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1. To decrease traffic congestion in city there is a need for a public transport (PT) system as a public buses, the increasing use of private cars has showed unsustainable in the developed cities (Adel, 2019). Therefore, should be encouraging public transport as a model transport policy for high car use cities, such as the Gharian city.
2. Future research in this area, I recommend applying a Binary Model, it is expected will considerably enhance the predictive accuracy of the models.
3. Search for other factors that affect the shift from private car to public transport.
4. To indicate the Traffic congestion problem, should be survey the traffic volume flow more cleared in detail.

Acknowledgment

The research was conducted in collaboration with the Civil Engineering and Structural Department, Engineering Faculty of Gharian, Gharian university – Libya

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vehicles were private car (about 82%). As in Al-Salkhana entrance, 9,832 vehicles per week entered from this entrance, about 8,422 of these vehicles were private car (about 86%). At Al-Dahra entrance, 3,633 vehicles per week entered from this entrance, 2,726 of these vehicles were private car (about 75%). Lastly Abou-Rshada entrance, about 3,364 vehicles per week entered from this entrance, 2,358 of these vehicles were private car (about 70%). In general, the traffic volume at the five main entrances was high, especially on Sunday and decreased on Monday and Tuesday and then increased again on Wednesday and Thursday, the highest traffic volume per hour was (8 am to 9 am). Traffic volume in Gharian is very huge and that is caused traffic congestion in center of city at peak period.

7- Conclusions and Recommendations

This study describes the traffic flow to Gharian streets from five entrances at peak period hours (8 am to 16 pm); it is noticeable that on Sunday and Thursday was the largest volume of traffic. Also it is known that the problem of the study became clear and no a public transport in the city. Some of factors as reasons support to use private car and the reasons to switch from private car to public transport have encouraged the travellers to shift to the public transport (PT) system (Wei and Jacquelin, 2013). It is clearly needed to improve and development road network in the city to entered public transport system (such as public buses) in city to avoid the traffic congestion. Finally, the increasing number of private cars and private transport namely taxi, minibuses and coaches in the city has been named as the cause for increased road traffic congestion and traffic accidents. Additionally, recommendations are presented for further work as follows:

Majority of respondents likes to switch to public transport by some factors as in figure (15), which 20% it is cheap, 26.6% it is fast service, 30.4% it is covered all city roads, and 23% would do so if the waiting time is appropriate.

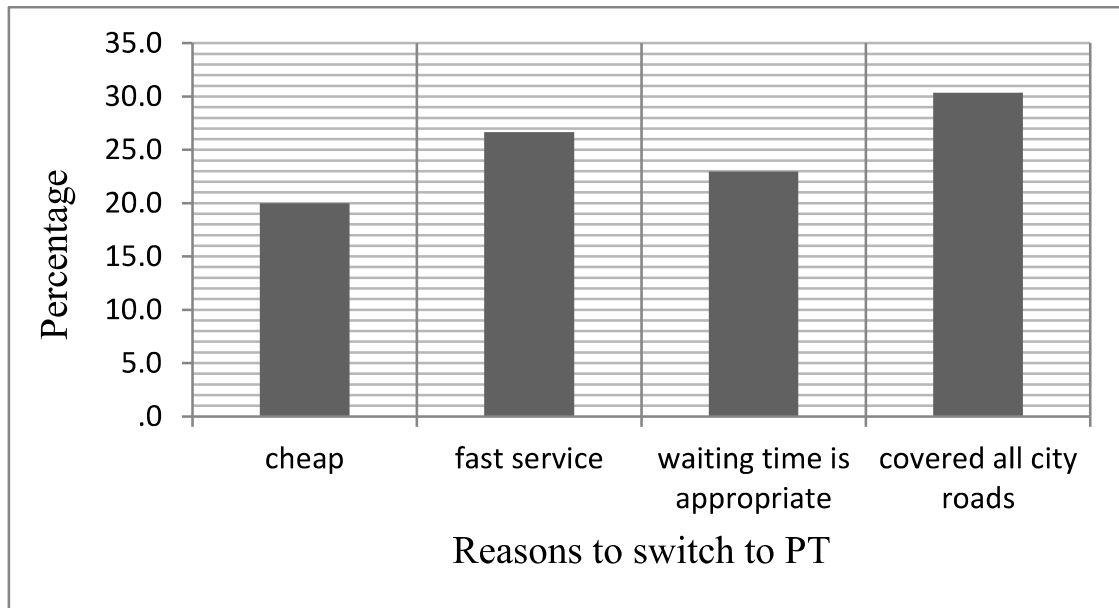


Fig- (15): Reasons to switch to PT system

6- Data Analysis and Discussion

A survey was conducted at the five main entrances of Gharian city to determine the traffic volume in the city center during peak period hours. The high traffic volume was in Tobby entrance, it is consider the main entrance for all travellers from outside of city, which approximately 16,233 vehicles (within five working days) per week entered from this entrance, 13,779 of these vehicles were private car (about 85%), which is a very huge number. As well dependence on private cars were also in the rest of the entrances. As in Sahban entrance, 12,293 vehicles per week entered from this entrance, about 10,131 of these

5- Questionnaire Analysis to Support of Public Transport

The analyses of the factors which support the public transportation system (PT) option will be described according to the questionnaire items as follows.

5.1- Reasons support to use private car

In Gharian city and all Libya cities most people consider the private car is favored over all other modes (Fathi, 2007), because from the figure (14) below shows the 20.7% car is available, 24.5% it is comfortable, 38.5% it is gave them freedom of movement, 8.9% it is safe, 7.4% it is prestige.

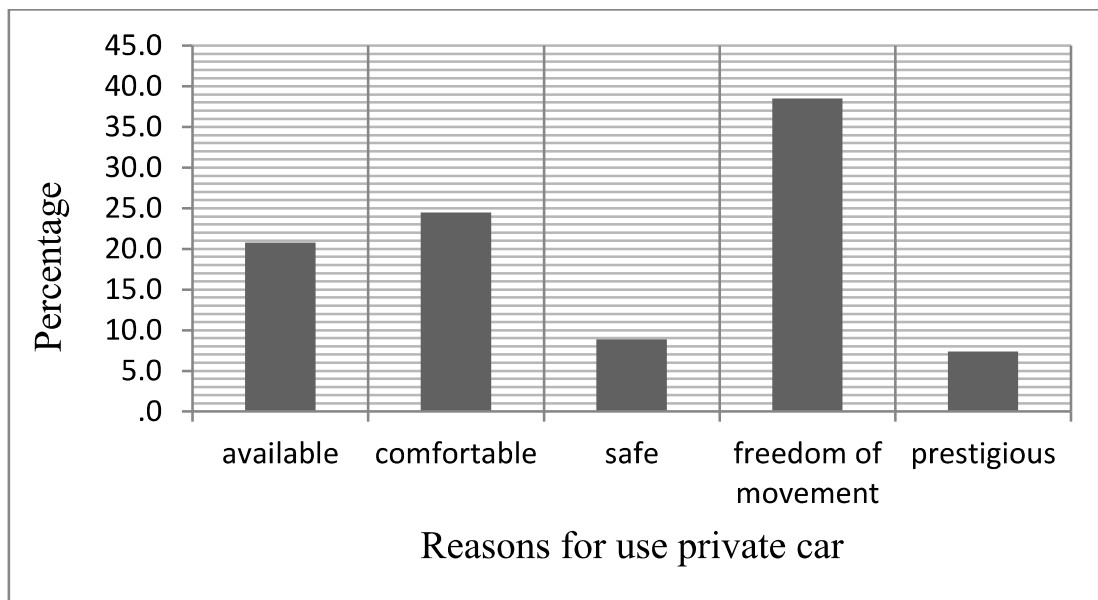


Fig- (14): Reasons for use private car

5.2- Reasons to switch from private car to public transport

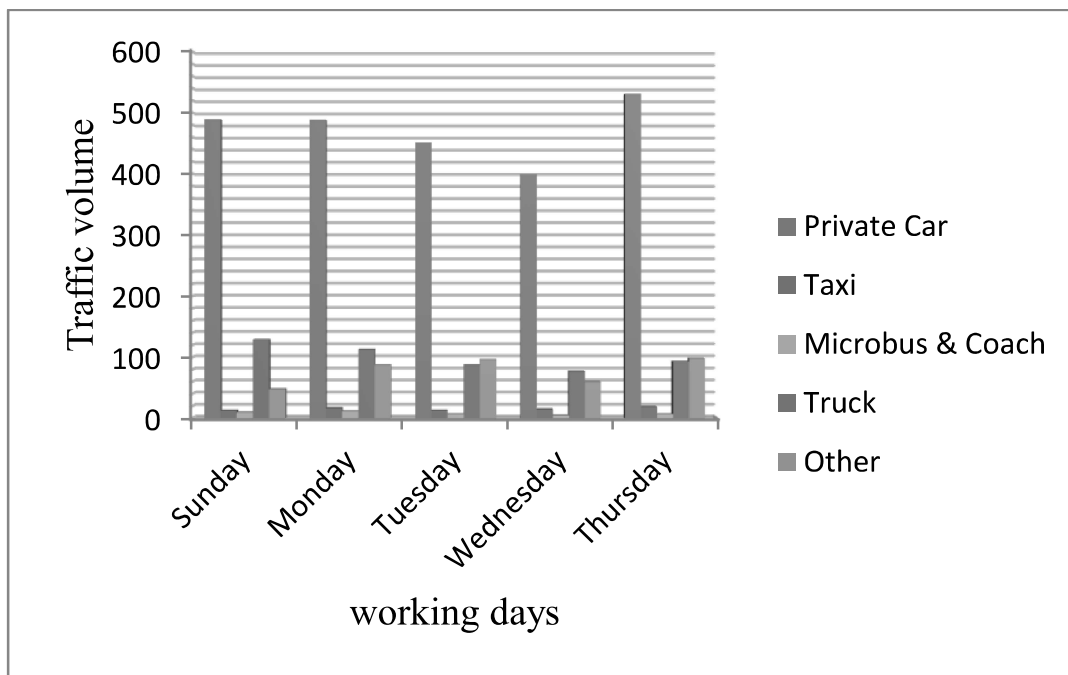


Fig- (12): Traffic Volume of Abou-Rshada Entrance during working day



Fig- (13): Horizontal plan of Abou-Rshada entrance



Fig- (11): Horizontal plan of Al-Dahra entrance

4.5- Abou-Rshada Entrance

The total number of vehicles at peak hours in Abou-Rshada entrance was 689 On Sunday (private car 71%, taxi 1.9%, Microbus & Coach 1.4%, Truck 18.7%, Other 7%), On 717 Monday (Private car 68.1%, taxi 2.4%, Microbus & Coach 1.7%, Truck 15.7%, Other 12.1%), 654 On Tuesday (Private car 69%, taxi 2%, Microbus & Coach 1%, Truck 13.3%, Other 14.7%), 556 On Wednesday (Private car 71.8%, taxi 2.7%, Microbus & Coach 0.9%, Truck 13.8%, Other 10.8%), 748 On Thursday (Private car 71%, taxi 2.5%, Microbus & Coach 0.9%, Truck 12.5%, Other 13.1%). Figure (12) shows Traffic volume during working days and Figure (13) shows the horizontal plan of Abou-Rshada Entrance.

4.4- Al-Dahra Entrance

The total number of vehicles At Peak hours in Al-Dahra entrance was 814 on Sunday (private car 75.9%, taxi 3.4%, Microbus & Coach 8.8%, Truck 6%, Other 5.9%), 750 On Monday (Private car 73%, taxi 2.5%, Microbus & Coach 12%, Truck 6.7%, Other 5.8%), 610 On Tuesday (Private car 70.5%, taxi 1.6%, Microbus & Coach 11%, Truck 9.7%, Other 7.2%), 657 On Wednesday (Private car 76.1%, taxi 1.4%, Microbus & Coach 5.6%, Truck 9.7%, Other 7.2%), 802 On Thursday (Private car 78.7%, taxi 1.2%, Microbus & Coach 8.5%, Truck 7.1%, Other 4.5%). Figure (10) shows Traffic volume during working days and Figure (11) shows the horizontal plan of Al-Dahra Entrance.

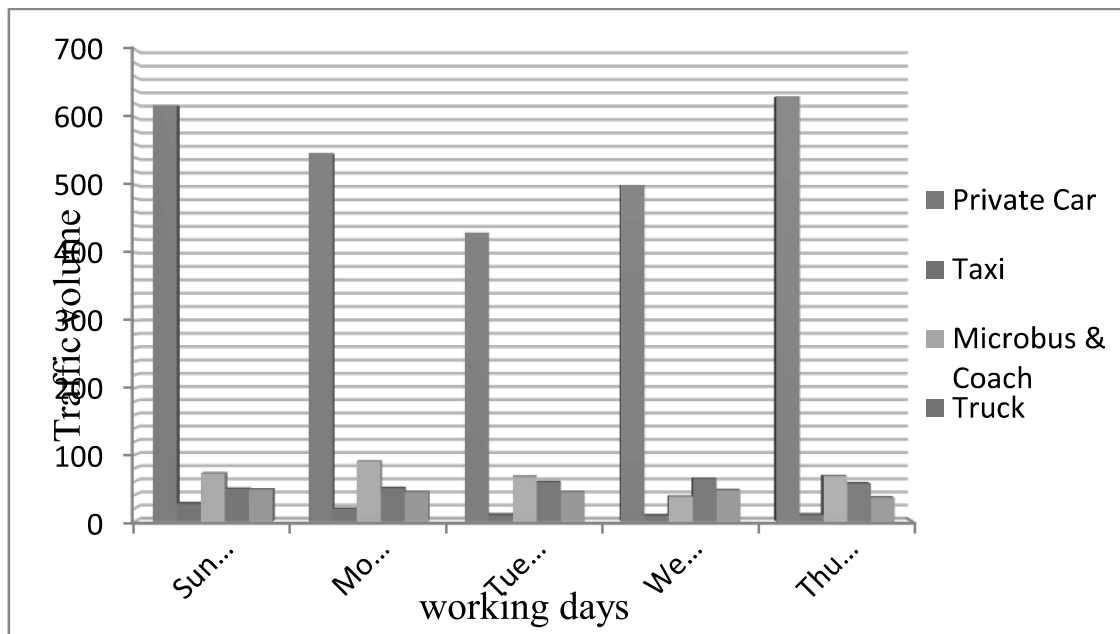


Fig- (10): Traffic Volume of Al-Dahra Entrance during working day

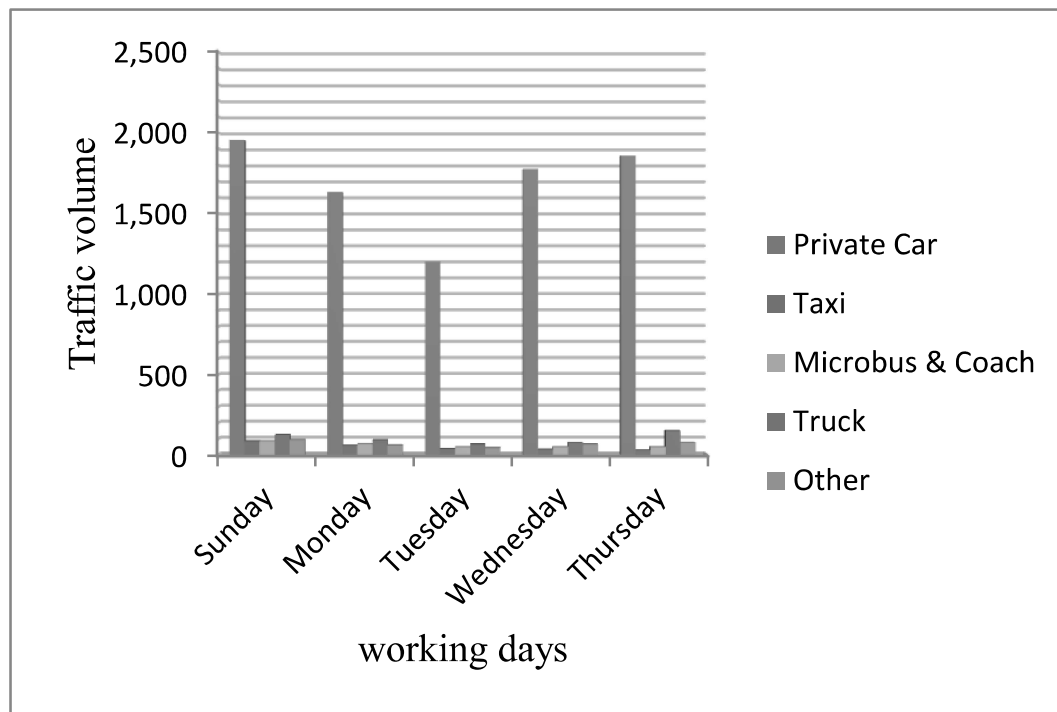


Fig- (8): Traffic Volume of Al-Salkhana Entrance during working day



Fig- (9): Horizontal plan of Al-Salkhana entrance



Fig- (7): Horizontal plan of Sahban Entrance

4.3- Al-Salkhana Entrance

The total number of vehicles per hour from 8 am until 16 pm from Al-Salkhana entrance was 2,349 On Sunday (private car 83.2%, taxi 3.7%, Microbus & Coach 3.7%, Truck 5.4%, Other 4%), 1,914 On Monday (Private car 85.3%, taxi 3.1%, Microbus & Coach 3.6%, Truck 4.8%, Other 3.2%), 1,401 On Tuesday (Private car 85.8%, taxi 2.7%, Microbus & Coach 3.6%, Truck 4.8%, Other 3.1%), 2,002 On Wednesday (Private car 88.7%, taxi 1.7%, Microbus & Coach 2.5%, Truck 3.8%, Other 3.3%), 2,166 On Thursday (Private car 85.8%, taxi 1.4%, Microbus & Coach 2.3%, Truck 7%, Other 3.5%). Figure (8) shows Traffic volume during working days and Figure (9) shows the horizontal plan of Al-Salkhana Entrance.

4.2- Sahban Entrance

The number of vehicles per hour from 8 am until 16 pm from Sahban entrance was 2,824 On Sunday (private car 82.6%, taxi 6.8%, Microbus & Coach 5%, Truck 3%, Other 2.6%), 2,334 On Monday (Private car 82.2%, taxi 6.2%, Microbus & Coach 5.9%, Truck 3%, Other 2.7%), 2,028 On Tuesday (Private car 80.3%, taxi 7.7%, Microbus & Coach 6.2%, Truck 3%, Other 2.8%), 2,420 On Wednesday (Private car 84.8%, taxi 5.2%, Microbus & Coach 5.6%, Truck 2.4%, Other 2%), 2,687 On Thursday (Private car 82%, taxi 5.5%, Microbus & Coach 7.6%, Truck 2.3%, Other 2.6%). Figure (6) shows Traffic volume during working days and Figure (7) shows the horizontal plan of Sahban Entrance.

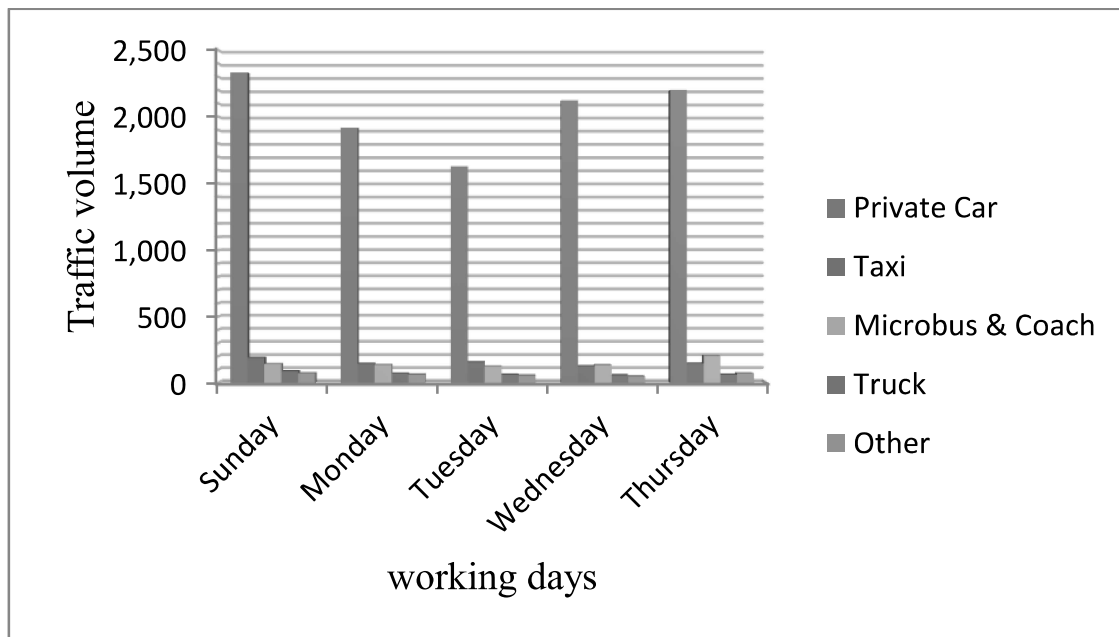


Fig- (6): Traffic Volume of Sahban Entrance during working day

4.7%, Truck 2.6%, Other 2.3%), 3,066 On Wednesday (Private car 84.6%, taxi 4.8%, Microbus & Coach 3.8%, Truck 2.9%, Other 3.9%), 3,732 On Thursday (Private car 85.6%, taxi 6.8%, Microbus & Coach 3.8%, Truck 1.8%, Other 2%). Figure (4) shows Traffic volume during working days and Figure (5) shows the horizontal plan of Tobby Entrance.

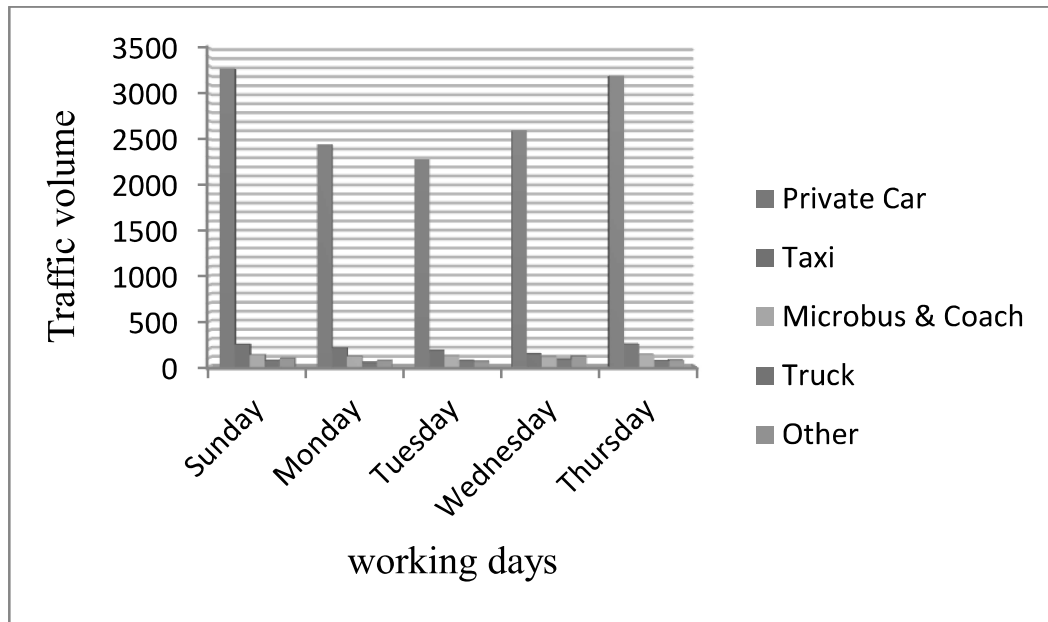


Fig- (4): Traffic Volume of Tobby Entrance during working day



Fig- (5): Horizontal plan of Tobby Entrance

Tobby entrance from the east side of the city, the south side two entrances of Sahban and Al-Salkhana, from the west side is Al-Dahra, as well as Abou-Rshada entrance from the North side of the city as shown in Figure (3).



Fig- (3): Main Entrances of Gharian city

- 1- Tobby Entrance 2- Sahban Entrance 3- Al-Salkhana Entrance
4- Al-Dahra Entrance 5- Abou-Rshada Entrance**

Source: <http://wikimapia.org>

All entries were counted and measured within five working days per week (Sunday 14 May to Thursday 18 May 2018) At Peak period hours (8am to 16 pm).

4.1- Tobby Entrance

The number of vehicles per hour from 8 am until 16 pm from Tobby entrance road to Gharian was 3,825 On Sunday (private car 85.5%, taxi 6.5%, Microbus & Coach 3.5%, Truck 1.9%, Other 2.6%), 2891 On Monday (Private car 84.4%, taxi 7.2%, Microbus & Coach 4.1%, Truck 1.8%, Other 2.5%), 2,719 On Tuesday (Private car 83.7%, taxi 6.7%, Microbus & Coach

environment (Neurman, 2003) and (WHO, 2015). Due to the complex scenarios happening in the city a study has been carried out to understand the traffic volume flow in the city center, and to try to establish suitable transport system model to reasonably described traveler's attitude and perception in Gharian city.

3- Methodology

Data collection, survey procedure and traffic counts were carried out on five entrances and major streets in Gharian city in May 2018. Traffic counts were collected for 8 hours per work day time starting at 08 am to 16 pm in order to have most of the day traffic volume fluctuation. A questionnaires study was carried out in selected urban areas of the Gharian city to determine and investigate why people use private car instead taxi (for example cab and micro or minibus) in Gharian city. A total of 150 questionnaires were collected (Sekaran, 2003) over period of one month from (1st May to 31st May 2018). The Statistical Package for Social Science (SPSS) version 19 and Excel 2007 software were used to analysis and descriptive the questionnaire and data collection in this study.

4- Traffic Volume on Gharian Entrances

This study aims to support the problem statement in the study area and shows the number of own vehicles entering Gharian every day at peak period hours. The result of this study points to the increased travel time and low driving speed during morning and afternoon hours for different areas in Gharian city and caused the traffic congestion in city center. This study aims to assess the traffic volumes on the five main entrances to the city,

Fig- (1): Location of Gharian city from Capital city of Libya

Source: <http://wikimapia.org>



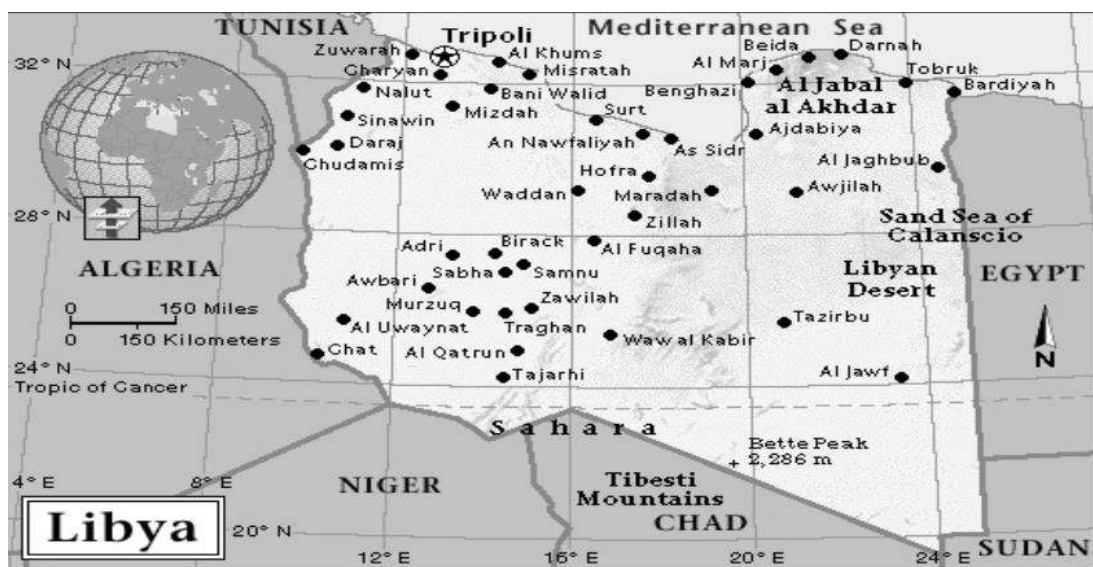
Fig- (2): Gharian city plan

Source: <http://wikimapia.org>

2- Problem statement:

The number of private cars users in Gharian city are increased and have becomes more popular and dominant than other modes of transport in city due to their availability, flexibility and convenient for travel when required. Private cars also represent high status, comfort and safety. However, travellers in Gahrian, also used private transport namely minibuses and private taxis to their works, study and shopping activities. Private transport can be owned and operated by individuals or private company. The uncontrolled usage of these transport modes has caused traffic congestion problems in the city, which has increased travel time, road accident and air pollution to the city

32°10'11"N 13°01'00"E, it is far about 85 km southwest of the Libyan capital city, Tripoli, located on 820 m above the sea level (Libya profile, 2008). According the latest statistics in 2016, the city population is 176,000 (Civil Status Bureau, 2016) and it has area about 4660 km². Figure (1) shows the location of Gharian in Libya map and Figure (2) shows Gharian plan. A roads and transport is important areas in our city lives (GTI). It is advanced science, studies and researches, designs and solutions in this area are being made daily to find the most appropriate ways for travellers and keeping up of the rapid development (Adel, 2019) & (Amiruddin and Adel, 2011). Expansion of cities is accompanied by an increase in the population growth and economic activities erected thereon; it is one of the major factors that cause an increase in Traffic. Traffic problems are varied and some of them very complicated, they are increasing day after day if specialists didn't find the right solution (GTI) and (Linda, 2003). No doubt, the problems that happen due to the development of cities, and in order to continue this development should search for appropriate solutions, this makes transportation system (PT) also advanced. In general, progress of cities is linked by the progress of transportation system.



المخلص:

معظم المدن الليبية تعاني من شدة الازدحام المروري. وهذا يرجع إلى الزيادة في استخدام السيارات الخاصة وسيارات الأجرة. غريان هي المدينة الرئيسية في الجبل الغربي وهي إحدى هذه المدن التي يفضل فيها غالبية المسافرين التنقل باستخدام السيارات الخاصة، التي تشكل نسبة تقدر بحوالي 90% من حجم حركة المرور بالمدينة، في حين أن نسبة عشرة في المائة المتبقية تستخدم وسائل النقل الخاصة مثل (سيارات الأجرة والحافلات الصغيرة والحافلات التي تعمل بواسطة القطاع الخاص). تهدف هذه الدراسة إلى دعم وإيضاح المشكلة في منطقة الدراسة، وتوضح عدد السيارات الخاصة وسيارات النقل الخاص التي تدخل مدينة غريان كل يوم في ساعات الذروة. كما تهدف إلى تحديد العوامل التي تؤثر على تفضيل وسيلة النقل وتطوير نموذج مناسب للمسافرين داخل مدينة غريان لجميع ومختلف الرحلات. الاستبيان صمم لإجراء مسح في مدينة غريان خلال العام 2018 ولإستكشاف إمكانية الحد من استخدام السيارات الخاصة على الطرق بالمدينة من خلال إمكانية تطبيق الاستخدام الأمثل لنظام النقل العام (PT). تم اختيار العينة وتوزيعها عشوائيا من المناطق السكنية المختلفة بالمدينة حيث بلغ مجموع عينة الدراسة 150 مستجوبا. واستخدمت في هذه الدراسة لوصف وتحليل هذا الاستبيان المجموعة الإحصائية للعلوم الاجتماعية (SPSS) الإصدار 19 وبرنامج Excel 2007. الكلمات الرئيسية : سيارة خاصة، حجم حركة المرور، الازدحام المروري، النقل الخاص (سيارات الأجرة، الميكروباص والحافلات)، المداخل الرئيسية ونظام النقل العام (PT).

1- Introduction

Most of the Libyan cities are suffering from severe traffic congestion (Adel, 2016). Gharian is one of the most active cities and the large city in the Al-Gabel Al-Garby in Libya. Gharian Located in the northwest part of Libya, Gharian is a Mountain City, coordinates:

The Descriptive Analysis for Traffic Volume on Main five Entrances to City Center of Gharian, Libya

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Abstract

Most of the Libyan cities are suffering from severe traffic congestion. This is due to increases in private car usage and taxi. Gharian is the main city of Algabel Algarbi, it is one of these cities that where the majority of the travellers prefer to use private car, which that make up of 90% of the traffic volume, whereas the remaining ten percents use private transport as (taxi, micro bus and privately operated coaches). This study aims to support the problem statement in the study area and shows the number of private car and private transport vehicles entering Gharian every day at peak hours. Also aims to identify factors that affect transportation mode preferences for all trips, to develop a suitable model for the Gharian travellers. For this questionnaire survey was carried out in Gharian city in the year 2018 to explore the potential reduction of private cars usage on the road through optimal use of public transport (PT) system. The study sample total is 150 respondents. They were selected and distributed randomly from different Gharian residential areas. The Statistical Package for Social Science (SPSS) version 19 and Excel 2007 software were used to analyses the questionnaire.

Key words: private car, traffic volume, traffic congestion, private transport (taxi, microbus and coaches), main entrances and public transport (PT) system.