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Transportation Survey Case Study Beirut.

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Abstract— *the present article tackles the problem of transportation in Beirut city. Transport policies developed in Lebanon have not brought any solution regarding the congestion. Through a survey in three different neighborhoods, we gathered information about Beirut's commuters travel behavior in order to guide policies regarding transportation planning and traffic control. The main factors causing congestion are car dependency, absence of organized public transport and centralization. The results showed an urgent need for organizing public transport. Furthermore, transport projects and road infrastructure need an upgrade taking into consideration all influential fields. These results highlight the necessity to priorities the execution of projects that allows more accessibility in the city of Beirut.*

Keyword — *Car dependency, Circulation, Policies. Public transport, Transport.*

1. INTRODUCTION

Beirut, Lebanon's capital faces several problems with daily circulation. Although different road infrastructure projects have been executed in the city but still congestion is increasing. Also lack of organization has led to chaotic driving on the roads. This article suggests studying the core reasons for the inefficiency of transportation policies in Beirut. The main object is to gather information about Beirut's commuters travel behavior in order to guide policies regarding transportation planning and traffic control. Our method is based on a survey conducted with commuters in three neighborhoods from Beirut. We searched to specify the difficulties met by civilians during their journeys and to define the social imagery of transportation policies. To determine the process of the recent projects for the city we held interviews with different transportation players. A new approach to transportation policies in Lebanon is necessary to help reduce the impact of congestion on the economy, environment and society. It is important to consider an action plan that tackles the various areas of influence. The results of the mentioned survey and the analysis of the recent projects can be useful to the decision makers to place a policy that could initiate the new projects on sustainable approaches and guarantee a comfortable transportation for the civilians in Beirut.

2. METHODS OF STUDY

The city of Beirut has been developed through different phases and according to multiple urban plans. The roads patterns vary from neighborhood to another based on the urban project followed in execution and the urban development that occurred at the time [1]. Throughout the years and with the increase of the cars some roads turned into highways [2] but due to the built-up area it was not always possible to enlarge all of them to more than two lines or three lines maximum in each direction. For this article we selected three main neighborhoods from Beirut, depending on their urban form and the transportation practices that take place in them: *(1)* the first site is Hamra's neighborhood, which is famous for having many functions that attracts civilians from around the country on daily basis. *(2)* The second site is the Down-town Beirut that has been rebuilt in the after war phase, while having a new infrastructure it is considered as a luxurious neighborhood. As for the third site, the Damascus road and its surroundings it symbolizes history and it has a social value. For the survey the technique was a face-to-face interview with 150 random people that we met in the road. The survey was held through three visits to each site study, during different hours and days of the week. Starting November 2015 until February 2016, we made many site visits analyzing the movement of civilians on the road. The target was to study the behavior of civilians their movement precisely, the purpose of their visit, the transport system they used, the difficulties they have met during their travel, their opinion of the mobility policies in Lebanon and their hopes for the future of transportation in the city. We used SPSS system for the counting of the field survey. Our analyses are based on the collected results.

3. PROBLEM IDENTIFICATION

3.1 Background

Beirut is a city that faced several wars and destructive events. It was developed through instability in administration and in politics. Though many studies have been prepared and many specialists have been conveyed, the end result was fragments of plans and roads executed to make a way through the city. The most influencer reference was the plan Ecochard [3] that was considered as a base for decades. To Verdeil, the logic Ecochard used made of Beirut a city delivered to the car, without reflexing on alternative transport systems [4]. Since the after war the Municipality of Beirut kept referring to the same plan to execute roads and highways.

3.2 Public transportation in Beirut

A review of the history of transportation in Beirut shows that before the civil war in 1975, the public transport considered different modes: the train, the tramway, the bus and the shared taxi. In 1965 the tramway was replaced by 150 buses [5]. In the after war phase the train was stopped due to great damages to the railway and to train stations. All train activities in Lebanon seized in 1995 [6]. As for the buses their activity was restricted in the after war phase to Beirut city. But there was no

specific itinerary, no precise stops and no maintenance to the vehicles. Today more than 5 000 public buses are registered [7], though they are operated by private companies. Some follow old bus lines, and some other operates between cities. As for the mini-buses they appeared a decade ago and took over certain areas of travel. While the taxi "service" remains one of the most used and with the highest numbers of vehicles in Beirut.

4. RESULTS AND ANALYSIS

Three Beirut Sites were compared in the following: Purpose of Beirut's visit, Mode split, Commuters opinion on the traffic control policies, Transportation rush hours, and the most influential factor in order to improve commute.

4.1 Purpose of Beirut's visit

As per the survey, the highest rates of visits to Beirut are related to work and education. We noted 44% of daily visits to Down-town Beirut for work, with a high percentage of visitors from south Lebanon.

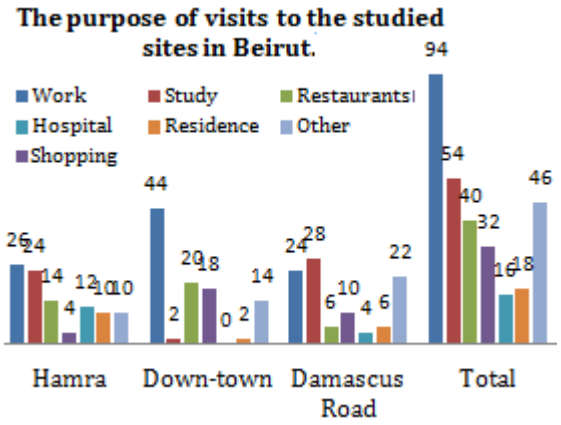

Fig. 1. Purpose of visits to the studied sites in Beirut.

As for Damascus Road site, it registered 28% of visits for education and had the highest daily visits from around the country. More than 50% of the surveyed people commute daily from other cities like Saida and Tripoli. As per the Council of Development and Reconstruction, the number of cars entering Beirut daily, reaches 140 000 cars from the North Side, 65 000 from the East side and 70 000 cars from South [8]. According to the answers we received, the main purpose of Beirut's visit is for the exclusive functions found in it. This exclusivity is caused by the policy of centralization that focused all administrative function in the capital and invested in its economic dominance. To this fact, an unbalanced development has been increasing between cities. As for citizens they find it easier to travel daily from far destination then to find an affordable apartment in the city and its suburbs. These results prove that centralization is one of the main reasons for increased traffic in the Capital and at its entrances. Having the most distinguished universities in Beirut with a very high cost for dorms; students prefer to travel each day from their hometowns. Moreover lack of job opportunities in the rural areas, drives young adults to pursue careers in the city of Beirut while living in neighborhoods in its suburban where they can afford the rent of apartments. The chart Fig.1 represents the results of the survey for the purpose of visits to the studied sites.

4.2 Mode split

The key of mode split analysis is to study the travel mode choice from origin to destination. To come to Beirut we notice that the mode split can differ from one neighborhood to another. In total, 57% of the surveyed people use a private car, highlighting car dependency in the city. The second most used mode is the taxi service. The taxi "service" in Beirut allows cab sharing for certain destinations. As for active transport modes, it reaches a percentage of 22% on Damascus road site and of 14% in Hamra, as for Down-town it reaches only 4%. The paradox lies between the urban space and the transportation choice, where even though the Down-town neighborhood offers the most of public spaces, sidewalks and areas dedicated for pedestrians, it registers the lowest rates. The civilians stated that they choose active transport mode when the origin of their travel is close to their destination, whether it is for work, study or shopping. Beirut Down-town is destined for tourists and the upper middle class [9]. Or due to the current economic and political situation both tourism and business has dropped in Lebanon [10]. To this fact this neighborhood is only active in its administrative and political functions as well as in its restaurants. Rare are the people still living and working in this area of Beirut, therefore most of the visitors of the Down-town come from outside the city. The lowest rates for transportation as per the survey are the bus and the motorcycle.

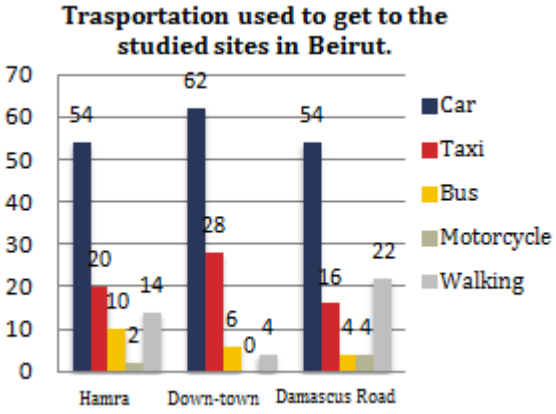

Fig. 2. Transportation used in studied sites in Beirut.

Low use of public transport led us to query about the needs of the citizens to encourage this mode. According to our study, to increase the use of public transport we need organized bus lines serving all neighborhoods with a fixed itinerary. Plus all kinds of communication regarding this mode should be developed in order to inform all users of its availability. The number of registered buses in Lebanon has increased to reach 5 082 public buses in March 2016 [11]. Only these buses are operated by private companies while the government is still waiting for the right budget to buy 250 buses. In this situation the cooperation between public and private actors seems beneficial for cost and time saving.

4.3 Commuters opinion on the traffic control policies

In 2012 a new driving law was established [12]. It started to be applied in 22 April 2015. This law was controversial and it is still. For though it helps to implement regulations, this law does not seem to be sufficient in organizing the behavior of drivers.

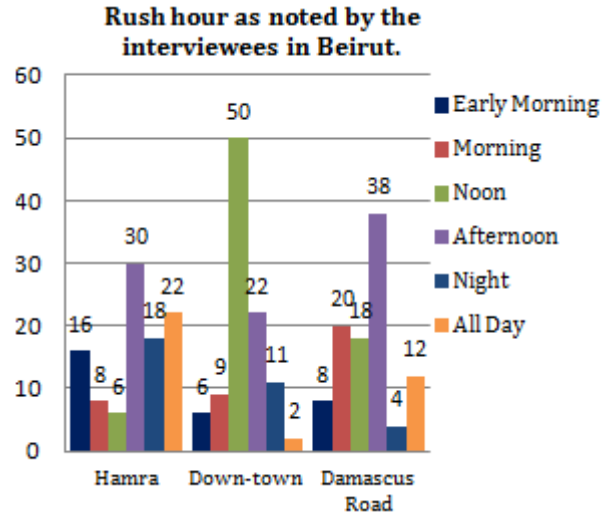

Fig. 3. Rush hour as noted by the interviewees in Beirut.

On the other hand it imposes an important amount of penalty fees [13] while the necessary security and road signalization are rarely provided. The impact of this law on the transportation practices is not obvious as per the social opinion. The most checked answers are: 30% the law is a good initiative and 27% it is not properly applied. Before demanding from travelers to respect the law, they request from the government to provide the necessary environment. Road infrastructure, signage, lighting and sidewalks all need maintenance in Beirut. Plus, decision makers and politics themselves should be leaders by respecting the law. Initiating the new generation on these regulations, also reminding the commuters of them will help the change of on road behavior.

4.4 Transportation rush hours

It is well known that everyone that gets late to an appointment in Beirut uses traffic congestion as an excuse. We decided to measure the rush hours as noted by the commuters in all three sites. According to the survey, rush hour is in the afternoon between 4 and 7, in Hamra and Damascus Road, when in Down-town it is at noon. If we link these results to the purpose of visit in each site we notice that the commuters coming for work influence most the rush hours. Or it is known that most administrative functions end by noon, which explains the traffic hours in Down-town.

4.5 The most influential factor in order to improve commute.

According to the survey the most influential factors to improve commute are reducing traffic (22%), and providing better road maintenance and infrastructure (26%). Our study shows that traffic in Beirut is increased by car dependency, lack of public transport use and centralization policy. In our survey we asked about the difficulties met by commuters on their way to destination: as an open question the responses were grouped under three main topics: *(1)* Traffic Jam,*(2)* Finding a parking spot, *(3)*Other commuters driving behavior. Traffic jam not only affects the user's budget for daily travels, but it also impacts his wellbeing at many levels. Being late and wasting hours on the road for a journey that supposedly must take less time, can cause stress to the traveler. Stress can lead to chaotic driving behavior engaging in conflict stimulation. As for car dependency it increases the need for parking lots that are already dominating in superficies over the public space and areas dedicated for pedestrians. The current situation needs to promote public transport in order to reduce the car park that has reached in March 2016. The municipality of Beirut can provide Parking buildings instead of parking lots in order to accommodate the needed space.

5. DISCUSSION

Throughout the years circulation problems in Beirut have increased that today it is considered a daily crisis. The city has waited long for a solution regarding the congestion. Only one project has been executed but not completely, the urban transport development project U.T.D.P. [14]. The main completed part was related to the road infrastructure. Since 2012, a Public Bus Transport System Project within Greater Beirut was approved by the Council of ministers, but still till today the necessary budget has not been provided for it [15]. Current responses to address the transportation situation did not bring any upgrade to the transport system. Identification of the main causes of congestion and mobility inefficiency in Beirut will facilitate the development of an action plan and may initiate towards new policies. In this study, we reflected on the experience of the surveyed public in their journeys to Beirut. We interviewed transportation players to bring data of the recent policies and projects. The results identified the importance of rethinking the transportation projects and optimizing the policies, in order to reduce car use. Sustainable strategies encourage diversity in the transport systems. Commuters indicate that more punctual, reliable, and improved public transportation would encourage their frequent use. Many have stated that they prefer public transport than their private car for the lack of parking spaces in the capital city. Or currently there is not one public bus that crosses the Damascus Road, nor one that goes through the main streets of Down-town. Only two bus lines pass by Hamra, but they do not connect it to the other main neighborhoods of Beirut. The bus project prepared by the ministry of transport and public work has planned lines that serve all neighborhoods of Beirut. The communication of this plan with the already working buses can allow more balanced operations. Commuters who live closer to the city are more likely to choose active forms of transportation, such as walking and biking. Increasing housing options closer to the city could also support a reduction in the number and travel distance of driving trips. But what is essential, it is to provide a secure travel for this kind of transportation. The necessary lighting, sidewalks and signage should be assured in the most active streets of Beirut. Promoting

priority of circulation to pedestrians can be emphasized in the driving behavior through imposed road regulations in order to protect them. In an effort to address the dramatic pollution of air in Beirut city, there is an urgent need to reduce single occupancy vehicle travel. Policies encouraging hybrid cars and eliminating older than 10 years cars can also be efficient. Moreover developed cities are promoting carpooling and car sharing. Through our survey, we noticed that in Beirut some students and coworkers share cars because they live close to each other. An adapted policy can encourage car sharing in universities, schools and companies. This action can reduce remarkably the number of cars that is used daily. In our research on contemporary transportation projects we noticed that they are part of studies that concern the city or the metropolitan's development. This highlights the fact that thinking circulation is directly linked to thinking urban development. Referring to the Diagram of Lebanese Regional Planning, development of secondary cities was encouraged in order to provide for locals all the necessary functions close to them and more job opportunities in these areas. This action plan was approved by the Council of ministers in 2009, and still to this day there has been no change. The decentralization importance has been also revealed in our study where it shows that the highest percentage of the surveyed people live outside of Beirut. One of the main reason congestion is increasing in Beirut, is the concentration of functions and their exclusivity. Whether it concerned business and job opportunities, or Universities and Education, Administration and Political, Health and Hospitals, all functions are attractive to people from around the country. The purpose of our selection of studied sites was to reveal how much transportation practices can differ on a small scale as neighborhoods and roads. Transportation projects should consider all scales from local to international travels in order to bring ultimate solutions for congestion. The old theory of enlarging roads is no longer a solution for the congestion. The urge is to reduce car dependency and provide alternatives for daily transportation. Our study has revealed moreover, the impact of functions in a neighborhood on the activity in its roads. This point and scale were rarely considered in the earlier executed circulation projects for Beirut city.

6. CONCLUSION

Though the government might not have provided the budget for ongoing studies regarding the city, cooperation with universities can help in collecting the needed data. Plus this action would initiate towards new ideas for transport upgrade. Can the study of transportation on multiple scales bring more accurate solution to the current situation in Beirut?

A multidisciplinary discussion could promote coordination between all transport players. Maybe, the top-down policy for transport in Lebanon has not worked in the past decades for a specific reason. And maybe it is time to promote new transportation behaviors with citizens in order to see a change in transportation in the city of Beirut.

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