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Existing Transportation Scenario In Tripoli, Libya

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Abstract: Own cars are the most common mode of transport in Tripoli, Libya. About 66% of Tripoli's residents prefer to use their own cars and only 34% resort to depend on public transports namely taxi, coaches and microbuses for their transportation activities in the city centre area. Rapid increase in own cars' usage, coupled with no public transport system have caused problems such as acute traffic congestion, an increase in road accidents, deterioration in environmental well being and unbalanced land use characteristics. A questionnaire survey was carried out in Tripoli to address the first two of these problems. About 900 respondents were analysed where their needs were observed and expectations explored. The study has found that the variables to support the use of public transport system are the reductions in travel time, distance travelled and reasonable fares. The study also identifies some factors that prevent the users of private cars, taxi, coaches and microbuses from using the public transportation system, in order to enable the researcher to suggest and formulate logical policies to support better use of public transportation system.

Key words: Own car, public transport, public transport system, Descriptive and analytical.

INTRODUCTION

Libya Location:

Libya is situated on the northern coast of Africa, bordering the Mediterranean Sea. Libya borders from west Algeria, from northwest Tunisia, from east Egypt, from southeast Sudan, Chad and Niger to the south, Libya has an area of approximately 1,759,540 sq km and country population of about 6,036,914 people. The religion of the people in Libya is Islam and the official language is Arabic, usually rendered useful for business purposes, some Berber language, as well as English and Italian. Libya has a shoreline of 1,770 km. Dominated by the Sahara desert; the majority of the land is barren and relatively level. The capital city of Libya named Tripoli Figure 1 shows the location of the country and the position of Tripoli on Libyan coastal pelt (Libya country Profile –2007, 2008).

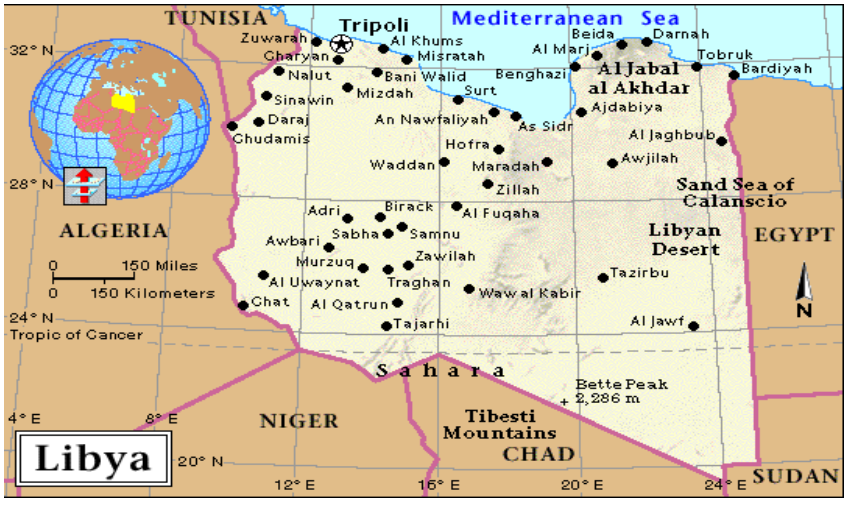

Fig. 1: The location of Tripoli - Source (http://www.libyana.org/cities/index.htm)

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Public Transport In Libya:

Public transports in Libya simply mean shared taxis, buses and coaches. Public transport is always assigned together with the required escort for those who arrive without one. Currently, there are no trains in Libya. Libya has no railways since 1965, where the government had to abolish this system, in order to restore the occupation that had been established. There are a few bus services, mainly come in the form of comfortable, air-conditioned coaches between Tripoli and Benghazi and other major cities. The bus services also include the microbus service which operates between cities. Long distance taxi fares can be quite expensive and should be agreed in advance. Taxis are available in large cities, and are often used to share works under the supervision of a private union and the majority of taxis are cheap and lease negotiation, and with prices specified in the fixed lines. Private taxis in the capital operate like other private taxis in other countries. They are found only in large cities as well as in the capital city of Tripoli. The increasing numbers of motor vehicles in Libya, all kinds from private cars, private transport, taxis and trucks and heavy equipment in the period from 1998 to 2008 demonstrated a condition of the severity of the congestion on major roads between main and interior cities, which reached more than 2,000,000 vehicles at the end of 2008. The vehicles' total number is 2052679 except that of government vehicles and those of the international organizations. The traffic statistics of the number of vehicles registered in Libya until the end of 1998 (203575) reached up to (2052679) car until the end of 2008 or increased to about ten times as it was in 1998 and was distributed following the private transport (367824), own car (1525429), taxi (77320), trailer and lorry (61124), Motorcycles (873), heavy equipment (20109), (extracted from data 2008).

Tripoli Case of Study:

Tripoli is the capital city of Libya and the largest seaport. Tripoli has two main airports namely Tripoli international airport and Umm Aitiqah airport. Tripoli is located on the coast of the Mediterranean Sea, north of the Equator at the latitude (32.56^0), and longitude (13.10^0), east of Greenwich. The importance of its location is suggested in Tripoli as one of the best economic and commercial centres in North Africa (Libya Nation Atlas 1978) as shown in Figure 1. Population of Tripoli is 1,682,000 people with Area of 400 sq km, population density 2207.32 people / sq km (Libya country Profile –2007, 2008). More than thirty years ago there were only a number of cars in Tripoli, and today the streets are more crowded with modern vehicles, own cars, taxis and different types of microbuses. The continuing growth in the vehicle's ownership, lack of road spaces and public transport system has led to the various traffic problems in Tripoli streets. The number of vehicles has increased to approximately 705025 own cars, 43,740 taxis, and lorries from one to three tons (120,599 vehicles), vehicles' heavy load (for 29,343 vehicles). Moreover, the total vehicles using the road of Tripoli every day are 898,707 vehicles, at the peak period from 7 am to 7pm, there is a continual congestion, where the traffic overflow is a frequent problem through weekdays (data as of 2008). Tripoli was growing very fast for the last ten years from the year 2000 to 2009, both geographically and administratively. More and more policies and regulations are being developed at the Tripoli level, particularly in the fields of traffic and transport. The free movement of people, goods and services is a key priority of the Tripoli city. Relatively speaking, the survey was carried in Tripoli due to the high number of private vehicles' ownership and no public transport system services which subsequeny leads to acute traffic congestion in the selected areas, as shown in Figure 2.

Fig. 2: Shows the study area (Source: Google Earth 2009)

A huge influx of the Libyan population into the Tripoli city has resulted in a five-fold increase in Tripoli's population in the seventies and early eighties. To accommodate this enormous increase, many new suburbs have mushroomed here and there, and a poor planning has resulted in a sprawling urban area with severe traffic congestion, especially in rush hours. Traffic congestion occurs when the traffic volume and the citizens' preference of using their own vehicles generate demand for more space than the road capacity made available for them. There are many specific circumstances which cause the acute traffic congestion; the majority of them decrease the capacity of city road at given point or over a certain length, or raise the number of vehicles required for a given fast movement of citizens or goods.

Reasons Selection of Study Area:

The reasons for selecting this topic are due to several overlapping reasons, which include the following:

1) To establish the correlation between the extent of the relational plan for the Tripoli city and the increasing population and number of private vehicles, and the flow of traffic, also the resulting problems, and to devise solutions that have been applied worldwide and the extent of their applicability in Tripoli.
2) To act on the noticeable increase in the possession and use of privately-owned cars and to know how reliable is the movement in Tripoli city.
3) To formulate a change in the general outline of the land use in the city, the development of commercial and industrial premises to the public roads without having to revise the job classification scheme, which reduces the operational function of some methods, and to create places to overcome traffic congestion and create the position of the sides of the vehicles.
4) To examine and resolve the growing number of victims of traffic accidents in Tripoli roads.
5) To highlight the lack or the scarcity of public transport to be manipulated in environment-friendly cities such as (mass transit system) as well as the weakness of its own infrastructure.

Why Tripoli Is the Study Area:

The survey was carried in Tripoli because it has a high number of private-owned cars, public transports namely taxis, coaches and microbus vehicles all of which contribute to the poor traffic condition, and because the traffic congestion of this area seems to have come from all over Libyan cities. For the reasons stated above Tripoli is expected to be the best case study representing Libyan cities. Table 1 shows the number of registered private cars and several vehicles as of 31 \ 10 \ 2009 in Tripoli.

Table1: The latest vehicles statistic until the thirty first of October 2009 (in Tripoli).

Type of vehicle	Libyan citizen	Foreigner citizen	Total
Own car	713258	30538	743796
Coaches & microbuses	118256	5301	123557
taxis	47031	0	47031
motorcycles	543	55	598
Lorry	11944	1589	13533
Trailer	7509	791	8300
Tractor	476	119	595
Heavy equipment	6170	1678	7848
Total	905187	40071	945258

Source: Traffic office and licensing of Tripoli, data as of 2009

Tripoli has more three times the number of own cars than it second largest city called (Ben Ghazi). Also, it has three times the number of public transport (as in table 2) which shows the number of own cars and private transport in some Libyan cities. The study was carried out in the main five Entrances into the city, such as the southern entrance for each of the Al-Gabis Entrance, Airport Road Entrance and the Al-Hadaba (Salah Al-Din) Entrance, the Al-Giran Entrance in the west side and the Tajora (Al-Bive) Entrance at the east of the city. Also, flowing through several downtown roads and main streets in the city, such as Omar AL-Mukhtar Street two direction and Mizran street and the First of September street in the city centre and road two way along the Tripoli city port named Al-Fatah street, and the old and modern streets in city centre, figure 2 above are the main routes involved in this study.

Public Transport in Tripoli:

In many capital cities in Arab countries including Tripoli, the travel demand management has been receiving increasing attention for its potential to improve urban transport problems. Managing urban travel demand is not only about planning the transport system but is also concerned with resolving the issues of traffic congestion, accidents and environmental pollution from the increasing use of private vehicles. The second dominant mode of transport in Tripoli is the white and yellow taxis, and these taxis connect the city to other cities such as (Zuwara - Sabratha - Sorman – Tajora - Gheryan,....) also the black and white ones which operate

within the city and are operated by the private sector and overseen by the Association Taxi General, where the taxis go and stop wherever requested by passengers even without the presence of stations or simply stopping by the roadside. Tripoli also currently does not have bus lines in the city, although they are operating on a regular basis during the period of the eighties through a public transport company. But in the late eighties the service came to halt when the company stopped all the bus services in the city.

Table 2: Registered own cars and private transport numbers in Libya cities (2009).

City	Own car	Public transport	City	Own car	Public transport
Al beida	29394	711	Darnah	22815	3262
Misrath	65712	1339	Algoba	2462	61
Zalitan	59652	1532	Tobruk	15773	759
Zawiah	65728	2695	Ajdabiya	13604	474
Tripoli [1]	713258	47031	Almarj	14066	226
Alkhums	33263	1347	Aljabal alakhdar	3164	94
Tarahuna	17432	869	Nalut	9009	263
Surt	24394	407	Gahrian	49805	1088
Benghazi [2]	196668	12420	Ghafrin	12973	238
Sabrata	35132	1410	Sahel Algafara	41600	959
Surman	18971	771	Tajora	15689	1685

Source: General People's Committee of General Security (2009)

Literature Review:

Mercado and Newbold 2009 in this study the researchers explained that family network could play an important role in influencing both movement decisions and provisions. Private cars have been found to be more preferred when a person lives alone as opposed to living with family in the household, a tendency that is stronger between the older than the younger age people.

Kamba et al., 2007 in this study entitled "why do people use their cars: a case study in Malaysia? illustrates some reasons that contribute to the use of own car as conflicting to the needs for public buses and trains, and the key reasons addressed are: 1) a decrease in travel time, 2) the desirable routes not covered by public Transportation system, 3) Comfortable, 4) safety, and 5) Infrequent Public transportation system services

Riza, 2004, in a study explains that the increase in population and vehicles in Malaysia has led to a raise in road traffic accidents and fatalities. These problems have propelled the Malaysian government to conduct some studies to address this problem. One of these studies was the switch of transportation mode from own cars to the public transportation system namely Buses and Trains in Kuala Lumpur, Malaysia.

Fiona Poole, 1998 shows that own cars are preferred because they can provide a faster journey door to door, that the cars are needed at work and for study trips, where the return trip time is often unknown and they provide safety and convenience. Drivers in their own cars may be combining a trip to work with taking their kids to school or meeting somebody at the station (in what is called as "combination journeys").

Methodology:

Descriptive and analytical transportation issue is the main research methodology in this study, where it involves a field survey in the form of a collection of data from Tripoli organizations which means references and previous studies. Data collection and survey procedure, traffic counts were carried out on five main entrances and major streets in Tripoli city in October 2009. Traffic counts were collected for 10 hours per work day was started at 08 am till 6 pm in order to have the most of the traffic's volume fluctuation in the day. Eight complete trips were made for five main entrances into Tripoli city to measure the travel time and speed for both directions in the morning and afternoon as the peak periods. A questionnaire study was carried out in selected urban areas of the Tripoli city to determine and investigate why people would rather use their own cars instead of being driven in taxis (for example cabs and micro or minibuses) in Tripoli city, and also suggests and encourages public transportation system use in Tripoli. A total of 900 questionnaires were collected over the period of five months from (21 July to 15 December 2009). This questionnaire was categorized into 3 parts as: (1) Traveller's personal information, (2) Trip characteristics and respondent's current preference of travel modes, (3) Public transport option. Excel 2007 and the SPSS software version 19 in this study were used to gather the descriptive data and to produce a corresponding analysis.

RESULT AND DISCUSSION

Popularity of the Own Car:

Own cars are one mode that is always readily available. Figure 3 shows the popularity of this category of transport, which represent 88 percent of the Libyan people who prefer to use his or her own car. Each Libyan generally has his or her own car. He/she can move from zone to zone in safety whilst it would take a few times

longer to transfer from one zone to another with other modes of transportation. The majority of people prefer to use their own car because they can feel free to do what are ever they want and by logic, they can travel in their own time. Therefore, there are many reasons why the people prefer to use their own cars and why the car is more popular than other current modes used in Libya. It is a reliable, comfortable, safe and convenient way to travel. It has been stated earlier that the cars owned have become more popular and dominant than other current modes in Libya, because it is usually available when required, such as it can take the users from door to door, and can reach several destinations. Also a car can represent the power status and prestige of the person driving it. The increasing number of own car used has in fact, worsened the road congestion, environmental pollution and traffic accidents. Table 3 shows the latest statistics in 2008 concerning the different vehicles being used in Libya.

Table 3: Show latest vehicles statistic in 2008 (in Libya).

Type of vehicle	Libyan citizen	Foreigner citizen	Total
Own car	1465776	59653	1525429
Coaches & microbuses	355145	12679	367824
taxis	77320	0	77320
motorcycles	808	65	873
Lorry	33446	3344	36790
Trailer	21365	2969	24334
Tractor	2743	240	2983
Heavy equipment	13206	3920	17126
Total	1969809	82870	2052679

Source: General People's Committee of General Security (data as of 2008)

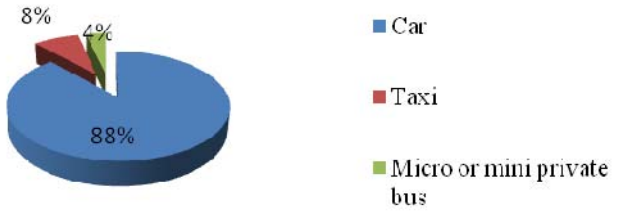

Fig. 3: Popularity of own cars.

Traffic Accident in Libya:

"Traffic accidents have increased dramatically in Libya and the deaths will reach up to 25 cases a day in the next ten years if there is no real measures like the duplication and construction of separate roads, as well as the roads and lighting control on the quality of vehicles and the introduction of high import. Although the women are less than men likely to suffer a fatal injury (men accounted for two thirds of the total number of deaths due to injury in 2008), hard injuries are a leading cause of death for both genders and in all ages. The age groups affected in the road deaths accidents were from the age of 25 years until 35 years and who simultaneously are the pillar, hope and the future support of the country (Secretariat of the Libyan justice 2009)".

Libya is one of the most affected countries because of the detrimental effects of traffic accidents- damage and human deaths, the physical harm, and social and physical loss, as well as the fact that it is clear to us that this leads to the death of 5 persons per day according to the (*Secretariat of the Libyan justice 2009.)* This is a very large number in a population that does not exceed seven million people (Office of traffic and licensing Tripoli (data as 2008). and through the traffic statistics for the proportion of road traffic accidents and the result that there is a direct relation between the proportion of the increasing numbers of vehicles and the increase of the proportion of road traffic accidents, who has also escalated at the end of 2008 to 126536 accidents, demonstrating the fatality of 18946 people, about 52915 people suffering from major injuries, 66707 people in minor injuries, reconciliation and 42592 people involved in damage accidents further imposed with losses worth 189665666 Libyan Dinar (LyD). (1.0 U.S. dollar is equivalent to 1.25 of LyD). Table 4 represents the road traffic accidents in Libya between years (1998 – 2008). Although table 5 shows deaths resulting from traffic accidents (cases) by sex and age groups in –2008.

Number of Car Ownership per Household:

Figure 4 shows that 49% have one to two cars in their homes, 31% have 2 to 3 cars and 11% with 3 to 4 cars in the house, also responses from 9% claiming to have no car and tend to use other transport choices such as the taxi and bus. Car ownership by the household is 100% presented as the best mode of transport in Tripoli, especially and in Libya generally and the majority of Libyan people depend on their own cars to travel.

Table 4: Road Traffic Accidents in Libya (1998 – 2008)

Year	Number of Accident	Vehicles involved in road Accidents	deaths	Hard injured	Simple injured	Damages accidents
1998	9393	10531	1224	3573	4770	3414
1999	9370	10574	1204	3515	4879	3267
2000	10667	12271	1504	4155	5462	3609
2001	10895	12528	1598	4141	5892	3505
2002	12017	13952	1751	4483	6575	3965
2003	12154	13938	1744	4479	6023	4266
2004	11643	14171	1785	5150	5596	3895
2005	11898	14620	1800	5380	6161	3954
2006	11982	16919	1866	5663	6501	3894
2007	13165	17859	2138	5950	7547	4553
2008	13352	18662	2332	6424	7301	4270

Source: General People's Committee of General Security (2009).

Table 5: Deaths resulting from traffic accidents (cases) by sex and age groups in –2008.

Age Groups	Gender	Drivers	Passengers	Pedestrian	Total	Age Groups	Gender	Drivers	Passengers	Pedestrian	Total
(-) - 04	Male Female	0 0	7 8	19 10	26 18	35 - 44	Male Female	137 12	25 40	58 17	224 69
05 – 09	Mal Female	0 0	17 14	47 21	65 35	45 - 54	Male Female	76 08	20 30	49 27	148 65
10 - 14	Male Female	0 0	17 14	42 10	61 21	55 -64	Male Female	44 0	10 22	33 19	87 41
15 – 19	Male Female	26 03	29 15	52 14	115 32	65 - 74	Male Female	27 0	06 02	33 05	66 07
20 – 24	Male Female	162 13	87 38	75 20	344 71	75 –or more	Male Female	04 01	02 04	16 02	22 07
25 - 34	Male Female	399 38	166 109	214 42	804 189	Total	Male Female	875 75	386 293	638 187	1962 555

Source: Secretariat of the Libyan justice (2009)

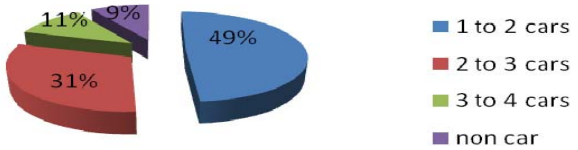

Fig. 4: Household Car ownership.

Total Traffic Volume Using Own Cars on Main Entrances:

Traffic volumes along the peak hours reflect that the behavioural traffic volume normally occurs between 8 am and 18 pm, and approximately 187,366 vehicles have entered Tripoli from five main entrances. It should be noted that during the traffic count survey, the ministry of general security has prevented the trucks from using the Airport Road entrance. Thus the percent of trucks presented in this study are understandably lower than expected.

Traffic Speed Survey:

Eight complete trips were made for from Tripoli city centre to Al-Gabis Road Entrance, Tripoli University, Al-Giran Road and Umm- Aitiqah Airport. To measure the travel time, delay and speed for both directions in the morning and afternoon peaks, the floating car method was used. The results of this survey would help in determining the level of service on each street in this study and could be seen in table (6). Table 6 shows the average running speed during the morning and afternoon peak hours in 8 trips starting from the Tripoli city centre to each access point and which ends in Green Square.

During peak hour periods, the average traffic flow speed in Tripoli is 16.33km/h. The minimum average speeds of traffic operation on Tripoli streets were 18 km/h in morning and 16.33 km in the afternoon peak. The running speed decreased to 16 km/h on the road to Tripoli University and 17.33 km/h on city centre streets. Table 6 shows the average running speed for Al-Gabis Road Entrance, Tripoli University, Al-Giran Road and Umm- Aitiqah Airport in both directions during morning and afternoon peak hours. There are various factors such as safety, freedom to manoeuvre, number of interruptions, comfort, convenience, economy, and speed which can describe the level of service on any section of roads as stated in El-Sayed 1995. However, in this study there are only two factors that have been incorporated to estimate the existing level of service. They are:

- Operating speed
- Ratio of traffic volume to capacity

Table 6: Average Running Speed during Morning and Afternoon Peak Hours

Street	Distance (km)	Direction From / To	Running Speed (km/ hr) Morning period	Running Speed (km/ hr) Afternoon Period	Average Travel time per minute in morning	Average Travel time per minute in afternoon	Average Running speed in Morning (km/hr)	Average Running speed in Afternoon (km/hr)
Tripoli city centre	10.200	From Al-Gabis	30 28 21	23 19 15	40	45	26.33	19
	10.200	To Al-Gabis	35 29 22	22 21 18	37	40	28.67	20.33
Tripoli city centre	7.100	From Tripoli University	18 20 16	20 18 15	37	40	18	17.67
	7.100	To Tripoli University	16 18 18	18 15 16	30	46	17.33	16.33
Tripoli city centre	13.900	From Al-Giran	20 18 19	29 31 35	35	44	19	31.67
	13.100	To Al-Giran	25 24 25	30 29 29	38	44	24.67	29.33
Tripoli city centre	08.00	From Umm Aitiqah	45 43 38	39 40 40	20	25	42	39.67
	08.00	To Umm Aitiqah	40 45 45	35 35 40	17	25	43.33	36.67

It is worth mentioning here that both of these factors were determined during the peak periods. If the operating speed is lower or slower, this indicates the ratio of traffic volume to the capacity of street is approaching one. This phenomenon will cause traffic jam or congestion. In fact, this will help the researcher to indicate the level of congestion or level of service during the peak hours for Tripoli streets.

Conclusion:

Understanding travel behaviour and the factors for selecting one transport mode over another is a necessary matter. However, travel behaviour has proven to be more complex. For each trip, travellers have to make a selection between different transportation modes. Each transport mode would naturally have specific characteristics, such as advantages and disadvantages depending on some factors such as travel time and travel cost. There are some people who would use public transports without fail, namely taxis, coaches and microbuses to reach their works or studies. The factors behind conducting this research which include to estimate the growing traffic problems and to better examine the congestion of traffic seek to establish suitable models to reasonably describe commuters' attitude in Tripoli. Privately-owned cars have become more popular and dominant than other current modes in Tripoli, because they are usually available when required and at any given time and circumstances, such as to take the users from door to door, and can reach countless destinations. Also owning a car represents the power status, also comfort and safety. The increasing number of own cars used in the city has evidently contributed to the increased road congestion, environmental pollution and not to forget, traffic accidents.

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