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URBAN TRAVEL BEHAVIOR AND SOCIO-SPATIAL ISSUES IN THE MENA REGION: WHAT DO WE KNOW?

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Unlike literature and studies coming from high-income or Western countries, the existing conducted on the Middle East and North Africa fail to draw a nearly complete image of the characteristics of passenger travel behaviors in the urban areas of the region. This gap necessitates a holistic review of the previous studies and comparing their results of those of the international findings. This paper summarizes the status of urban travel behavior studies on the MENA region under eight categories of socio-economics, land use, perceptions and attitudes, urban sprawl, neighborhood design, public transportation use, active mobility, and new technologies and concepts. Descriptive literature review and desk research depicts both lack of research results or data and differences between the behaviors in the MENA region and the Western countries. Moreover, based on the background review, this paper provides a list of recommendations for having more sustainable mobility in the MENA region.

Keywords: Urban transportation planning, travel behavior, land use planning, urban form, MENA region

1. Introduction

With the vast increase of the population during the past century, major cities all around the world and especially in the Middle East and North Africa (MENA) region, faced transportation issues (Delatte *et al.*, 2018). The increasing urban travel demand lead to a fast growth of traffic, affecting the well-being of the citizens. On the large scale, urban travel plays a major role in both social and economic levels of the society. Therefore, there is an urgent need to come up with transport strategies balanced with urban development (Errigo & Tesoriere, 2018). The main problem is that citizens in the MENA region are dealing with a lot of congestion and pollution problems that affect the region socially and economically. This paper attempts to clarify the status of urban travel behavior in connection with land use and socio-economics in the MENA region. Various strong arguments support the effect of different land-use patterns in terms of density, urban size, mixing and frequency of public transport alternatives (Hanly & Dargay, 2003), on influencing the conditions for various transport systems and travel patterns (Hanly & Dargay, 2003; Lundqvist, 2003). Internationally, the literature concentrating on the impact of urban land use on the travel behavior has grown rapidly in the western countries, especially North America (Masoumi, 2017). However, this topic has gained relatively little attention in developing countries, where the research in the MENA region is limited in terms of number and depth, except few countries that focused on the topic like Iran, Egypt and Turkey (Masoumi, 2017; 2018). Whereas, the interrelation between land use and transport behavior should be further looked in the MENA region and seen in the light of emerging policies for sustainability, knowing that an appropriate land use program can significantly reduce the vehicle ownership and travel distance (Lundqvist, 2003; Litman, 2010). According to the intensive amount of fossil fuels produced by transportation that emits greenhouse gases, it made the transportation sector a main contributor in the global warming. (WRI, 2012). As car ownership is increasing, the environmental impacts will increase too.

One of the main factors that affect urban travel behaviors and perceptions of people is land use; and specifically land use mix that is directly related to road network configuration, accessibility, walkability, and mobility. Urban travel behavior can be affected when the urban form and land use is designed in a mono centric way, in which all the facilities are placed at the center of the capital (for example), and the other cities do not have facilities, transportation infrastructure, and planned or unplanned urban sprawl; this will cause the dependence on mobility and decreased accessibility and walkability and thus will increase the urban travel distances and traffic congestion in cities.

The phenomenon of urban sprawl has earned momentum at the end of the last century, assisted by the progression of technology, particularly with the rise of mass produced vehicles, houses and highway structures. Urban sprawl is frequently defined as the “spreading of a city and its suburbs over rural land at the fringe of an urban area” (Patacchini *et al.*, 2009). In the MENA region, the population has grown rapidly over the past few decades, quicker than all regions, except for Sub-Saharan Africa. This rise in population has been accompanied by high rates of urbanization, increasing at an average yearly rate of two percent (Farzaneh, 2001). By now, eight of the region’s cities are populated by more than three million citizens; Tehran, Cairo, and Istanbul even have more than ten million (Bjerde, 2008). The reasons behind the sprawl in the MENA region vary greatly from those behind the sprawl in USA and Europe that was impacted mainly by income increase, decreased commute cost, crime rates, and the percentage of ethnic minorities in cities (Patacchini *et al.*, 2009). In the MENA region, it was primarily the outcome of politic and economic developments due to the wars that prevailed such as the Arab-Israeli wars (Keulertz *et al.*, 2016).

The main issue that needs attention is the lack of evaluation of urban development procedures and outcomes in the MENA region. The planning organizations and individuals are not aware of the intensity of the sprawl in the cities. The majority of cities in the MENA region have weak infrastructure and insufficient mass transportation systems since the transit networks had been originally created for a smaller population. Governments have failed to keep the pace with recent population growth by neglecting to invest in public transportation. Subsequently, the high rise in usage of private vehicles has resulted in congestion, air pollution, and high accident rates. Despite the fact that car ownership rates in the MENA region are considered relatively low in comparison to other regions in the world, those rates are quickly growing and some cities have even reached similar levels to those in Western Europe. To date, certain MENA municipalities lack institutional structures and professional resources to organize public transportation in an effectual and accessible manner (Enzelberger & Kahramane, 2015). All this diminishes quality of life as well as economic and social opportunities, while greatly affecting the cities’ competitiveness and economic growth (El Naggar, 2009).

With skyrocketing urbanization, urban mobility challenges have been increasing exponentially. ‘Urban mobility’ is classified under collective (public transit), individual (walking, cycling, car) or freight (Contois, Rodrigue, & Slack, 2017). More specifically, in the MENA region, the need to address congestion, air pollution, and energy consumption resulting from transportation is harsher than ever (Masoumi *et al.*, 2019). This makes planning for sustainable mobility a priority. In light of this, neighborhood design in the MENA has shifted from being a ‘basic planning unit’ to an area where sustainable planning principles can be implemented (Ibrahim & Masoumi, 2018; Masoumi, 2019).

Walking, the most basic urban transport mode for all short-to-medium length travels, as well as bicycling, play a fundamental role in urban transport, especially in most low- and middle-income countries throughout the MENA region (Diab *et al.*, 2013, p. 11). Non-Motorized transport is often a key element of successfully encouraging clean urban transport. It can be a very attractive mode of transport for relatively short distances, which make up the largest share of trips in cities. The key to reversing the trend towards more private vehicle use is making walking and cycling attractive, with improving public transport (UNFCCC, CNCT, 2010). In 2015, urban planners in the MENA have been urged to develop cities built around mass non-motorized transport rather than expand infrastructures to accommodate the continued buildup of private vehicles on the region’s roads. (TradeArabia, 2015). Despite the prevalence of this mode share, interests of non-motorized travelers tend to be thoroughly neglected in investment, network management and infrastructure maintenance. Without secure, continuous, and high-quality infrastructure, people will often refrain from walking and bicycle travel (Diab *et al.*, 2013, p. 14)

For most countries in the MENA region, the transportation sector is considered to be in an ascending development pace, this sector is central to their main objectives of accelerating economic development through export led growth, creating jobs, and reducing vulnerability and exclusion (Yamoury, 2010). Having that said, it is also a key to their regional integration by spreading a web of public transportation, which is also vital to improve the quality of life and reducing poverty alongside pollution that takes a major part in the MENA country’s priorities (Kaysi & Chaaban, 2015). Sustainable

transportation is actually related to the triple bottom lines namely, economic, social and environmental pillars of sustainability. Accordingly, by increasing public transportation infrastructure in the MENA region, a reduction can occur in urban transport emissions increasing the level of mobility and accessibility (Gettani, 2015), alongside improving their level of sustainability. In the light of the above, many economic, social and environmental problems worldwide are associated with urban areas that are currently hosting more than 50% of the population (Marzouk & Azab, 2017). With a growing world population and ongoing urbanization, the share of people living in the cities will rise considerably in the next decades. Thus, sustainability in urban transport becomes increasingly important.

Public transportation is considered to be a main solution tool in implementing sustainable transportation, and this is embedded within the culture of the country and within the infrastructure and lifestyle of the community where these facilities should be available as a first available option for the users (Saidi *et al.*, 2018). Under current “business as usual” scenarios, emissions are expected to rise further in supreme terms, highlighting the criticality of addressing unsustainable forms of transport and finding prompt solutions to solve this issue (WHO, 2011). In the Arab world, as well as the rest of the world, efforts have been placed to tackle the issue. Work done in the US and Europe exceeds that of the Arab world and the MENA region, and their efforts have been successful, and have thus succeeded in reducing GHG emissions which leave us to a main question.

The motorization level has been increasing in both developed and developing countries (Comtois *et al.*, 2013; Hebel and Wołek, 2017). This has led to many problems such as congestion, traffic accidents, insufficient parking spaces, pollution, higher energy prices, etc. (Asdrubali & Baldinelli, 2005; Buliung, Bui, and Lanyon, 2011; Comtois, Rodrigue, and Slack, 2013; Hebel and Wołek, 2017). To address this problem, strategies such as carpooling, car sharing, and bike sharing have emerged especially after technological advancements (Asdrubali & Baldinelli, 2005; Comtois *et al.*, 2013; Faroqi & Sadeghi-Niaraki, 2014; Keyvanfar *et al.*, 2018; Abolhassania *et al.*, 2019). The applications of new technologies and concepts in easing the urban transportation in the MENA region have also been discussed in this study.

As mentioned above, the geographical focus of this paper is the MENA region, which can have different definitions coming from different sources. The definition of MENA which is used in this paper is derived from the World Bank (Dasgupta & Nabli, 2003) in addition to Turkey. This definition includes countries limited by the eastern border of Iran through Morocco. Due to socio-cultural similarities, Turkey has also been added to this definition by this paper.

This paper will be composed of four main sections, the introduction, the literature review, discussion and conclusion. The literature, responding to the paper’s objectives, aims to examine the effect of the land use on the urban travel behavior internationally, in Western countries, then in the MENA region. While the discussion, by responding to another objective aims to compare the findings of both areas and propose some recommendations for the future urban planning policies that should take place in the MENA region, based on some policies applied in the western countries. The last section will be concluding the discussed ideas and proposing future research recommendations for the MENA researches.

2. Methodology

This manuscript targets a general objective. It is aimed to clarify the most dominant urban passenger travel behavior issues related to land use, socio-economics, culture (reflected by attitudes, perceptions, and lifestyles), infrastructure, and technology in the MENA region and compare these issues with the international studies and trends in the Western countries. For this purpose, the following research questions have been focused.

1. Why are urban travel behaviors problematic in the MENA region, and what are their effects on the socioeconomic level?
2. How do the Land use patterns, urban sprawl, and street connectivity interact with urban travel behavior in the MENA region? How have sprawl issues been addressed by the policymakers of the MENA region?
3. How are the attitudes regarding the urban travel and mode of transportation in the MENA region?
4. What is the status of active mobility, public transit use and ride sharing (as a main aspect of new technologies and concepts in urban transport) in the MENA region?

In general, the paper has a comparative nature, focused on the similarities and differences between urban travel behaviors, urban planning policies, and urban form in the Western countries and the MENA region. Following literature review and discussion, some recommendations are provided at the end of the manuscript.

The study presents a narrative review using multiple sources picked from international studies or studies on the cities of the MENA region. Since the studies on the travel behaviors in the MENA countries are not so numerous, no selection criteria were needed. The studies on high-income countries were selected where necessary. The topics related to urban travel behavior were categorized into eight pillars of socioeconomics and urban travel behaviors, “land use and urban travel behavior, people’s perceptions attitudes and decisions regarding urban travels, urban sprawl and the relations with urban transportation, neighborhood design and mobility, active mobility, public transportation in relation with environmental pollutions, and finally, new technologies and concepts.

3. Review of Interrelations of Travel Behavior and Socio-Spatial Issues in the MENA

3.1. Socioeconomics and Urban Travel Behaviors

The expansion of the population was accompanied by a rise in the number of travelers, the number of personalized vehicles and the distances travelled by citizens individually (Antipova, 2018). In fact, urban travel behaviors promoted deep changes in the structure of the countries, increasing the abundance of urban sprawl with damaging consequences like accidents, longer trips, pollution etc. (Errigo *et al.*, 2018). In the MENA region especially, most adults go to work with their personal cars and many families have multiple cars owned each by a different family member. Another problem reported in the MENA region would be that most countries of this region are struggling financial problems and thus cannot opt for large public transportation fleet (Balchin, 2013). This leads to an overload of vehicles on the streets (Fig. 4). Researchers in the field of urban planning tackled this issue by shedding light on the importance of active travel alternatives that include walking and cycling as substitutes of motorized vehicles. These are regarded as “green alternatives” that do not only decrease traffic, but also help the environment by minimizing pollution caused by vehicles’ fuel burning and carbon dioxide (CO₂) release. These active travel ways are mostly practiced in Europe including Germany, Netherlands and Denmark (Antipova, 2018). In the MENA region, the situation of urban mobility is very much related to the political directions and legislation. For instance, Errigo *et al.*, (2018) conducted a study aimed at discussing urban travel behaviors in different Saudi Arabia cities including Riyadh, Dammam and Buraydah. They found that transport systems are related to urban approaches as well as financial support and political programs. In fact, on the political level, women were not allowed to drive until 2018 in Saudi Arabia. Consequently, they relied on other transport services like buses or cabs private for women which further increased the required number of vehicles.

Moreover, reliable data on the affective factors on transport behavior is missing, except for some studies in Iran, Turkey, and Egypt, very few related efforts in the region seem to provide a higher quality of data. Studies on Iranian cities show that the travel behavior is mainly affected by the socio-economic factors (Masoumi, 2018; Soltani & Esmacili-Ivaki, 2011). For example, only 5 to 7.5 percent of people have chosen their residential location based on mobility requirements in the observed neighborhoods. Where economic needs like the housing price are main reasons for residential self-selection. This is in contrary with the findings about the 28 western countries like the U.S., U.K. and Germany (Masoumi, 2013).

As a summary of this part, what we know about the connections of urban travels with socioeconomics is probably more precise than more complicated sub-topics in urban travel behavior research in the region, but still there is a long way to go to reach the quality of the international studies in high-income countries. Studies on the cultural issues that makes differentiation with behaviors in other regions may be of great significance. This sub-topic corresponds with the first research question of this study.

3.2. Land Use and Urban Travel Behavior

It is generally thought that getting an appropriate land-use mix would decrease the travel need. Because of this, there is a vast literature on the impact of land use factors on travel demand and mobility in the western countries, specifically in North America (Hanly & Dargay, 2003). This literature indicates that geography, urban size, density, planning, transport modeling and urban economics as various land use factors can affect travel behavior, the amount and type of transportation (Litman, 2018). According to Ewing and Cervero's recent summary article, the California Air Resources Board (CARB) ongoing research program, and Litman's report “Land Use Impacts on Transport”, different land use factors would impact the travel activity, mainly:

- Regional accessibility; which could reduce the per capita vehicle mileage by 30%.
- High density, mixing land use and centrality of portion of jobs in commercial centers are able to decrease vehicle ownership and provide alternative transport modes.

- Network connectivity, may also enhance non-motorized travel.
- Transit quality and accessibility, would limit automobile transportation and provide alternative transport modes (Crane & Boarnet, 2001).

Where various researches depended on these factors to generate smart growth policies that integrated programs of various land use management strategies- including the listed (Gehrke, 2017), to achieve various planning objectives as infrastructure cost savings, consumer savings, improved public health, energy conservation and emission reductions, thus adopted and applied in various countries (AASHTO 2009; TRB 2009; ULI 2010; USDOT 2010). However, the urban travel behavior characteristics and the relations with land use in the MENA countries is less studied. So, concerning the effects of the land use factors like urban form and lifestyle, it is entirely not investigated in majorities of the MENA countries (Masoumi, 2018). Besides the limited number of studies, MENA studies lack multivariate mathematical or computer-based modeling for the effective factors of urban travels (Masoumi, 2018). The effect of urban form factor like street network, connectivity and layout as, length suitability for walking, traffic signals, and side walk width have a high significant influence on route choice of pedestrians (Özbil, 2014; Masoumi, 2018). Noting that due to the stated factors and other unnoticed ones, the urban transformations of the early and mid-twentieth century in the MENA region resulted in automobile-oriented planning (Masoumi, 2015).

This sub-topic of travel behavior research is in connection with the first and second research questions. The trouble with bringing objectively-quantified land use into travel behavior studies is the difficulty of measuring it by existing geo-coded data. In many countries of the region, finding good GIS maps with enough layers related to land use is difficult and even if they are available, implementing the land use quantification is a time-consuming activity, which many transportation researchers avoid. Thus, land use – transport models have not been created so much in the region, but availability of such studies will be helpful for having a better understanding about the procedures of mobility planning in the local level.

3.3. People's Perceptions, Attitudes and Decisions Regarding Urban Travels

In Europe, since they have poly-centric urban forms and the sustainable transportation mobility is available, the European cities have the least fuel consumption for vehicular activities and transport related energy consumption compared with the urban density and population of the countries. In Italy, planners are developing innovative mobility plans that integrates with the urban planning actions, since mobility strategies are related to land use planning. (Travisi *et al.*, 2010; Boarnet & Crane, 2001). Whereas, the Kingdom of Saudi Arabia is facing a fast urbanization which resulted in changes in its urban form from mono-centric into an urban sprawl. This change in the urban form has a lot of effects on the travel behavior of the residents. Due to the urban sprawl and the non-mixed land use, travel distances are increased allied with traffic congestions and traffic accidents (Francesco & Tesoriere, 2018). The urban form in the KSA became similar to the American-dream urban form having zoned districts rather than mixed used, which results in the decrease of walkability and accessibility to workplaces and other facilities to be reached that generated an increase in mobility and car ownership, and produced car dependent cities (Omran, 2014; Francesco & Tesoriere, 2018)

Many factors affect the travel behaviors in the KSA and the people's decisions towards this issue; one of the main factors is the climatic conditions that automatically shuts walkability out of the options. Another main factor is the low gas price and non-fuel taxes (Fouzani, 1995; Francesco & Tesoriere, 2018). In addition, the religious and cultural beliefs play a big role in mobility and car ownership of the residents (Al-Mosaind, 2001). Riyadh's (in the capital city of KSA) urban planning and infrastructure is all based on personal car use, where most of its residents build their way of life around cars, it does not have any rail systems (Omran, 2014). This fact causes heavy traffic congestion, air pollution emitted from mobility, road accidents, and the decline in public health caused by driving hours in long travel distances due to the residential districts and non-mixed land use (Aldalbah & Walker, 2015). In Beirut, the high car ownership rate can be explained by the lack of adequate urban planning, poor public transportation system, the perception of cars as a social status symbol, and the availability of old used vehicles. In addition, the reliance on cars are mostly for people who live outside Beirut and thus ride to Beirut for their work, this explains the mono centric urban form and lack of facilities in the neighboring cities (Chalak *et al.*, 2016). However, In Chinese megacities, studies revealed that attitudes towards mode of transportation is directly influenced by the intention of car ownership, meaning that attitudes have tiny impact on the travel mode choice when people own a car. This explains the serious traffic problem in the Chinese megacities, hence in order to control car driving mode, car ownership must be limited. The regulations in China do not put any measures on the transportation modes like; fuel tax, parking fee and congestion fee that can manage and decrease car ownership (Plowden, 1983; Matsumoto *et al.* 2012; He & Thøgersen, 2017).

This sub-topic corresponds with the first and third questions of this study. It has gained even less attention compared to other sub-topics, perhaps because its nature is very interdisciplinary. Bringing psychological attributes into mobility research can improve the quality and diversity of the studies, but usually presence of variables of psychological factors can make the statistical analysis more complicated.

3.4. Urban Sprawl and the Relations with Urban Transportation

One of the main factors that have been influenced by sprawl is the transportation systems and behaviors. The sprawled urban form on transportation are often related to the long distances between the destinations. Long travel lengths are caused by massive built-up areas with low connectivity of the street networks (Calthorpe, 1993; Duany, 2000). Improving infrastructure capability and service efficiency to correspond to the increased levels of mobility of the increasing population and the requirements of a budding economy are the biggest challenges for the transportation sector in MENA. With around 60 percent of its inhabitants residing in cities, the MENA region is highly more urbanized than South or East Asia. Nevertheless, the development of urban transport systems has lagged, leading to an unwarranted reliance on private vehicles (El Nagggar, 2009). Moreover, as a result of urban sprawl, motorization, and reduced physical activity have caused health problems such as chronic diseases and obesity (Kelly-Schwartz *et al.*, 2004; Sturm & Cohen, 2004; Freudenberg *et al.*, 2005; Li *et al.*, 2005; Lathey *et al.*, 2009; Zhao & Kaestner, 2010). Urban planners stress on the features of sprawl like lack of pedestrian-friendly neighborhoods and transportation options. Preservationists are more inclined towards focusing on the real amount of land being urbanized by sprawl (Patacchini *et al.*, 2009).

This sub-topic is also related to the first and second research questions. Some limited studies solely about urban sprawl exist mostly on some of the countries of the region, like Turkey and Iran. However, these are often not quantitatively or even qualitatively connected with travel behavior. Presence of such studies can help urban planners and decision makers of the region solve transport problems by means of converting urban sprawl from problem to solution.

3.5. Neighborhood Design and Mobility

Rodriguez and Joo (2004) found that neighborhood design barely affects walking behavior. Cervero (2002) and Aditjandra *et al.* (2012) disagreed claiming physical attributes had significant roles in changing travel modes. Anyhow, though there are some inconsistencies in the literature, neighborhood design has been proven to be relatively important in defining the characteristics of short-distance mobility such as active transportation. It is crucial to further understand the context before going into the attributes affecting mobility. In North America, traditional neighborhoods are urban forms built before the early 20th century (Masoumi, 2019). They were characterized by higher densities, compact urban forms (Crane, 1998; Masoumi, 2019), mixed land uses, and connected grid street networks (Crane, 1998). Neo-traditional neighborhood design refers to developments based on the urban form of traditional neighborhoods both in the Western societies and the MENA region (Crane, 1998; Masoumi, 2019). Walkability was a significant characteristic of traditional neighborhoods (Sallis *et al.*, 2004; Gilderbloom, Riggs, and Meares, 2015). Today, while the sprawled urban forms of newest American, Australian and Canadian cities are car-oriented, the dense urban forms of European, Japanese and Chinese cities, encourage walking and cycling (Comtois *et al.*, 2013). Using the produced understanding about walkability by the international studies that the compact, traditional cities of MENA are highly walkable, but there are actually very few empirical studies of this kind in the MENA region.

Micro-urban form is recognized as an attribute affecting mobility. Scholars stressed the positive effect of compact forms on mobility (Boussauw *et al.*, 2013; Breheny, 1995; Neuman, 2005; Nijkamp & Rienstra, 1996). Holzclaw (1990), Ewing *et al.* (1994), The US Institute of Transportation Engineers (1997), and Khattak *et al.* (2005), found that compact urban form could reduce Vehicles Miles Traveled (VMT). Dill (2004) proved that neo-traditional neighborhoods' compact form led to shorter travel times. According to Masoumi (2019), there are many concerns when planning neighborhoods, among which are their size and centers. Also, historical areas in MENA provided quality neighborhoods with their dense contexts, short distances, and centrality, i.e. the availability of local neighborhood centers where activities are concentrated (Masoumi, 2019). All of these factors encouraged sustainable mobility on the neighborhood level (Masoumi, 2019). Findings of the study also concurred that newer neighborhoods were larger than older ones and adopting a very small neighborhood size would work towards more sustainable mobility. Also, Alghatani *et al.* (2013) found that sprawled urban form (larger neighborhood size) impacted travel mode in Riyadh, Saudi Arabia.

Streets were also recognized as an important factor. Cervero (2002) found that neighborhood infrastructure affects people's travel choice. Krizek *et al.* (2009) and Strath *et al.* (2007) also concluded

that walking relied on adequate infrastructure (sidewalks, bicycle lanes, etc.). Street networks were found related to walking (Penn and Turner, 2004). Calthorpe (1993) found that grid streets reduced VMT by 57%, bringing origins and destinations together. Streets were identified as a factor affecting mobility. Shbeeb and Awad (2013) studied the effects of sidewalks on students' safety while walking in Jordan. Özbil *et al.* (2014) concluded that the suitable street, pedestrian crossings, traffic signs, and sidewalk width affected students' chosen street path in Istanbul, Turkey. Özbil (2013) found correlations between street connectivity and pedestrian flow. Masoumi *et al.* (2018), in their study on Cairo, Istanbul, and Tehran, found that the lack of nearby destinations and the low street accessibility were reasons for not walking; and the lack of biking facilities were one reason for low cycling rates (Masoumi *et al.*, 2018).

Land use is also influential. Niemeier and Rutherford (1994) found that land use mix could impact walking more than others. Lamiquiz and López-Domínguez (2015) asserted the role of land use in predicting neighborhood walking frequency. Satariano *et al.* (2010) found that mixed use areas encouraged walking for older adults, in particular, when mixed with retail (Cao *et al.*, 2010; King *et al.*, 2003; Michael *et al.*, 2006 and Nagel *et al.*, 2008).

The Western planning influenced neighborhood design in the MENA region, leading to the adoption of the Neo-traditional neighborhood design. However, after 1970, trends shifted from the Western models to local values and design (Masoumi, 2019). Fathy (1973) is one of the advocates for vernacular urban forms in Egypt. Land use was also identified as a physical attribute affecting mobility. Sabry and Talaat (2015)'s study in Egypt showed the usefulness of land use in determining travel speed. Masoumi *et al.* (2018) found that shopping and retail shops were the reason people walked in Tehran, Cairo, and Istanbul. However, apart from these findings, very few empirical studies have followed the trend of specialized study of urban form with a special look to mobility in the region.

Neighborhood design has also been the topic of some studies, as mentioned above, but the relation with active transport in the MNEA is not yet understood. This subject is connected to the first and second question. A better understanding of this sub-field can help urban planning in the smallest scale increase the quality of life by encouraging people to use sustainable modes especially for their non-commute short trips.

3.6. Active Mobility

Walking and cycling enhance equity as it can be used for both the rich and the poor. They offer affordable access to work, education and other essential services to all especially the poor (UNEP, 2017, p.5). They have been described as captive modes of transport since the majority of the urban population has no other choice (UN Habitat, 2013). Typically, two different groups use bicycle in regions like MENA. For those who cannot afford a private motorized vehicle, bicycle is regularly used for urban mobility, while for those with time and money for leisure activities, cycling is primarily a recreational activity (UNFCCC, CNCT, 2010). However, in some of the European countries like the Netherlands or Denmark, planners have attempted to make bicycle an every-day transport mode for all purposes. Non-Motorized Transport are active modes of transport and hence their benefits to health are immense. Also, they reduce inequality within and among countries, make cities inclusive, safe, resilient and sustainable as well as they help reduce the air, water and soil pollution. (UNEP, 2017, p.7-8)

Many challenges face non-motorized transport in the MENA region. The main barriers to maintaining or increasing this mode of transport are primarily safety and increasing this mode of transport are primarily safety and poor infrastructure followed by education, culture, financing of facilities and cycle purchases (Diab *et al.*, 2013, p. 15). Safety is the predominant issue for users of the non-motorized transportation in the MENA region. Pedestrian safety may represent a large problem in the Middle East (Odero *et al.*, 1997; WHO, 2009). Cycling is also seen as unsafe, as a lack of road safety education and lack of facilities forces cyclists to mix with fast-moving motorized vehicles (Diab *et al.*, 2013, p. 11). Pedestrians and particularly cyclist is vulnerable, and therefore need separate road space, or at least be respected and taken note of by vehicle users. Lack of social safety, especially for females can also be a barrier. (UNEP, 2017, p. 7). Infrastructure and the maintenance of existing facilities for pedestrian and cyclists remain poor in the MENA region (UNEP, 2017, p.7). Sidewalks begin and end, with no continuous connections to create a walkable network around urban centers, as well as they are poorly maintained causing pedestrians to favor the sides of the road, causing safety issues (Diab *et al.*, 2013, p. 33). While walking is used to access virtually every mode of transport, this elemental form of moving about is often neglected from both a planning perspective and at the infrastructural level. Particularly where motorization is occurring rapidly, infrastructure that separates different groups of road users is often non-existent, and road expansions often come at the expense of space formerly dedicated to pedestrians, putting these individuals increasingly into harm's way (UNFCCC, CNCT, 2010).

In short, some of the transportation trends and policies in the Arab countries are characterized by:

- Inefficient and inadequate public transportation systems, and excessive reliance on private cars.
- The existence of government policies that encourage private car ownership as opposed to other modes of transport such as public transport, cycling and walking.
- Weak and insufficiently enforced environmental policies and regulations (Chaaban & Kaysi, 2011, p. 134-135).

Active mobility is completely out of the scope of transportation planners in the MENA region. In many countries, transportation data does not consider walking and biking modes of mobility, so they are not present in the secondary data. This makes problem for travel behavior research, leading to the difficult and time-consuming process of primary data collection. There is a large gap about this sub-field (which is a part of the first and fourth questions of this paper) in the region both in the research and practice levels.

3.7. Public Transportation in Relation with Environmental Pollutions

Public transportation has proven to be a successful GHG emission reduction strategy, with an estimated 30 million metric tons CO₂ reduction as a result of public transit usage in the US (Kaysi & Chaaban, 2015). These values reflect the importance of relying on this strategy as a vital tool for reducing CO₂ emission alongside facilitating transportation and connectivity. As a matter of fact, several strategies can be attributed to this reduction, and they aim at increasing public transportation usage, since fewer passengers would decrease the efficiency of this strategy and lead to its failure. In order to increase and facilitate the use of public transportation, policymakers try to make the overall experience quick and easy to use through the implementation of smart travel cards. It is estimated that the introduction of the travel card in London in the 1980s increased the bus trips by 16% (Tochtermann, 2008). The main reason behind this increase is that such tickets can reduce boarding time and can reduce uncertainty about which ticket to buy. In addition, assessing the strategies being considered to increase public transportation usage in the US, it can be concluded that such policies aim at increasing ridership through offering easy, quick, and affordable access to transit modes in addition to enhancing vehicle technology. Except some efforts in Istanbul and Tehran, very limited plans have been implemented to create integrated ticket systems in the cities of the MENA region. Aiming to project similar strategies in the region first and in order to understand the workflow and success of public transportation strategies in these countries, one should study and assimilate the culture, traditions, lifestyle and obstacles that these countries suffer from in order to implement adequate integrated strategies.

Climate change mitigation is a special challenge in the MENA region. Indeed, although MENA GHG emissions are less than 6% of the world total in the transport sector, some countries (mainly the oil producers) are among the highest emitters in the world per capita (Yamoury, 2010; Saidi *et al.*, 2018). In addition, of all the regions of the world, MENA has the highest GHG transport emissions per unit of GDP (about 150 Tons CO₂ per US\$ millions of GDP, roughly the same as North America). So far, also, very little has also been done for adapting the transport sector to climate change. In Morocco, for example, recent natural disasters have damaged transport infrastructure and disrupted services, thus inflicting serious costs on the economy. Floods have also been made worse by design flaws in transport infrastructure (Yamoury, 2010).

The studies on public transportation have been a part of transport engineering, so traditionally they have existed since last decades, but the studies with links to environmental issues have been neglected in the region. Such studies with more multi or interdisciplinary essence (linked to the first and fourth research questions) are more needed in the region.

3.8. New Technologies and Concepts

Carpooling, car-sharing and bike-sharing have been commonly used in developed countries especially after the development of technological advancements. Carpooling which is the sharing of a private vehicle to go to a common destination (Asdrubali & Baldinelli, 2005; Cohen & Robins, 2011; Hebel & Wolek, 2017) has initially started in the USA and spread later to European cities (Asdrubali & Baldinelli, 2005; Hebel & Wolek, 2017). Car-sharing which differs from carpooling by being rented from a company is also widespread in developed countries. As for bike-sharing, which is the rental and return of bicycles from and to stations, underwent several unsuccessful attempts before the technological advancements due to theft and vandalism but gained popularity in 2007 after a successful initiative in Paris. Technology has helped increase the safety of commuters and the protection of vehicles through GPS tracking and allowed them to easily find and join car pools through smartphone applications.

Ride-sharing has many benefits on the environmental, economic and social levels. On the environmental level, it reduces traffic congestion and all its environmental impacts by decreasing the

number of cars on the roads; thus, it increases highway air quality (Asdrubali & Baldinelli, 2005; Cohen & Robins, 2011; Hebel & Wołek, 2017). On the economic level, it reduces commuter costs for fuel and car maintenance (Cohen and Robins, 2011; Al Atawi, 2016). Socially, commuters sharing a vehicle can socialize and can improve their time management by performing tasks along the ride (Cohen & Robins, 2011). Moreover, bike-sharing, in particular, is more reliable and sustainable compared to motorized vehicles and it contributes to public health (Faghieh Imani *et al.*, 2017 cited in Abolhassani *et al.*, 2019). However, ride-sharing also entails some limitations and faces some challenges. First, a major issue that defies commuters from using ride-sharing is the safety issue, as there is an anxiety of riding with a stranger (Hebel & Wołek, 2017). This can be mitigated through technology as the commuter can know the profile of the driver beforehand. A second challenge is related to the planning and management of the stations. Stations should be planned adequately to complement public transportation systems. Moreover, ride-sharing is not effective in cities with a high level of public transportation especially from the environmental and public finances perspectives (Hebel and Wołek, 2017). As for the management, stations should always be rebalanced to maintain the availability of vehicles (Chiariotti *et al.*, 2018).

In the MENA region, the motorization index varies among its countries, however, most of them witness rapid urban population growth and urban sprawl thus altering the transportation systems and causing traffic congestion (El-Geneidy *et al.*, 2013). Ride-sharing programs can be observed in many countries in the MENA region as it hosts many car-sharing and carpooling programs mainly through smartphone applications but has less bike-sharing programs (Shared mobility thoughts, 2018). Culture plays a role in commuting modes choices. Faroqi and Sadeghi-Niaraki (2016), after a study on people's attitudes toward ride-sharing in Tehran, Iran, suggest that people should be familiarized with the advantages of ride-sharing to be able to use them; moreover, incentives should be given to encourage them (Faroqi & Sadeghi-Niaraki, 2016; Abolhassani *et al.*, 2019). Another cultural aspect that affects the use of ride-sharing is the association of these systems with poverty (El-Geneidy *et al.*, 2013) or associating owning a personal car with independence (Belgiawan *et al.*, 2014) thus decreasing the use of ride-sharing. In Saudi Arabia, as well, attitudes towards car-sharing are also related to social and economic factors. According to Al Atawi (2016), these are associated with the travel cost, the position in the family, and the car availability. Gender also plays a role in commuting choices as most ride-sharing commuters are women especially before the cultural transformations that occurred. However, recently, carpooling companies started to recruit female drivers with whom female commuters prefer to ride (Korosec, 2018). Finally, in Beirut, Lebanon the literature focuses on the need and desire of urban university students to use carpooling due to the lack of organized public transport and the traffic congestion; thus carpooling applications have been developed for that purpose (Aoun *et al.*, 2014; The Daily Star, Beirut, 2016). In the following section, ride-sharing will be compared between the two regions.

The applications of ICT in transportation planning is not so old, so it can naturally be expected that they do not make a large share of the studies on transportation in MENA. Working on topics like ride-sharing and other vehicle-sharing systems can be a good opportunity to the planners and researchers of the region. This sub-topic is related to the first and fourth questions of the study.

4. Discussion

4.1. Contextual Differences of the MENA with Western Societies

Urban mobility is affected by numerous factors, which is why it is important to look at each of its aspects to know how to handle it. First, urban sprawl, which is the spread of an urban area into a rural one, has a negative dual relation with urban mobility: larger distances are required to get to work, and because of that public transportation may take longer than private ones or can even be absent. The United States Department of Transportation (2005) revealed that approximately 40% of the citizens are ready to walk if the distance is 0.8 kilometers or less. Second, land use influences urban travel behaviors: (1) denser population induces congestion of traffic, (2) lack of accessible public transportation increases personal vehicle usage, (3) traffic leads to a waste of time and money because of extra fuel recharging, being late to work, etc. A third reason would be bad planning; sometimes the government wastes public resources to construct highways and bridges that turn out to be non-efficient.

The main difference between urban travel behaviors in the MENA region and in high-income countries is that the later ones have been developing green alternatives for example. In fact, in Europe, many citizens walk or cycle to move from one place to another. Also, public transportations are more abundant and well organized in high-income countries with trains, public buses and even boats. These transportations lessen the number of personal vehicles and thus lead decrease pollution and traffic issues. A third difference would be that high-income countries have online applications like carpooling, using

which one could share online, where he or she is going and a random person going to the same place can join. Plausible methods would also be to manage traffic lights timing, and the administration of land use mix like residential accessibility (proximity between house and leisure activities that minimizes the need for motorized travels) (Vojnovic *et al.*, 2013)

In the studies on Western countries, empirical studies have partially shown that urban form, and land use factors like; mobility behaviors, accessibilities and human perceptions highly affect the urban travel behavior. Thus, based on these factors, responsive smart growth land use policies were generated and applied to achieve various planning objectives. While for the MENA region, geocoded data is unavailable due to the few number of studies and lack of modeling and simulation tools. However, the few conducted studies show that socio-economic factors, lack of good quality mobility and some urban form characteristics like street layout and connectivity, density, land use function locations are affecting the travel behavior, and resulting in an automobile-oriented planning (Masoumi, 2015), which is increasing in the absence of reliable data and researches and thus responsive planning strategies and policies that would limit it are limited, in contrary to the western countries that are applying such responsive strategies. So, to limit the increase of automobile use, intensive future researches on the topic is recommended, to collect data and define the major factors affecting the urban behavior, in order to precisely develop and apply responsive proper sustainable planning strategies. But till now, according to the available data on the MENA region and responding to the defined socioeconomic and urban form factors, some strategies are recommended referring to strategies of the western countries literature:

- Providing regional accessibility.
- Mixing land use, providing job employments within the affordable residential areas and reduce street distance between locations.
- Provide Network connectivity, and alternative transportation modes to improve the walkway and enhance non-motorized travel.
- Provide good quality and accessible transit.

In the MENA region, the urban travel attitudes are hypothetically affected by several factors like culture, climate, fuel affordability, economic status, and social status, in addition to the urban form and urban structure. When comparing the MENA region with European countries, we can notice that many European cities integrate mobility plans with urban planning actions, and have mixed use polycentric cities which encourages walkability and decreases urban travel distances. Whereas in the MENA, most of the cities are monocentric with poor public transportation, which increases car dependency and long urban travel distances. These differences in the urban form directly affect the attitudes toward the urban travel of the residents of the city and control their attitude towards this issue.

Transportation is becoming increasing dynamic as a result of the success of planning policies. Coordinating transportation and its influence on economic mobility, ecology and lifestyle is becoming a vital tool in planning for the coming century. For example, the advocates of smart growth and transit-oriented expansion have highlighted the need of planning more linked street networks to encourage drivers to use slower means of transportation (walking/biking) and have more face-to-face interfaces (Calthorpe, 1993; Duany *et al.*, 2000). Furthermore, most countries in the MENA region must improve the efficiency of their expenses in transport in addition to the general volume of expenditures so as to adapt to the demand of growth and innovation (El Naggat, 2009). A major challenge that remains within the region's transport segment is removing main policy and practical restrictions to private sector contribution. Policymakers must greatly develop the regulatory, financial and institutional framework in transport to deliver proper incentives for private contribution. This will play a large role in developing well-planned transactions that are appropriate to the specific political and economic context of MENA countries. Cost-effective transportation services should also be encouraged through deregulating transportation markets and bigger competition between service providers. Even though the condition differs significantly by country, there are many examples of gross price alterations in the MENA transportation segment; for example: public transport tariffs and fuel pricing. These must be progressively removed while focusing on the social impact of cost reflective price levels.

In the European countries, urban mobility policies, pay increasing attention to the support of senior citizens, to enable lifelong mobility as well as safe and suitable transport (UNECE, 2015). The sustainable Urban Mobility Plan approach in the EU are diverse and focus on improving quality of life, contributing to improve health and environment by allowing sustainable mobility such as walking and cycling as well as making mobility seamless (UNFCCC, CNCT, 2010). Non-motorized transport in the MENA region compared to the EU countries, can be simulated by a policy package consisting of investments in facilities, smart urban planning, improved public transport and disincentives for the use of motorized private vehicles (Haydamous, P., 2014, p. 4).

Both developed countries and the MENA region suffer from similar mobility problems exhibited mainly in traffic congestion. Ride-sharing and new technologies have emerged as a reaction to these problems in both cases. However, due to cultural differences, these new trends have manifested differently in these regions. Moreover, both in the developed countries as a whole and the MENA region, it is important to assess the effectiveness of these trends in decreasing the number of cars from the roads and reducing congestion. As carpooling services via applications are paid, they are becoming similar to a taxi service, thus straying from the aim of shared-commuting to reduce Vehicle Miles Traveled.

4.2. Recommendations for More Sustainable Urban Travels in the MENA

As previously stated, sustainable transportation is a necessity in our current days as the implementation of sustainable transport policies can lead to better living standards for citizens, and could even lead to economic prosperity at the level of the entire nation (Kaysi & Chaaban, 2015). Therefore, it is important to learn from the experiences of the European and American governments and agencies in implementing sustainable transport policies to understand their success factors. There are several obstacles that would prevent the implementation of certain policies in the region; therefore, the policies should be carefully crafted to serve the Arab nations and other groups of residents in the region. Recommendations for improving the conditions of urban mobility in the region can be suggested based on the gaps and shortcomings identified under Section 3 of this paper. These shortcomings have been summarized in Table 1.

Table 1. The gaps and shortcomings of urban transportation planning in the MENA region

Related Sub-Title Number	Topic relative to section 3	Gap and Shortcoming
3.1	Socioeconomics and urban travel behaviors	<ul style="list-style-type: none"> • Car dependence and personal car ownership because of the societal necessities. • Lack of public funds or establishment of efficient mass public transportation systems. • High dependence of residential location choice to socioeconomics instead of the needs related to commuting to work (this leads to prolongation of commute trips).
3.2	Land use and urban travel behavior	<ul style="list-style-type: none"> • Lack of local knowledge about the connections between urban form and travel behavior • Unknown effects of street connection and layout on travels.
3.3	People’s perceptions, attitudes and decisions regarding urban travels	<ul style="list-style-type: none"> • Absence of studies on the perceptions and attitudes of passengers about urban transportation and infrastructures. • Lack of adequate urban planning and urban transportation planning based on the perceptions of attitudes of people.
3.4	Urban sprawl and the relations with urban transportation	<ul style="list-style-type: none"> • Very high urbanization rates, which lead to unknown circumstances of urban sprawl. • Adopting Western knowledge, concepts, and solutions for combatting sprawl.
3.5	Neighborhood design and mobility	<ul style="list-style-type: none"> • Unknown vernacular neighborhood design concepts that lead to higher levels of active mobility. • Unfollowed trend of studying the Middle Eastern urban form and neighborhood, leading to lack of neighborhood design concepts suitable for mobility planning.
3.6	Active mobility	<ul style="list-style-type: none"> • Dominant physical and social safety problem for walking and biking. • Cultural issues and governmental restrictions of the biking of women. • Inefficient and inadequate public transportation systems, and excessive reliance on private cars • The existence of government policies that encourage private car ownership as opposed to other modes of transport such as public transport, cycling and walking. • Weak and insufficiently enforced environmental policies and regulations
3.7	Public transportation in relation with environmental pollutions	<ul style="list-style-type: none"> • MENA has the highest GHG transport emissions per unit of GDP • Imposing costs of national economies by damage to transport infrastructures caused by natural disasters.
3.8	New technologies and concepts	<ul style="list-style-type: none"> • Cultural and gender issues limiting the applications of Information and Communication Technologies in urban transport sector, such as ride-sharing and carpooling. • Poverty limits the usage of ride-sharing. • Independence cause of personal car use is culturally preferred over vehicle-sharing systems.

According to the summarization of shortcomings and gaps presented in Table 1, the following recommendations can be suggested to urban planners, transport planners, municipalities, and decision-makers of the region:

- To avoid leapfrog developments, increase density, and plan for shorter distances.
- Since street infrastructure, network, and accessibility have an effect on mobility, the recommendation is to provide adequate infrastructure (sidewalk width, street length), take safety measures (curb extensions, crossings, traffic signs), and plan for connected streets with accessibility to activities.
- Since mixed land use can encourage sustainable mobility, the recommendation is to provide this diversity. A final recommendation is to avoid imported models and generate context specific planning.
- Provide/Improve sidewalks, crosswalks, paths, bicycle lanes and networks.
- Public bicycle system (rental systems for short urban trips).
- Integrate mobility plans with urban planning actions.
- Create polycentric cities, in which each city or even urban district is economically self-sufficient with the availability of amenities and facilities to decrease urban travel distances.
- Limit car ownership, by controlling used cars ownership and put fuel taxes and congestion taxes
- Enhance public transportation and infrastructure in order to change the socio-cultural stigma associated with bus riding.
- Road maintenance, which has mostly been underfunded and is facing the financial crisis and its monetary consequences. Enhanced maintenance funding is critical to prevent the deterioration of road networks and it will serve, at the same time, as a big source of employment.
- Public transportation must be a priority, especially the development of mass transit systems in big cities, which are an obligation given the density of passenger transport demand. This will greatly assist in resolving the issue of congestion.
- The efficiency and capacity of transportation infrastructure for regional trade ought to be developed.
- Transportation expenditure strategies must take into account social development, such as enhanced safety standards of all road networks and tailored micro level developments (El Naggar, 2009).
- Giving guidance on policies and allowing local government management to further enhance decentralization, reinforce municipal financing of elementary urban services, improve maintenance and asset control, expand the contribution of the private sector in “public-private partnership (PPP)” arrangements, and react to resident needs by funding required urban services and infrastructure (Madbouly, 2009).
- Culture and religion: Difference in culture and the gender mix between female and male remains an issue in some of the Arab countries which should be dealt with through finding proper solutions.
- Weather condition: Hot climate in some of the Arab countries is as well a reason of discomfort while using public transportation which should also be taken into consideration while designing strategies for public transportation.
- Low fuel price: In oil and petroleum countries which lead to an increase in the usage of cars without taking into consideration the cost of using fuel.

5. Conclusion

The MENA region has gone through a big demographic increase in the last couple of years that affected urbanization and ultimately urban travel behaviors. The financial struggle compared to more developed countries as well as the lack of efficient public transportation keep the MENA states from addressing this issue properly. However, one main problem would be the mindset of the citizens that are still not ready to break the habits: In Lebanon, a group of students came up with a mobile application “Yalla Bus” that allows citizens to follow the directions of public buses and get to their destination. Further research is still needed to find similar non-costly and efficient ways through which countries from the MENA region could handle urban transport behaviors.

This paper presented the land use effect on the travel behavior internationally, in the western and MENA countries. At the western countries, literature shows that urban form and mixing land use factors highly affects the travel behavior, and for improving this behavior towards sustainable planning, smart

growth policies that integrated programs of various land use strategies were generated and applied. However, in the MENA region, due to the lack of researches on the topic, factors affecting the travel behaviors, are not determined nor controlled, resulting in automobile oriented planning. So, in the third section of discussion, by comparing it to the western countries some strategies complying with those of the smart growth policies were suggested to create regional accessibility, mix land use and improve transit quality and accessibility. Besides, due to the lack in the studies and gathered data about this topic, except some studies in Iran, Egypt, and Istanbul, future recommendations for the MENA planners and researches are suggested, to collect scientific data of the region, using mathematical models in research and to apply land use/travel behavior interaction considerations in their future research and plans of the region, where most of the MENA countries need more studies clarifying the main aspects of urban mobility in order to provide local urban sustainable transportation planning, similar to the western high income countries.

In the MENA region, proper planning should be implemented focusing on mixed land use in order to enhance urban travels and decrease urban travel distances, and will arouse future research questions to be answered; if the public transportation is improved in the MENA, will the culture of people change towards this issue?

In order to properly address the issue of urban sprawl in the MENA region, awareness must be spread about the intensity of the sprawl and its impact on several aspects of the residents' daily lives. Proper policy making and planning can greatly enhance the quality of life of the citizens and decrease the intensity of the sprawl. One of the many areas that has to be addressed is the transportation sector, whereby most of the infrastructure in the MENA region is weak and unable to serve the present intensity of sprawl. Private sectors must be encouraged to play a role in the enhancement of transport infrastructure, since decentralization of the process can lead to faster and more efficient results. The improvements can be a direct response to the needs of the residents in each city, and can be done according to the capacity of the government and the municipalities. If taken, this step will have a majorly positive impact on urban life quality and on the environment.

Sustainable Urban Transport face many challenges in the MENA region. Authorities should develop knowledge base in implementing policies to foster more sustainable urban transport and mobility. The policies should address the role of public transport and Non-Motorized Transport for Urban Mobility and Transfers making walking and cycling attractive (UNECE, 2015, p.15). This can be done by a range of activities including construction of sidewalks and bike lanes, bike sharing programs, urban planning and pedestrian oriented development. Non-motorized transport is a highly cost-effective transportation strategy and brings about large health, economic and social co-benefits (UNFCCC, CNCT, 2010). As many other cities, the high levels of congestion in Beirut, Lebanon makes walking in the city's central areas is one of the priorities (Nabti, 2014). Therefore, the future research is recommended to target the application of sustainable and activeurban transport in the Lebanese context.

Unsustainable transportation practices have been causing substantial damage to the earth and its inhabitants for years (World Bank, 2013). With urban air pollution, which is significantly a result of transportation, and traffic injuries responsible for the deaths of around 2.5 million people a year, it is crucial that governments take a strong stance against unsustainable behavior that will cause further damage (WHO, 2011). The sustainable policies considered by governments in Europe and the US, show that there is concern among policymakers, more so than those in the Arab world for many factors stated previously.

It is important to learn from the experiences of the European and American governments and in implementing sustainable transport policies to understand their success factors and accordingly relate them to the economic status and characteristics of the MENA region. However, many of the MENA countries such as Lebanon, lack the proper upgradable infrastructure which can cause a lot of difficulties in implementing any public transportation strategy.

This paper also briefly showed that ride-sharing has many benefits on the environmental, economic, and social levels; however, it faces challenges especially on the planning and management levels. On the planning level, location of the stations should be well designed to respond to the commuters' needs and to complement existing public transportation systems; this brings forward the importance of an integrative approach in mobility planning. These stations also require a good management of rebalancing the stations to ensure the availability of vehicles whenever and wherever needed. In the MENA region, in particular, more research needs to be done to guide planning and integrate the new mobility trends within the existing urban transportation systems and thus ensuring better urban mobility. It is also important to consider the culture specific to each location in the MENA region while planning; thus more research is needed to understand the attitude of people towards these new trends.

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