anomalies detection & predictive maintenance	P/F	Identification of anomalies or failures on a specific machinery, equipment or system, and aid to maintenance programming
Georeferenced data	P/F	Assess the impact of events or scenarios and can save time, effort, and resources before implementing the actual project.
Port traffic management	P/F	Increase port safety and security based on data collected by a network of sensors.
Energy Efficiency	P	Energy efficiency improvement of complex systems.
Passengers flow analysis	P	Timestamping of passages position at strategic locations for findings gaps for process improvements.
Sectors: P: Passenger; F: Freight		

Table 1. Big data technologies tested in the survey.

their operations. In fact, Big-data Analytics technologies can be used to collect and analyse data that is employed to predict individual ship movements and cargo flows. Machine learning provides the algorithms to classify and analyse flows and situations based on previous experience (Mitchell, 1997). For instance, the correlation of logistics data to detect anomalies and / or errors can be used to assess and to predict bottlenecks based on recognizable patterns. A second innovative application of big-data technologies consists of the digital twin: a model capable of reproducing the state of an asset and its behaviour in reaction to external operating context in close to real-time. Machine learning and big-data analytics improve the knowledge extraction capability of software that deals with large and heterogeneous output collected by sensors, enabling the improved performance of a digital twin (Erikstad, 2017). A third application of big-data analysis provides considerable benefits to energy efficiency. Energy Management Systems (EnMS) can substantially increase the efficiency of navigation of complex passenger ships (Gualeni et al., 2016) and port facilities (Lee Lam et al., 2017). In this context, big data analysis offers a very powerful instrument for EnMS configuration (Perera & Mo, 2016). Moreover, bigdata can also be exploited in passenger terminals to study and optimise passenger flows and embarkment procedures.

Finally, in the freight sector, loading/unloading operations can be optimized. Specifically, resources can be planned based on real-time data and artificial intelligence (AI). The automatic detection of logistics' level of service can be performed through systems based on data detection and management technologies such as radio frequency identification (RFID). Moreover, before the implementation of a new project, georeferenced data can be exploited to analyse scenarios and future events in order to reduce the implementation time and required resources. Finally, big data can improve port safety and security by monitoring and managing vessel traffic management based on real-time information coming from sensors.

Ranking results

By applying the methodology provided in Mazzarino et al., 2019 the relevance and ease of implementation of the selected technologies have been defined according to the opinion of relevant stakeholders from the Adriatic Region. Five-step scales have been applied for the importance in the area (1. not at all relevant; 2. not very relevant; 3. no opinion; 4. relevant; 5. extremely relevant) and the efforts required for its deployment (1. very difficult to implement; 2. somehow difficult to implement; 3. no opinion; 4. somehow easy to implement; 5. very easy to implement). Responses have been collected from 24 organizations, divided into different categories as shown in Figure 1. Most of them are port authorities from Italy and Croatia, including the port authorities of Venice, Rijeka, Sibenik and Rovinj.

Rank	Technology	I	σ_I	D	σ_D
1	Bigdata/data management	4.60	0.58	3.20	0.81
2	Data standardization	4.36	0.64	2.86	1.14
3	Big Data Analytics	4.30	0.64	3.00	0.77
4	Port traffic management	4.09	0.67	3.05	1.02
5	Loading/unloading optimisation	3.95	0.80	3.30	1.05
6	Automatic detection of logistics' level of service	3.89	0.81	2.68	0.80
7	Energy Efficiency	3.88	0.76	2.69	0.92
8	Anomalies detection & predictive maintenance	3.86	0.77	2.81	0.73
9	Machine Learning	3.75	0.62	2.60	0.92
10	Passengers flow analysis	3.70	0.71	2.95	0.86
11	Digital twin	3.52	0.91	2.35	0.91
12	Georeferenced data	3.48	1.10	2.85	0.85

Table 2. Ranking of big data technologies.

The big-data technologies, ranked by importance I are shown in Table 2, along with their deployment difficulty/easiness D and the related standard deviations σ. Figure 2 provides a graphical representation of the results on a scatter diagram. It is worth noticing that all the technologies are located in a restricted area in the upper part of the diagram. Figure 3 provides a more detailed view of the scatter diagram. Numbers shown in Figure 3 refer to the ranking reported in Table 2. It can be concluded that no clear correlation exists between importance and deployment's relative ease or difficulty, since a clear trend in the scatter diagram does not emerge. However, the quite high value of standard deviations related to innovations' importance reduces the significance of the ranking. At the same time, a group of more interesting innovations can be identified from the diagram, including Big data/data management, Data standardization and Big Data Analytics meaning that the organizations involved assign a clear preference for data storing (database design/data management) and data standardization issues globally as a prerequisite for the efficient application of any kind of data analytics.

The least important innovations are Digital twin and Georeferenced data. The first is not considered very significant for improving the logistics chain, despite the fact that the digital twin is considered a very powerful simulation tool according to stakeholders. Regarding Georeferenced data, they are judged useful – but not essential - for optimization purposes, since similar results could be easily obtained with the adoption of other technologies. A wider spread can be observed on the innovations' implementation difficulty in the Adriatic region as well as larger standard deviations, leading to greater uncertainty. Innovations which are considered to be easily deployed are Loading/unloading optimization and Big data/data management, since well-established procedures and applications are already available on the market for both of them. On the other hand, the innovation most difficult to be deployed is Digital twin, since it requires considerable efforts in terms of system integration, collection of historical data, and the development of processing algorithms.

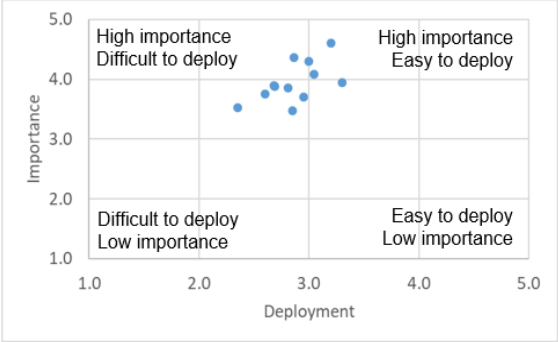

Fig. 2: Innovation Importance vs Deployment Easiness/ Difficulty

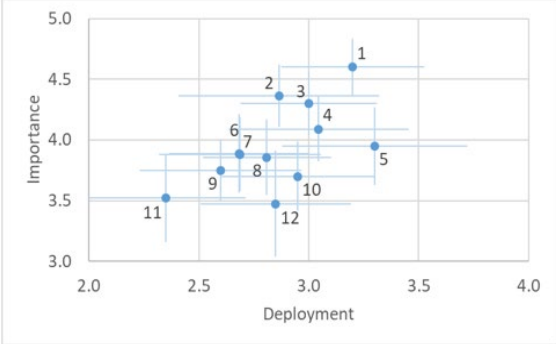

Fig. 3: Detail of Importance vs Deployment Easiness/Difficulty; bars refer to a 95% confidence interval

Conclusion

Overall results show that all the innovations considered in the study are located in a restricted area in the upper part

of the scatter diagram. Clearly, then, involved stakeholders assign a medium/high importance to all the selected innovations, thus, confirming the quality of the selection process carried out during the preliminary study.

By analyzing stakeholders' preferences, a ranking of innovations by importance is defined in the Adriatic region. However, the quite high value of standard deviations related to innovations' importance reduces its applicability. Nevertheless, a group of more promising innovations is clearly detected, including Big Data/data management, Data standardization and Big Data Analytics - which all are at the basis of every big-data project. Results then suggest that in the Adriatic area, where a strong interest in the development of the infrastructures required for their exploitation is in place, the application of big-data technologies is just at its starting phase. In conclusion, the whole "big data issue" does represent a significant focus in the area by relevant stakeholders. In particular, major opportunities are reported, ranging from data management to analytics and data standardization.

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Keywords

Big data, maritime transport networks, Adriatic region

On User Perception of Mobility Patterns, Problems and Efficient Measures for University Campuses in Mediterranean Countries

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Abstract

University campuses are a microcosmos of the urban landscape and an excellent testbed for implementing and evaluating novel mobility policies regarding public transport and multimodality. Nevertheless, reality shows that the mobility tools and policies implemented on campuses are not always efficient, nor consistent with the needs of the faculty, students, and staff. The objective of this paper is to develop two multivariate structural equation models to identify the most efficient measures based on user perception of mobility patterns and several other parameters including the type of area in which the campus is located (inside/outside) and the demographic characteristics (gender, affiliation, age group, residence, yearly income etc.). Data comes from a questionnaire survey that took place in seven University Campuses. In order to efficiently represent the interactions between the problems and the relevant measures, two latent variables have been developed describing the perception of users for mobility problems, as well as measures needed to enhance mobility. Results indicate that in campuses located inside urban areas the perceived measures needed to enhance mobility are correlated with the perception of users for existing mobility problems in relation to the accessibility of campus, the gender of the user and two transport modes. Regarding campuses located outside urban areas indicative results include that the yearly income of the user affects the use of passenger cars, that trip duration affects walking and motorcycling, and that cycling is affected by age whereas the use of public transport is correlated with the duration of the trip and the yearly income.

Introduction

The Mediterranean region presents a quite diverse set of urban mobility characteristics, mainly characterized by rapid urbanization, failure of the public transport system to meet the growing demand, high fatality rates accounting for sustainable transport modes as well as increasing incomes and rates of car ownership (ARLEM, 2013; Ufm, 2011). For this purpose, Urban Mobility Plans define a set of interrelated measures designed to deal with mobility problems and satisfy the people's mobility needs. They consist of an integrated planning approach and address all modes and forms of transport in cities and their surrounding areas (Wefering et.al., 2014).

University campuses are also a microcosmos of the urban landscape and an excellent testbed for implementing and evaluating mobility and novel mobility policies. Universities constitute a generator and attractor of highly variable demand for travel with significant mobility needs in terms of magnitude and extent to the environment in which they are located (Miralles-Guasch and Domene, 2010). A special characteristic of university campuses is that they are unique places functioning in specific contexts (Toley, 1996; Balsas, 2003; Gamberi et.al., 2015). Universities are characterized by the fact that they represent a cross section of the population from different socio-economic backgrounds and ages, generate irregular schedules and the constant movement of people throughout the day. This is even more noticeable in university campuses located in suburban settings: Daily commuting of the university population, longer distances travelled, and the predominance of private car use over non-motorised means of transport (Miralles-Guasch and Domene, 2010, Silva and Fereira, 2008).

Given this, it is important to identify common problems and establish innovative approaches and policies, particularly in terms of transport and mobility. The present work therefore attempts to correlate the mobility problems and efficient measures for university campuses in Mediterranean countries with respect to the following factors: the type of area in which the campus is located (inside/outside), and the demographic characteristics (gender, affiliation, age group, residence, yearly income etc.). To this end, two multivariate structural equation models are developed using questionnaire data from different Mediterranean universities. The proposed modeling approach is structured in such a way that it can be used as a managerial tool to assess the awareness and acceptability of different mobility tools and policies.

Methodology

Survey

For the purposes of the present research, a mobility questionnaire was developed including questions on the following topics:

- Current mobility - to present current mobility of the participants both regarding mobility from/to and inside the Campus
- Desired Mobility - to present the desired mobility of the participants both regarding mobility from/to and inside the Campus
- Mobility problems - to identify mobility problems

- Proposed measures/policies/tools - to evaluate specific measures, policies and tools that are already implemented regarding the mobility from/to and inside the campus

- Participant information including age, gender, affiliation etc.

Universities were asked to collect questionnaires based on the following sample criteria. Faculty members: 10%, Administration personnel: 20%, Students - postgraduate: 20% Students – undergraduate: 50%

The above percentages were decided upon in order to achieve a representative sample in all universities with a focus on the affiliation of the participants. The questionnaire's data collection took place for approximately one month and resulted in 1090 questionnaires as presented in Table 1. The university campuses were further categorized as being inside or outside an urban setting.

Analysis Method

Structural equation models belong to latent model analysis. This type of analysis is used to deal with several difficult modelling challenges, including cases in which some variables of interest are unobservable or latent and are measured using one or more exogenous variables (Washington et al. 2011). In the present research, the case of the unobserved on user perception of mobility problems and measures is attempted to be investigated through this type of analysis.

Structural equation models have two components, a measurement model and a structural model. The measurement model is concerned with how well various measured exogenous variables measure latent variables. A classical factor analysis is a measurement model and determines how well various variables load on several factors or latent variables. The structural model is concerned with how the model variables are related to one another. Structural equation models allow for direct, indirect, and associative relationships to be explicitly modelled, unlike ordinary regression techniques with implicit model associations (Washington et al. 2011). Furthermore, a very useful tool regarding the interpretation of the results is path analysis as a method for studying the direct and indirect effects of variables. How the paths are drawn determines whether the explanatory variables are correlated causes, mediated causes, or independent causes. Finally, although model Goodness-of-Fit measures are an important part of any statistical model assessment, Goodness-of-Fit measures in structural equation models are an unsettled topic, primarily because of a lack of consensus on which Goodness-of-Fit measures serve as “best” measures of model fit to empirical data (Arbuckle and Wothke, 1995). Several studies are implemented discussing these debates and a multitude of SEM Goodness-of-Fit methods such as Mulaik et al. (1989), One of the most common Goodness-of-Fit measures is Standardized Root Average Square Residual (SRMR) which is an index of the average of standardized residuals between the observed and the hypothesized covariance matrices (Chen, 2007). Values of the SRMR range between zero and one, with well-fitting models having values less than 0.08.

Results

Within the framework of the present research two distinct SEMs – one for campuses inside and one for campuses outside urban areas – have been developed and presented below. For efficiently representing the interactions between the problems and the relevant measures, two latent variables are introduced: the first latent variable (Problems) aims to describe the perception of users for the importance of existing mobility problems in relation to the accessibility of campus. The second latent variable (Measures) attempts to describe the perceived importance of the measures needed to enhance mobility in campus areas. Both problems and measures are estimated by the different thematic areas of the questionnaire (parking, walking, cycling, public transport, road infrastructure, environment, car related issues, mobility management, freight management).

Results are presented through the path diagrams in figures 1 and 2. It should be also noted that the Standardized root mean square residual value (SRMR) is in both models less than 0.08 (0.071 and 0.074 respectively), indicating the statistical significance of both models. In figure 1, the SEM graph for the campuses inside urban areas is presented.

Figure 1 presents several models regarding the mode of transport, problems, and the respecting measures for campuses inside urban areas. Regarding the problems that were assessed through the questionnaire, a latent variable is developed and is mostly correlated with three indicators, mobility management, walking and road infrastructure. The second latent variable regarding measures is estimated based on all the thematic areas of measures with small differences in the coefficients. Finally, in the structural part of the SEM the new unobserved variable representing the perception of users on measures is correlated with the problems that users identify, with the gender and with two different modes of transport (bicycle and motorcycle). In figure 2, the SEM graph for the campuses inside urban areas is presented.

Results are quite different regarding the campuses located in the suburban or outside urban areas as presented in Figure 2. A key difference from the previous model are the predictors of the overall measures that should be taken. More specifically, the unobserved variable of measures is predicted by the problems that are identified by the users, the frequency, and the gender of the participants. As a result, it is very interesting that none of the assessed transport modes in a predictor in the perceived importance of the measures needed to enhance mobility in campus. In addition, several regression models are developed regarding each transport mode.

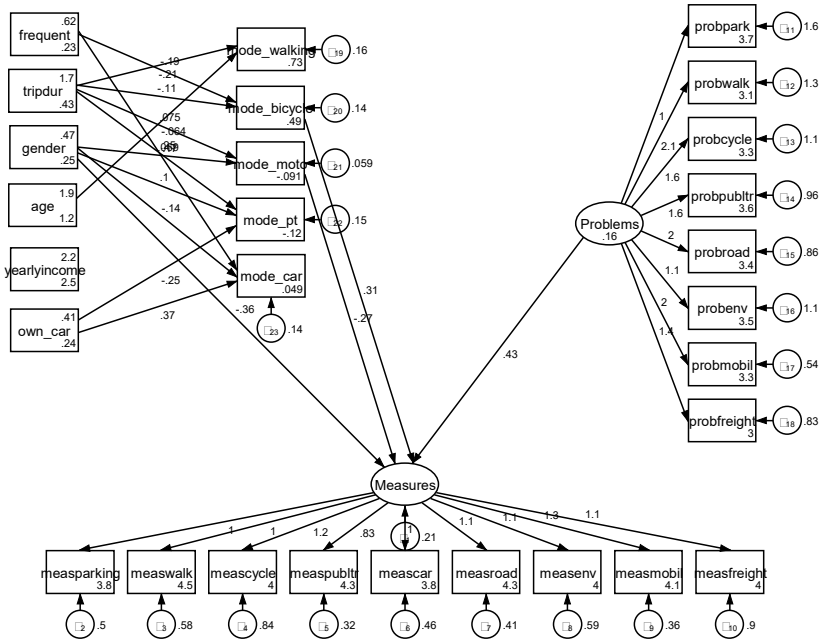

Fig. 1: SEM graph for the campuses inside urban areas

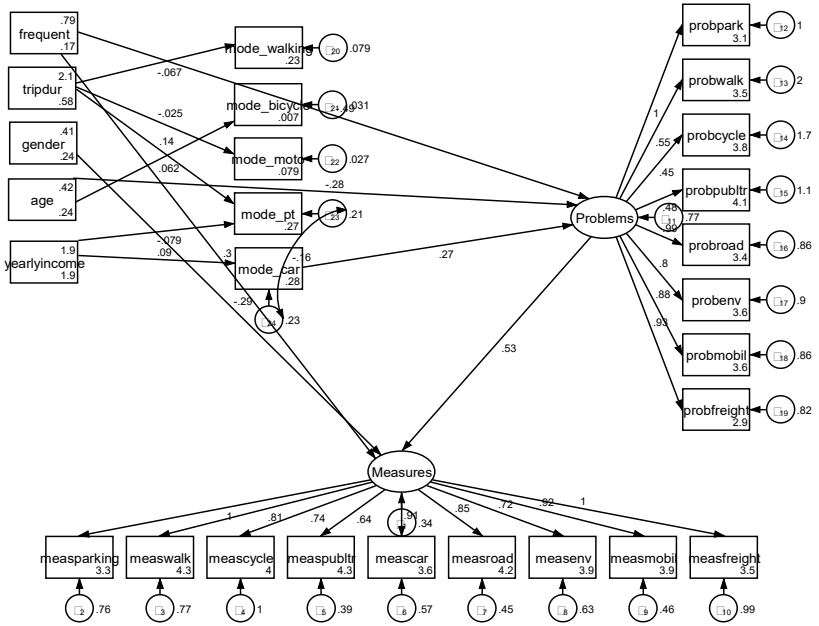

Fig. 2. SEM graph for the campuses outside urban areas

	University	Location	Area (m^2)	Students	Questionnaires
1	University of Catanzaro	Outside	260.000	11.000	104
2	National Technical University of Athens	Outside	1.000.000	13.500	124
3	University of Malta	Inside	194.452	11.500	250
4	University of Valencia (1 campus)	Outside	1.000.000	10.000	227
5	University of Valencia (2 campuses)	Inside	400.000	35.000	100
6	University of Split	Inside	245.000	24.000	100
7	University of Cyprus	Outside	1.200.000	7.000	85
8	University of Bologna	Outside	6.570.023	85.000	100

Table 1. Campuses characteristics

Conclusions

Considering that latent model analysis and especially structural equation models have been rarely implemented in the field of mobility patterns, the objective of the present research is the development of multivariate models relating mobility patterns of users with their perception on mobility problems and efficient measures. A key contribution on the present research concerns the successful development and application of latent model analysis through structural equation models. Considering that mobility perception is a multidimensional phenomenon, the results of this analysis allowed an important step from piecemeal analyses to a sound combined analysis of the interrelationship between several user characteristics and mobility problems and measures. Based on the analysis, two distinct SEMs - one for Mediterranean campuses inside and one for Mediterranean campuses outside urban areas - were developed.

Results indicated several differences with respect to the location of the campus. Regarding campuses located inside an urban area the perceived measures needed to enhance mobility on campus are correlated with the perception of users for existing mobility problems in relation to the accessibility of campus, the gender of the user and two transport modes, which indicates that users have different opinion on the measures that should be undertaken based on the transport mode that they use. The above statement, however, does not apply in campuses located outside urban areas where the users' perceived measures are not correlated with the mode of transport of the users, indicating that problems in these campuses are much more general.

Moreover, the most important measures that are evaluated on campuses located inside urban areas include the increase of safety on crossings, the increase of frequency of public transport and the improvement of the density and extent of the public transport network, all measures regarding soft modes infrastructure and public transport. On the other hand, in campuses located outside urban areas four out of the five most critical measures concern public transport (increase of frequency, coordination, improvement of the density and extent of the public transport network, and actions to improve the comfort of the vehicles) proving that public transport is the key mobility issue in campuses located outside the city.

To conclude, as several mobility plans and policies in universities will be implemented with the aim of enhancing the general quality of urban areas in terms of mobility and sustainability, it is highly important for the policy makers to identify appropriate measures for each campus. Based on the above, the present research can act as a guide to identify measures that better deal with mobility problems based on the location of the campus, and consequently, to better improve the quality of life for the campus and the wider area.

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Keywords

Campus mobility, Problems, Measures, Structural Equation Models

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Mediterranean City Ports and the Chinese One Belt One Road Initiative

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Abstract

This paper discusses the characteristics, investments and impacts of the Chinese One Belt One Road (OBOR) initiative in the Eastern Mediterranean ports and Eastern European countries with particular emphasis on its realization in Greece in the port of Piraeus and the so-called Land-Sea bridge railway connections of this port to Eastern European countries. For Greece, the investments of Chinese company Cosco in the two container terminals of the port of Piraeus and later on for the acquisition of majority share for the whole of the port, has increased the traffic on the port in terms of containers and made it, within just a few years, the no. 1 port for containers in the Mediterranean and one of the top 5 in Europe. At the same time, it has caused some serious local objections concerning plans for expansion of port activities into areas that compete with similar local activities. The paper also discusses the concerns of the EU as a whole and of some European governments in the Chinese OBOR investments in the area of Eastern Mediterranean and Europe and concludes with a discussion on the pros and the cons of the OBOR initiative for the region as a whole.

Introduction

Mediterranean city ports have always been points of modal transfers from maritime to land transport over the course of long-distance transport chains to and from their final destination or origin. In most cases, these transfers have to do with access to local or national markets that are normally termed the "hinterland" of the port. The ports on the northern side of the Mediterranean have attracted particularly strong flows of maritime freight traffic as access to central and eastern European countries from these ports is usually quicker and easier. The Chinese government-owned shipping and logistics company, COSCO has selected certain ports within this network to serve as access points. However, they not only serve as transit ports to reach their national or international hinterlands, but also as transshipment ports, in which large ocean-going ships coming from the far east unload to smaller ships for delivery to other local or regional ports in the area. COSCO has mainly been using the ports of Piraeus in Greece[2] , Genova and Venice in Italy, Marseille in France, and Valencia in Spain in this way. Their most pronounced investment was in the port of Piraeus where they now own 51% of its shares. COSCO uses Piraeus as a modal transfer point to reach destinations in central and Eastern Europe. In doing so, it can reduce total travel times to the same final destinations in central and Eastern Europe by a total of around 10 days, on average, as compared with the long sea routes via Gibraltar and the big ports of Western Europe (Rotterdam, Amsterdam, Zeebrugge, Ostend, Le Havre)[3]

The Chinese selection of the northern Mediterranean ports as major transit and transshipment points in their transport and logistics chains is combined with strong investments and cooperation agreements between the Chinese government and the governments of the respective countries of the ports. These are all part of a wider Chinese initiative to open international corridors of transport and commerce linking China to its major markets. Known as the One Belt One Road or OBOR, and in some cases as the Belt and Road Initiative or BRI, the initiative was officially announced by President Xi Jinping in 2013. For the countries of the Eastern Mediterranean and the Balkan Peninsula, the Chinese government's implementation of the BRI has initiated several bilateral agreements in parallel to the multilateral cooperation agreement known as the 17+1 initiative.

In this paper, we examine the main characteristics of the OBOR initiative and its impact on the countries of the Mediterranean / Balkan Peninsula region. Our main country of reference is Greece, as until now most of the OBOR related investments in the Mediterranean region have taken place in this country.

Outline of the OBOR initiative

The One Belt One Road (OBOR) or Belt & Road initiative (BRI) can be depicted, however, as an initiative led by the government of China to create modern efficient transport and other infrastructures related to corridors and countries

[1] This article is an extended abstract of the graduation Thesis of the author submitted to the School of Rural and Surveying Engineering of the Aristotle University of Thessaloniki under the supervision of Prof. Dr. Socrates Basbas.

[2] This is the largest port of the country serving Athens and its vicinity.

[3] According to the Port of Piraeus newsletter, May 2019.

connecting China to major economic centres of the world. These OBOR corridors consist of six large land corridors across the Eurasian continent known as the "Silk Road Economic Belt" and an extensive maritime route network connecting Asia with Africa and Europe known as the "21st Century Maritime Silk Road".

The main routes that characterize these corridors are shown in Fig. 1a, b, and c and can be described as follows:

I. The "Land Bridge" rail corridor linking China to Europe through the central Asian countries (Figure 1a) consists of multiple rail links and connections. The "Land Bridge" also includes a road corridor. The rail / road corridor goes through Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Iran, and Turkey, aligning broadly with routes of the ancient "Silk Road". It is the main land corridor linking China with the Mediterranean countries and the countries of the Balkan Peninsula.

II. The north rail corridor, linking China to Europe via Mongolia and the Russian Federation (Siberia) also includes several alternative routes and connections as shown in Fig. 1b.

III. The south corridors linking China to South-Asian countries include maritime links, and a rail / road corridor to Indonesia. From there it connects to Africa and the Middle East. Alternatively, there is corridor to Pakistan or to Myanmar and India.

IV. The main maritime corridor links China with ports in Southeast Asia, the Indian Ocean, the Arabic peninsula, the Mediterranean Sea, and southeast Africa (Fig. 1c). For the Mediterranean region, the main European port utilized by the OBOR initiative is in Piraeus, Greece.

The notion of "corridors" in the context of the OBOR initiative and its investments is not restricted to transportation. They are seen in a broader sense as reserved spaces for the transfer of energy, data and information, commerce, and manufacturing, etc. Along those corridors, and within the countries involved, there are investments for fibre optic networks, energy networks, international airports, and the creation of special economic zones, etc. There are also joint policies that are applied in economic areas of common interest and rigorous political support for international bilateral or multilateral cooperation agreements concluded by the Chinese government and the governments of the countries concerned. Table 1 shows the main agreements which China has concluded recently with the countries of the (eastern) Mediterranean and Balkan regions.

Category of cooperation agreements	***Description***
Agreements of general cooperation under the framework of the Belt and Road initiative (BRI)	The 17+1 multilateral agreement between China and 17 countries in the Eastern Mediterranean and Balkan area. Many other bilateral or multilateral agreements have been concluded in the frame of the 17+1 initiative as mentioned below.
	Bulgaria, the Czech Republic, Poland, Slovakia, and Serbia signed the MoU with China on "Jointly Promoting the Belt and Road Initiative - BRI" at the 17+1 Summit in Suzhou (China) in November 2015.
	Turkey and China signed a MoU on "Jointly Promoting the construction of the Belt and Road Initiative" before the G20 Summit in Antalya (Turkey) in November 2015.
	MoU of Cooperation between China and Croatia, Albania, Bosnia / Herzegovina, and Montenegro signed in May 2017.
	China and Greece signed a "2017-2019 Plan on Key Areas of Cooperation" in March 2017.
	Similar agreements were signed with other non-Mediterranean countries in the Eastern European corridor e.g. with: Hungary (2015), Rumania (2015), Latvia (2016), etc.
Agreements in the field of Transport and customs cooperation under the BRI	Hungary and Serbia signed a MoU with China on modernization of the railway link between Budapest and Belgrade in November 2014. Further agreements for the upgrade of this link were signed at the "17+1 Summit" in Suzhou in November 2015, and at the Belt and Road Forum (BRF) in Beijing in May 2017.
	Albania and Montenegro signed a MoU with Chinese company Pacific Construction Group on the construction of the Blue Corridor motorway project at the 17+1 Summit in Suzhou in November 2015.
	Bulgaria, Croatia, Latvia, and Lithuania signed a MoU on "Port and Harbor Industrial Park Cooperation" at the "16+1 Summit" in Riga (Latvia) in November 2016.
	Belarus, Turkey, and Uzbekistan signed an "Agreement on international transportation and strategy coordination" with China at the BRF in Beijing in May 2017.
	A number of countries including Greece, Belarus, Serbia, Switzerland, and Turkey signed a Joint Initiative on "Strengthening Standards Cooperation and Building" at the Belt and Road Forum in Beijing in May 2017. Further Agreements on customs cooperation have been signed by Poland in June 2016 and by the Netherlands and Poland at the BRF in Beijing in May 2017.

Table 1: Recent Agreements and projects under the OBOR initiative in the eastern Mediterranean – Balkan region Source: (Steer Davies Gleave, 2018)

Fig. 1a: The central, land OBOR corridor through Uzbekistan, Iran Turkey to the Mediterranean - Balkan countries

Source: (Morgan Stanley, 2018)

Fig. 1b: The northern, land OBOR corridor through the Russian Federation to Europe.

Source: EU funded project NEAR2 (*https://cordis.europa.eu/project/id/314254/reporting*) – Presentations in the 3rd NEAR2 Workshop, Shanghai 2014.

The so called 17+1 initiative was started in 2012 by the Chinese government and 16 countries in the Balkans / Eastern Mediterranean region (they became 17 later when Greece also joined this initiative). It is aimed at initiating and developing cooperation in many fields but mainly on developing the major transport corridors in central and Eastern Europe. The aim is to provide adequate connections to the ports used as the modal transfer points in the maritime/land transport chains from China to Europe. On the basis of the 17+1 initiative, China financed major transport infrastructures in all countries of the area together with other bilateral cultural, touristic, and commercial activities. Between 2012 and 2017, Chinese

commerce with the countries of the 17+1 initiative doubled, reaching by 2017 a total value of approximately €65 billion, while the number of Chinese tourists to these countries tripled (Ferchen et al, 2018).

Financial means and instruments

The OBOR initiative is pursued via huge investments by the Chinese government, Chinese banks and companies. Between 2013 when the OBOR was announced until 2018, China has invested (through subsidies or loans) an estimated 200 billion dollars worldwide in the countries that participate in this initiative (OECD, 2018). It has been predicted that China's overall expenses over the lifetime of the OBOR/BRI could reach $1.2–1.3 trillion by 2027, though estimates on total investments can vary (Morgan Stanley, 2018). According to the same source, Chinese companies have invested $34 billion in overseas economic and trade cooperation zones in the OBOR connected countries and about 4 500 Chinese companies have set up businesses in these cooperation zones. They have paid $ 2.8 billion in taxes and fees to local governments and created more than 300 000 job openings for local people (Morgan Stanley, 2008).

These investments are channelled through two major Chinese lending banks, the China Development Bank (CDB) and the China Exim Bank (for Export-Import) which manages the country's foreign investment. By 2017, the China Exim had financed 1200 projects related to the BRI worth a total of €84 billion. Other Chinese state-owned banks that participate in the OBOR initiative are the Bank of China, the Industrial and Commercial Bank of China and the Agricultural Bank of China.

The main Chinese OBOR investments in the Mediterranean region are primarily through the 17+1 initiative and in the field of transport (highways, railways, airports and ports). The Balkan / Eastern Mediterranean area is probably the most pronounced area of Chinese investments in Europe. In November 2013, China, Serbia and Hungary signed a Memorandum of Understanding (MoU) for the construction of the Hungaro-Serbian High-Speed Railway (HSR), connecting Belgrade and Budapest. The link was part of the corridor that would facilitate transporting Chinese exports from Greek ports to European markets (Pavlićević, 2014)). China is pursuing other rail infrastructure projects along this corridor i.e., the railway route through North Macedonia and the upgraded north-south route in Serbia. In this way and given that the railway line from Piraeus to the northern borders of Greece is financed by the EU together with the Greek government, the whole railway axis from Piraeus to Budapest will have been completed when these projects are implemented.

OBOR investments in the Mediterranean – the case of Greece and the position of the EU

In the Mediterranean area, especially the eastern Mediterranean, the Chinese government has given priority to projects that develop the port infrastructures as well as those that connect these ports to Central and Eastern European countries. The port of Piraeus (also serving the capital city, Athens) was one of the first such ports. There, in 2008, COSCO acquired the concession to the containers piers II and III and started operations one year later. Eventually (in 2016), the same company acquired a majority stake (51%) of the company that owns and runs the port (with 26% more, as an option). In parallel to this first major investment, the Chinese government has also financed (under the 17+1 initiative and its several cooperation agreements) major road and rail infrastructures along the transport axes that connect Greece (and the port of Piraeus) with Bulgaria / Rumania on the one hand and with Serbia / Hungary on the other (see previous section).

Investments by COSCO from 2008 to 2016 for the improvement of infrastructures and equipment in the port of Piraeus are shown in Table 2. By August 2019, total investments had reached 800 million Euros . When COSCO acquired the 51% stake of the port of Piraeus, a resolution passed in the Greek Parliament in 2016 obliged the company to implement additional investments of

Figure 1c: The maritime OBOR corridor and its land / sea extensions in the Mediterranean area

Source: Author

Date of project	Amount(euros)	Aim of project
2008	50 million	30 years contract for the management of jetties no. II &III
From 2009	215 million	Upgrade of jetty II
From 2012	120 million	Construction of jetty III
From 2013	230 million	Upgrade of jetty II and Re-construction of jetty no. III
2016	280,5 million	Acquisition of the 51% of the Piraeus's shares

Table 2: Investments of COSCO in Piraeus in the period 2008-2016

approximately 600 million Euro[4] . The primary target of COSCO is to increase the annual capacity of the port of Piraeus to the level of 10 million TEU/year (TEU is the container equivalent unit). Already due to the investments made so far, the total number of containers moved through the port of Piraeus reached 5 million in 2018, a number that now ranks Piraeus as the first port in the Mediterranean.

As regards the impacts of these investments on employment and the wider economy in the region, there are notably an estimated 3000 new jobs that have been created directly through the COSCO investments (approximately 90% of them for Greek personnel) and about as many others for indirect employment. More importantly however are the wider developmental implications that seem to have been triggered by the port of Piraeus's transformation into the main maritime container node in the Mediterranean and Europe. These are the result of decisions made by private investors and large international companies (such as Samsung, ZTE, Huawei, DHL among others) to establish and develop value added activities in the Piraeus port region[5].

These decisions would not have been made if the port of Piraeus had not been functioning as a large-scale distribution center for containers. Despite the promising messages noted above from the Piraeus port developments, there remain some reservations and causes for concern. These are mainly related to wider reservations about the increased Chinese influence and political leverage that the official EU leadership sees in the OBOR Chinese policy (Van der Putten, 2016). The collective position of the EU towards the OBOR initiative is – at best - cautious. The European Commission has on several occasions characterized the OBOR initiative as a medium for the advancement of Chinese commercial and political influence which "in the long term could be to the detriment of the national interests of the EU member countries" (Van der Putten, 2016). A concise and officially adopted EU policy on behalf of the OBOR has not, however, been formally adopted. Instead, several EU documents and reports have been issued. These documents express the unofficial position of the EU towards the OBOR.

Perhaps the most holistic view of the EU's position was given in a recent report by the European Parliament (2018). This position is one of a critical stance; not against the OBOR initiative as a whole, but opposing some practices that the Chinese employ when investing in OBOR infrastructures. As an indicative presentation of the EU's position, the following five conditions are mentioned as those the EU sets to "recognize" and cooperate with the OBOR initiative:

1. Existence of reciprocity such that the financed infrastructures and the policies applied are recognized as being beneficial for both sides involved.

2. Establishment of transparent and objective procedures in the assignment of various construction contracts.

3. Equal access for both European and Chinese companies to the markets "opened" by the OBOR infrastructures. This is a serious point of friction for EU member countries as the assignment of the OBOR construction contracts are normally assigned to Chinese companies

4. Use of commonly agreed and accepted technical standards in the construction of the OBOR infrastructures. The EU generally demands that the OBOR investments are made in accordance with the same environmental and technical

[4]These are the investments concerning the development of new hotels, shopping malls, shipyards, a car terminal and new logistics warehouses. As it was to be expected this type of investments create competition to other existing similar ones and as a result, they have attracted some negative reactions mainly from local authorities and private business interests.

[5]During the years after the first acquisition of the two piers II and III by COSCO, the Greek economy went into a severe economic crisis that lasted a decade. During this decade the Greek economy contracted by almost 25%. It is expected that the secondary implications from the development of the port of Piraeus would have been greater should the national economy be in a healthier state. In Africa, this practice is much more pronounced and according to a recent survey there, by the McKinsey Company in 8 African countries, there were 1073 Chinese companies involved in OBOR projects employing only 44% of local employees while the rest are Chinese.

standards and guarantees under which its own investments are made.

5. Coordination of the OBOR investments in infrastructures with the investments and the corresponding services planned for related infrastructures by the EU.

As regards the last of the above five conditions, it should not be forgotten that the EU is developing a pan-European network of Transport corridors by all modes of transport - the Trans-European Transport Networks (TEN-Ts). As the OBOR provides funding for infrastructures that may not be of the same nature and priority with the plans and priorities of the TEN-Ts, it is conceivable that this can cause conflict with the policies of the EU. A characteristic example of this situation is the construction of the railway ring of Budapest. This project was promoted by the Hungarian government in order to enhance the country's rail network by by-passing Budapest. The project would reduce the transit time to Hungary for freight trains by as much as 4 days. The EU had not yet approved this project, due mainly to the environmental implications that would disrupt suburban areas of the city. This project was, however, very much in line with the OBOR objectives and priorities, and the Hungarian government eventually came to an agreement with China to finance it through the OBOR financing mechanisms. The project was financed by the China Development Bank with a total of €1.2 billion. As expected, this case was considered as "disruptive" by the European Commission which intervened, stating its objections to the financing of the specific project (Van der Putten, 2016).

Despite such objections, the EU has come to an understanding with China regarding the OBOR initiative. In September 2015 it signed a Memorandum of Understanding stating a number of principles to be followed in the development of OBOR in EU member countries. At the same time, the Commission developed an internet-based Connectivity Platform that aims to monitor the conformity of both sides to the above five principles and the development of commonly agreed activities. So far, however, the results remain unclear. Overall, it can be said that the EU has adopted a cautious attitude of "wait and see" in relation to the OBOR initiative.

Conclusion

The officially stated aims of the OBOR initiative as expressed by the Chinese government are to: free and facilitate commerce and investments; promote economic cooperation with the countries involved; coordinate policies on various global issues; create competencies and human resources interaction. In the Mediterranean region, the Belt and Road initiative has so far developed – perhaps by way of priority – a number of infrastructural investments that have most notably facilitated Chinese exports to central and eastern European countries and placed the region in one of the most successful OBOR transport corridors. These investments are made under the umbrella of the so called 17+1 initiative which is a multilateral inter-governmental agreement between 17 countries in the area and the Chinese government. There are more than 20 other bilateral or trilateral agreements under this umbrella 17+1 initiative and it can be said that, overall, the OBOR has created in the area of eastern Mediterranean and Balkan peninsula, a multilateral cooperation that is beneficial for both sides. On the one hand, countries of the region benefit from financing for major infrastructures not only in the transport sector but also in other sectors such as energy, tourism, etc., and on the other, China benefits by developing the major transport corridors it needs to access the markets of central and eastern Europe.

There are some reservations, however, that are expressed on behalf of the European Union and other western governments (including the US). They have to do with the wider political and economic repercussions foreseen by these governments that may result from increased exposure to Chinese influence and debt. They are also concerned about the eventual Chinese control of the main logistical supply chains at global level and to some extent other sectors of local economies such as commerce, energy and so on. Other problems that have been noted in relation to the Chinese OBOR projects' execution in the area of the Mediterranean are the following:

a) Inclusion of the new infrastructure projects in the approved list of investments without sufficient prior evaluation of their feasibility and justification.

b) Utilization of Chinese labor, materials and equipment by way of priority or exclusivity.

c) Large environmental footprint of the infrastructures especially in the energy sector.

d) Limited understanding of the functions of the local markets and tendency to non-compliance with the local labor legislation and procedures (e.g., as regards salaries and insurance issues of personnel).

e) High levels of borrowing for the recipient countries resulting from loans received in the process of OBOR infrastructure developments. These loans may solve short-term financing problems but could also result in "borrowing traps" in the long-term.

Based on the experience from the OBOR presence in Greece, a country at the forefront of the OBOR investments in the Mediterranean region, our final concluding remark would be that the overall results so far point to a "win-win" situation. Both sides have benefitted. For Greece, it is fair to say that the investments made by COSCO in the Piraeus port have benefitted both the port itself and the Greek economy overall. During the years since 2009 when the concession to COSCO started, the Piraeus port became one of the fastest growing ports in the world and is currently the no. 1 port in the Mediterranean. At the same time, COSCO's investments in infrastructure and equipment have made the port a focus of economic activity for the region, increasing local employment and creating value adding economic activities that would not have occurred there had the port remained under the old regime. It has also created valuable political capital for the government of Greece, which, while remaining a strong

member of the EU and the Eurozone, has improved its relations with China and other international Organisations and fora of Chinese influence. Meanwhile, the Chinese side has secured – as illustrated by the port of Piraeus - a hub of operations of global significance, whilst developing its relations with a member country of the EU that, given the right circumstances, stands to become the "bridge" between two worlds, that of the EU and Europe and that of the PRC and Asia.

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Keywords

Port of Piraeus, Sea-Land bridge, One-Belt-One-Road, combined transport, Greek transport.

Impact of Gender-Based Violence (GBV) on Women's Daily Travel Decisions: The Case Study of Cairo

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Abstract

Gender-based violence (GBV) on public transportation (PUT) is a global phenomenon that many women face daily. This phenomenon impacts women's mobility decisions, ranging from changing trip mode and route to cancelling the trip or even in some cases resigning from work. PUT is a vital component of urban life by providing the means of accessibility and mobility. Violence towards women on PUT often results in negative impacts on women's life, such as loss of opportunities, loss of accessibility, and extra financial burdens. In this research, we discuss the issue in the context of data from a survey collected recently in Cairo, Egypt.

Introduction

According to the World Bank population data, women represent almost 50% of the world's population (World Bank, (female % of total population), 2019). Women typically have specific travel patterns that differ from men, reflecting the different responsibilities they have to take in their daily life and the different mobility challenges they face. Women are culturally expected to spend more time fulfilling basic family obligations, such as domestic work, and elders and childcare (Blumen, 2000; Jiménez Ruiz & Moya Nicolás, 2017; Sánchez et al., 2014). The societal acceptance of unshared extra responsibilities has forced women to perform more complex, shorter, multichain, multi-purpose travel patterns when compared to men, especially in multi-person households (Fan, 2017; Patterson et al., 2005).

According to Patterson et al. (2005), in Montreal, Canada, women tend to perform more frequent, shorter trips compared to men. In Spain, the same female travel pattern holds, where women perform more trips regardless of their reason compared to men (Sánchez et al., 2014). Moreover, while females statistically take shorter trips to work, they spend the same travel time as men (Sánchez et al., 2014). A study by the International Transport Forum (ITF) in eight cities in Europe and Asia (Auckland, Dublin, Hanoi, Helsinki, Jakarta, Kuala Lumpur, Lisbon, Manila) revealed that women tend to travel shorter distance trips compared to men, travel more than men for non-work-related purposes, and those trips are more likely to take place outside the peak hours (Ng & Acker, 2018). Furthermore, the association of shorter trips with women was observed in the UK for all travel modes (Root et al., 2000). The same travel pattern is observed in Rajkot, India; however, an increase in women's income is linked to increased travel distance, but still shorter than their male counterparts (Mahadevia & Advani, 2016). Another important aspect of travel pattern is the mode choice, where women tend to prefer PUT over cars, such as the case of Ahmedabad, India (Mahadevia et al., 2012), Sweden (Polk, 2004), USA (Rosenbloom, 2006), and Germany (Vance & Iovanna, 2007).

Motivations and Study Design

One of the most difficult challenges women face, while using PUT, is GBV. GBV is not a location-specific problem. Both developing and developed cities suffer from GBV on PUT: cities like Paris, France, New York, US, London, UK, Tokyo, Japan, Moscow, Russia, Lima, Peru, New Delhi, India, and Jakarta, Indonesia, feature some of the world's most dangerous PUT systems for women, according to a survey performed by Thomson Reuters Foundation (CNN, 2014). The same survey states that Cairo, Egypt, is expected to be in the top five most dangerous systems; however, conducting a survey at the time of the study was not possible (CNN, 2014). Women experience different forms of GBV, according to the same survey in New York, Paris, Lima, New Delhi and Jakarta, half or more of the women have suffered verbal harassment. In Moscow, Jakarta, New Delhi and Tokyo, at least half of the women have suffered physical harassment. Table 1 shows the rates of incidence of GBV forms reported by different surveys for the aforementioned places. GBV against women on PUT influences the perception of safety. According to Ait Bihi Ouali et al., 2019 based on large scale customer satisfaction data from 2009 to 2018 from 28 world cities, there is a significant gender gap in the perception of safety, in which women are more likely to feel unsafe than men. Furthermore, more acts of violence tend to decrease the feeling of safety from women. The design and operation of PUT overlooking the gender differences provide a system that tends to hinder women's access to opportunities and might end up contributing to the social impacts caused by gender inequality.

In this study, we consider the EU definition of GBV, where it is defined as any act of violence directed towards any

person based on their gender. Women and girls are more likely to be subject to GBV, which likely results in physical, sexual, psychological, economic harm (What is gender-based violence? n.d.).
According to Quito's new urban agenda (UN Habitat III, 2016), cities should be a safe, healthy, inclusive, and secure environment that enables people to participate in urban life without the fear of violence. Cities should focus on enabling women and girls, who are more vulnerable targets for violence, in civil participation and civil rights without the loss of economic opportunities. Such a vision needs to be achieved by facilitating and providing efficient infrastructure and sustainable age and gender-responsive modes of transit. Considering the UN stated targets (UN Habitat III, 2016), there is a need to gain deep insights into the GBV phenomena on PUT to be able to produce evidence-based policies.

Place	Type of GBV	Incidence reported	Source
UK (London)	Sexual	11%	Transport for London (2015)
Brazil (São Paulo)	Sexual	49%	Datafolha (2014)
France	Sexual	87%	FNAUT (2016)
US (New York)	General harassment*	75%	Kaufman, Polack, and Campbell (2018)
Japan (Tokyo)	Sexual (groping)	25-50%**	Shibata (2020)
Russia (Moscow)	Physical	50%	Thomson Reuters Foundation (2014)
Peru (Lima)	Sexual	78%	Martinez, Mitnik, Salgado, Scholl, and Yañez-Pagans (2020)
India (New Delhi)	Sexual	58%	Madan and Nalla (2016)
Indonesia (Jakarta)	Sexual	64%	Kirchhoff et al. (2007)

* According to the survey, 75% of female responses indicated some form of harassment or theft while using public transportation.
** The study conducted a survey among students and approximately 25% of women have experienced groping in the past three years, it also compares with other studies in which the share varies up to 50%.

Table 1: – GBV against women reported by different survey studies

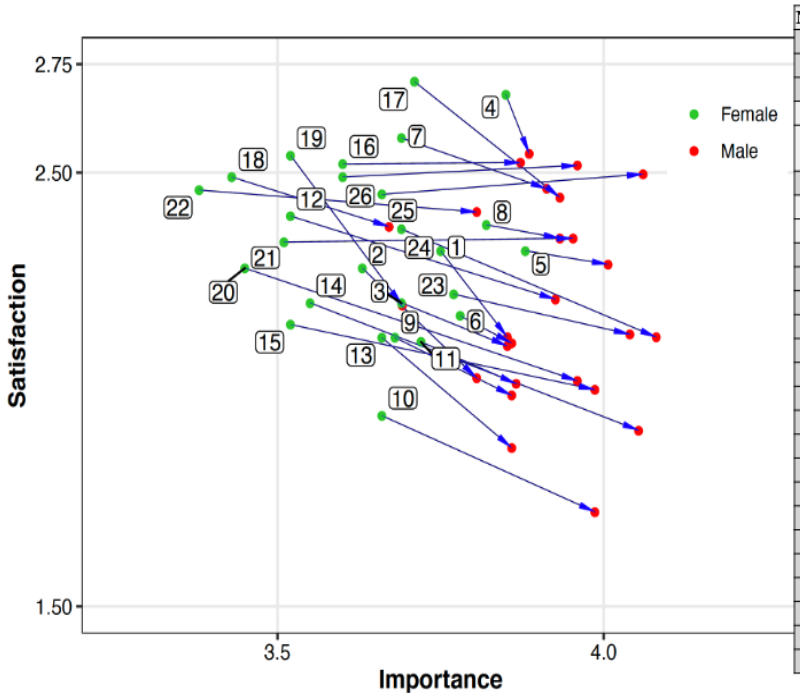
A two-stage survey is conducted in Cairo, Egypt. Cairo is the capital of Egypt, and the most populous city in both the Middle East and North Africa (MENA) and the Mediterranean areas, one of the world's ten Megacities with a total population of 20 million inhabitants (United Nations Department of Economic and Social Affairs, 2018). Like other southern megacities Cairo suffers from the problems of over-crowdedness, daily traffic congestions, and insufficient public transportation supply (El-Hamamsy, 1998). The main goals of these surveys are to investigate the phenomenon of GBV in PUT, to evaluate the factors impacting users' satisfaction from PUT, and to understand the different problems associated with GBV from the different users' (and especially female's) perspective. This survey aims to assist planners and decision-makers to take the required measures to reduce and eventually eliminate the GBV phenomenon and increase the users' satisfaction from PUT. The proposed analysis of the survey will be done using two methods: I) Survey sample data will be analysed to understand the different travel patterns and their association with the different demographics, II) Behavioural models will be specified and estimated to investigate the factors affecting travel decisions. The current paper relies mainly on simple analytics from the survey responses for the derivation of conclusions; more detailed model explorations are planned as next stages of this analysis.

Methodology

The first stage of the survey was a pilot project that was conducted in Cairo in June and July 2019. The pilot consisted of three main parts. The first part investigated the different sociodemographic attributes of the interviewee. The second part investigated the general travel behaviour, and the last part explored the different PUT service characteristics that affect the user satisfaction, and their importance from the users' point of view following the guidelines of the handbook for measuring customer satisfaction and service quality (TRB, 1999) and similar to Tyrinopoulos and Antoniou (2008). The evaluation of importance and satisfaction was done on a Likert scale of five points, where one corresponds to completely dissatisfied, five to completely satisfied, while three denotes indifferent. The questionnaire was implemented using open software (Limesurvey.com). A total of 214 complete responses were collected. This analysis has the objective of understating the interplay of perceived satisfaction and importance and how different are the results from the gender perspective. The comparison between male and female travellers enables grasping how the service is perceived differently. A subsequent Factor Analysis (FA) is performed with and without gender perspective to analyse the attribute loadings for the main variables related to importance and satisfaction.

The second stage survey (which is planned for the second half of 2020) will target a sample size of 1000 respondents, and the results of this pilot study will guide its design. The second survey will be collected through face-to-face interviews targeting only female PUT users in different locations around PUT hubs and locations of harassment incidents (reported using the available digital platform for harassment incidents map, Harassmap.org). This survey will explore additional GBV indicators related to different categories of harassment, such as physical, verbal, and sexual harassment.

Pilot Results



NO#	Description
1	Cleanliness on board
2	Vehicle Crowd level
3	Vehicles Modernity
4	Safety against theft on board
5	Safety against Female harassment on board
6	Cleanliness stops
7	Safety against theft at stops
8	Safety against Female harassment at stops
9	General Condition stops
10	Accessibility to stops
11	Percentage of sheltered stops
12	Waiting time at stops off peak
13	Waiting time at stops during peak hours
14	Service punctuality
15	Service frequency
16	Service provision
17	Travel speed
18	Walk distance to the next transfer
19	Waiting time during transfer
20	Information Apps availability
21	Ticket price
22	Ticket type availability
23	Staff behavior
24	Driving style
25	Network coverage
26	Distance between last stop and destination

Fig. 1: Importance vs. satisfaction for PUT characteristics

Importance	All	Male	Female
Security of female users against harassment	0,584	--	0,669
Security of female users against harassment at stops	0,734	0,732	0,776
Satisfaction			
Security of female users against harassment	0,71	0,614	0,825
Security of female users against harassment at stops	0,79	0,789	0,849

Table 2: Selected factor loadings for variables of interest (empty cell indicates loading lower than 0,4)

Fig. 1 outlines the importance and satisfaction analysis of the results of the first survey, based only on the average score per gender and it shows that the average satisfaction score is in general very low. In fact, in a scale from one to five, the average satisfaction score is less than 2.5 for all users, except in 5 attributes (4: safety against theft on board, 7: Safety against theft at stops, 16: Service provision, 17: Travel speed, 19: Waiting time during transfer), where female users' average satisfaction score is more than 2.5 points. Another pattern that can be inferred from Fig. 1 is that men tend to evaluate the various attributes as more important compared to female counterparts, while they are also less satisfied. It is indeed surprising that this pattern unexpectedly holds in points (4: safety against theft on board, 5: Safety against female harassment on board, 7: Safety against theft at stops, 8: Safety against female harassment at stops). The previous pattern changes slightly in three attributes, in which male respondents seem more satisfied than female respondents: 16: service provision hours, 25: geographic network coverage, and 26: distance from last stop and final destinations. One explanation to the fact that women in general seem more satisfied with PUT services is that they are more reliant on them, as they have fewer alternatives (e.g., driving license: 40% for female vs. 79% for male respondents, access to car: 43% for female vs. 82% for male respondents in our sample).

In order to explore more specifically the difference in perceptions between male and female respondents with respect to the questions about female harassment, we performed several different sets of factor analyses (Washington et al., 2020), based on the following dimensions:

- Importance; satisfaction.
- Entire sample; female respondents only; male respondents only.

In Table 2 we summarize the obtained factor loadings for each of the main variables of interest. In fact, it is confirmed that the loadings of each of the variables are higher for female respondents, than male respondents.

Discussion

GBV is a significant issue, affecting many cities around the world. In this research, we use data from an online survey, conducted in Cairo, Egypt, to gain insight into the issue. The findings from this study are being used to develop a larger, face-to-face survey, to be conducted in

the Cairo PUT system. The authors are aware of the limitations of the current preliminary study, including the sample size and potential bias, due to the opportunistic data collection. However, we believe that they provide some initial insights and add to the literature.

The full survey will enable the development of suitable econometric models (such as Integrated Choice and Latent variable models), that will be used to determine more factors affecting women's daily travel decisions, and to understand women's cognitive perception of safety and GBV, and their impact on travel behaviour. Women's perception of the different dimensions of GBV, and personal safety during the different trip phases will be evaluated in parallel with the number, severity, and locations of the incidents they have faced to investigate the impact of different dimensions of the incidents on women's perception, and the resulting change in daily travel decisions. Current survey data from literature suggests that different women harassment experiences also vary according to location, therefore indicators for different types of GBV (e.g., sexual, physical and verbal harassment) are going to be explored to analyse the impact of different GBV experiences on women's travel behaviour.

Understanding the factors affecting women's travel decisions and cognitive travel behaviour, perception of safety, and perception of harassment severity will enable a better grasp not only on the travel behaviour of women, but also the extent of GBV influences. The results will provide planners and decision-makers with useful knowledge to address underlying issues affecting the harassment phenomenon of GBV, not only for transport in cities of the Mediterranean region, but also in many other regions in the world, where similar issues remain.

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Keywords

Egypt, Public transportation, Travel pattern, Gender-based violence (GBV)

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Defining the Objectives of a National Energy Policy for Transport

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Abstract

This paper examines the objectives and the main elements of a national energy policy for transport based on the experience of such plans in the six Mediterranean EU-member countries. These plans define the energy and Green House Gas emission reduction objectives in the field of Transport which are adopted by each country and provide a guideline for future transport policies. They are strategic energy management plans which have to be aligned with the overall energy plans of the country that define the objectives for reducing the total energy consumption and developing new renewable sources of energy. Furthermore, the paper refers to the potential energy savings and the use of alternative fuels in Transport for the case of other Mediterranean region countries and defines the main pillars of a national strategic plan for energy policy for the Transport sector.

Introduction: The general framework

All EU member countries are obliged to follow the central policies of the Union as regards the decarbonisation of transport that calls for – among other measures – the reduction and eventual elimination of carbon fuels. A great number of legislative directives have been introduced for reducing energy demand and eliminating Green House Gases (GHG emissions in the Transport sector). The policies were aligned with the EU's flagship initiative "Resource-efficient Europe" set up by the "Europe 2020 strategy" and the "Energy efficiency plan 2011" within which an ultimate reduction (relative to 1990 levels) of GHG emissions of up to 95% by 2050 was targeted. A milestone in the process of decarbonisation was the 2016 strategy for low emission mobility (EC, 2016) and the three packages of the so-called "Europe on the move" (EC, 2017a; EC, 2017b; EC, 2018). These packages came in response to the UN COP21 climate conference in Paris in 2015 but were also due to the realization that the goals set by the previous EU directives and decisions (including the 2011 Transport white paper) were not sufficient to deliver the UN COP21 decisions. The United Nations' Quito 2016 Agreement on the New Urban Agenda and the Sustainable Development Goals have set the framework and made reference to national urban policies to facilitate measures and to adopt approaches for a "smart-city" hosting clean energy technologies.

The Mediterranean EU-member countries are six: Spain, France, Italy, Malta, Greece, and Cyprus. In response to the above EU initiatives, all of the aforementioned countries had to define their own energy and GHG emission reduction plans by 31 December 2019. These plans, though within the overall guidelines and objectives of the EU policies, must also pay due respect to their own national goals and economic conditions. Currently, all six Mediterranean members of the EU have developed strategic energy management plans that set the targets for reducing their total energy consumption, develop new renewable sources of energy, and form strategies for specific sectors including the Transport sector.

This article is concerned with the potential for energy savings and the use of alternative fuels in the transport sector in the case of the Mediterranean region countries, with special reference to the Mediterranean EU member countries. It defines the main pillars of a national strategic plan for energy policy for the transport sector and extends this consideration to a wider context by presenting actual cases.

Current Energy Policy Status

Mediterranean countries account for 7% of world population and they consume about 8% of the world's primary energy demand. Primary energy demand in the Mediterranean is expected to grow substantially over the next 25 years spurred by sustained population (+105 million compared to 2013) and economic growth (+2.3% of GDP per year on average) in the region (ADEME et al, 2016) The EU member countries account for a high percentage of these figures (i.e., on average approximately 80%). Compared to the very strict and ambitious EU member countries' energy consumption targets, the prospects for the energy consumption outlook for the countries of the Mediterranean area as a whole are considerably less ambitious. In a recent Mediterranean Energy Scenario formulation exercise that covered 25 Mediterranean countries the business-as-usual scenario forecasts a situation that would evolve critically on all counts over the next 25 years, doubling energy demand and tripling electricity consumption, soaring infrastructure and import bills for fossil fuels, and a critical rise in carbon emissions (+45%). Such a scenario, based essentially on fossil fuels, would put further strain on the environment and exacerbate geopolitical tensions in the region. A change of energy trajectory is therefore necessary for all Mediterranean countries to help change current trends and to increase efforts promoting energy efficiency and renewable energies.

An energy transition scenario for the countries of the Mediterranean region was developed in 2016 by the three organisations: *Agence de l'environnement et de la maîtrise de l'énergie – ADEME*, Mediterranean Association of National Agencies for Energy management (MEDENER) and the *Observatoire méditerranéen de l'énergie (OME).* In this scenario, it was foreseen that by 2040 the Mediterranean region countries should achieve the following goals (ADEME et al, 2016):

- ✓ 30% reduction in energy demand
- ✓ 23% reduction in final energy consumption
- ✓ 27% share of renewables in the energy mix of the region, with renewables becoming the primary source of electricity production
- ✓ Avoiding an additional 200 GW of fossil-fuel based electricity production infrastructure
- ✓ Reduction by 38% in CO2 emissions.

Compared to the above goals, those of the EU-member Mediterranean countries are much more ambitious. In a summary form they are:

- For 2020: 20% reduction in GHG emissions with respect to 1990; 20% of Renewable Energy in energy consumption; 20% reduction in primary energy consumption compared to a baseline projection. A comprehensive legislative package was introduced in 2008 to implement these targets, including mandatory obligations for renewables, energy efficiency, and the application of the Emissions Trading System (ETS), as well as eco-design standards for appliances and CO2 standards for vehicles.
- For 2030: 45% to 46% reduction in GHG emissions with respect to 1990; 32% of Renewables in gross final energy consumption; 32.5% reduction in primary energy consumption compared to a baseline projection. These were determined in 2018 based on the 2016 EC proposal for a comprehensive policy package, Clean Energy for all Europeans. The EU also started implementation of a Market Stability Reserve for the ETS which has already pushed carbon prices significantly upwards in 2018.
- For 2050: Originally a target of an 80% to 95% reduction in GHG emissions with respect to 1990 was set for the EU as a whole, which for the transport sector meant a reduction of 60%. This reduction was later increased to 90% by the Mid-Century Strategy Policy proposal by the EC, put forward at the end 2018. After the new Commission took office (at the end of 2019), a new "green deal vision" was officially declared which involved a 100% reduction: making European transport totally carbon free by 2050.

Example of an Energy National Plan – The Case of Greece

Most of the necessary legislation is already put in place in EU member countries to a considerable degree and it is characteristic that even for a relatively small and economically troubled EU member country (Greece), the EU's energy transition targets are already part of the national legislation. Due to its economic troubles during the period 2010-2018, Greece experienced a reduction in gasoline consumption of approximately 30% during the five years 2014 – 2018, while diesel consumption has faced a generally upward trend after 2013. In the railways, only 22% of the network was electrified by 2019, placing Greece at the lowest European position of electrified railways with obvious adverse effects in carbon fuels consumption in the transport sector. For maritime transport, crude oil usage showed an increasing trend over diesel, which is also the main maritime fuel for the rest of the EU (YPEKA, 2009). The National Plan for Energy and the Climate (ESEK) for Greece, which was officially adopted on 3rd January 2020, recognizes these facts, and is creating concrete objectives as well as a roadmap (based on scenarios tested by a comprehensive modelling exercise) for the full transformation of the energy sector.
Among other provisions, the plan foresees a substantial rise in renewables for electricity generation and transport fuels. Utilizing the sun and the air for electricity production is among the top priorities of the plan, while for transport it adopts all of the aforementioned targets from the EU's guidelines. It also foresees the closure of all coal based electric power production in the country by 2028 – and this date has already been brought forward to 2023 by a recent decision of the government. Greece already produces considerable amounts of alternative fuels to a level of approximately 10%. More specifically:

- *Biodiesel*. The biodiesel production network in the Greek market consists of 16 producers and 5 importers (Government Gazette of the Hellenic Republic, 2020).
- *Compressed Natural Gas (CNG)*. The Public Gas Company is DEPA and its FISIKON gas network is the main CNG distribution in the country. Currently, 14 CNG refueling stations are located in Greece, mainly in large cities, with another 7 planned to be in operation by 2020 (FISIKON, 2020).
- *Liquefied Petroleum Gas (LPG)*. Also known as Autogas, it is the most widely spread gas fuel in Greece used for transport activities with a large number of available refueling stations (more than 1000 all over the country).
- *Electric energy*. Currently there are approximately 140 charging points located in several spots in Greece supported either by FORTISIS, or Blink Europe (FORTISIS, 2020; Blink Europe, 2020), or by form of pilot installations as for example from the Hellenic Petroleum (HELPE, 2017). According to the Hellenic Institute of Electric Vehicles there are several spots existing along the national

highways, but also in a number of public open areas and parking spaces, such as Polis Park.

- *Biogas.* According to the European Biogas Association (2018), Greece has 37 biogas production plants with all produced volumes to be used for generating electric energy

- *Liquefied Natural Gas (LNG).* An LNG storage facility is already in operation on the island of Revithousa for hosting the imported volumes of gas. There are also two more installations planned and under construction in the north of the country (Alexandroupolis area).

Nevertheless, due to the absence of LNG refueling stations as well as appropriate vehicles, the fuel is not currently used for transport activities in Greece.

Defining goals and objectives of a National Transport Energy Policy

The reduction of CO2 emissions from the transport sector can be achieved through a combination of technical alternatives regarding the engine and the fuel used but also the ways they are utilized and operated. The identification, assessment, and implementation paths for the various alternative actions and policies should be defined within a National Transport Energy Strategic Plan. This plan should be part of a more general Energy and Environmental Policy Plan of the country as a whole that should also be formulated.

The first and foremost ingredient of a National Transport Energy Strategic Plan would be the delineation of the objectives and goals of the national policy in relation to a number of parameters that will define the energy mix for the transport sector in the coming 30 years or so (until 2050). These parameters include:

A. National targets for the reduction in transport related GHG emissions in all transport sectors. For the EU member countries in the region, these targets would be largely set by the EU's policies and legislation already in place as mentioned in the beginning of this article. For the other countries in the region, each government should, by 2022, define these targets within the so-called Nationally Determined Contributions – NDCs that have to be defined as part of the COP21 Paris Agreement of 2015.

B. The national targets for the specific energy mix for the energy carriers in the transport sector that would achieve these emissions reductions.

C. The targets and objectives regarding the fleet mix: i.e. the types of vehicles that will be allowed to circulate in the country. Some European countries are already in the process of proposing a ban on vehicles with internal combustion engines in urban areas after 2040.

All Mediterranean countries must make an intensive effort to improve their energy resources and develop long-term plans, not only in the transport sector. In defining the main contents of a national transport energy plan, the following guidelines are given concerning the main ingredients of such a plan based on previous EU member countries experience.

The new developed plans will provide motives for the use of renewable and alternative fuels. The corresponding EU guidelines and legislation can form a good example for these plans. For the Transport sector the use of hybrid and electrical cars is to be incentivized and promoted by all measures feasible in each country. Measures should also be considered for increasing the use of vehicles supplied by fuels containing larger amounts of biofuels or only biofuels as well as the replacement of older vehicles with new (energy efficient) ones. Also, the plans should provide encouragement in the use of LNG or CNG as fuels in transport, especially in the maritime.

Boosting national production and the use of "clean" fuels in transport is very important for the techno-economic opportunities of a country as well as for the transformation of the cities into "resourceful cities" (Mega, 2002). To reach the set goals and prospects, the country and especially the responsible government ministries should take action to motivate local authorities in implementing measures in cooperation with the private sector. Finally, the major challenge of implementing the energy reduction policies is the clear understanding of the consumer needs and their market behavior whilst managing their social dimensions.

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Keywords

Energy, transport energy, energy plan, Mediterranean countries, Greece

EKISTICS GRID

Created by Doxiadis as a Thinking Tool for Constructive Action, for Focusing Discussion, Classifying, Cataloguing, inspired by Geddes *Notation of Life* and *CIAM Grid*, with the added dimension of Ekistics Population Scale

Kinds of Human Settlements:			Temporary		Villages		Polises		Metropolises		Megalopolises		National Systems	International Systems	
Community Class				**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
Ekistic Unit	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Kinetic Field	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Name of Unit	**anthropos** (human being)	**room**	**house**	**house group** (dwelling group)	**small neighbourhood**	**neighbourhood** or village	**small polis** (town or urban ecovillage**)**	**polis** (town or suburb)	**small metropolis** (large city)	**metropolis**	**small megalopolis** (conurbation)	**megalopolis**	**small eperopolis** (urbanized region)	**eperopolis**	**ecumenopolis**
NATURE - Habitat Foundations															
ANTHROPOS - Physiological/biological and social-psychological needs and constraints															
SOCIETY - Social, economic, governance and political organization															
SHELLS - the envelopes that contain settlement functions															
NETWORKS - Node-to-node systems and flows of resources, waste, data, people and information															
SYNTHESIS - Human Settlements Combined, applied, coherent design and knowledge															
EPS (Ekistics Population Scale) Doxiadis rounded figures	**1**	**2**	**5**	**40**	**250**	**1.5 T**	**10 T**	**75 T**	**500 T**	**4 M**	**25 M**	**150 M**	**1,000M**	**7,500 M**	**50.000 M**
Core Population calculated at log 7	**1**	**2**	**5**	**35**	**245**	**1.7 T**	**12 T**	**84 T**	**558 T**	**4 M**	**29 M**	**202 M**	**1,412M**	**9,886 M**	**69 B**
Population Range			3-15	16-100	101-750	751-5000	5-30 T	30-200 T	200-1,500 T	1.5 -10 M	10 - 75 M	75 - 500 M	500 - 3000 M	3 - 20 B	> 20 B
	T = Thousand; M = Million; B = Billion (thousand million). Each unit has 7 times the population of the previous unit, based on Christaller's hexagon theory.														
	Kinetic Fields a-g are the distances anthropos can walk for a given period: **A-H** are when using draft animals or vehicles.														
	Adapted by Catharine Nagashima for Ekistics and the New Habitat 2020/05/07														


Ekistics