Students' Transportation Problems in University Campus
A Case Study, Tripoli University, Libya

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Abstract --- **University campuses are small cities in urban areas that are active and attractive destinations. This high level of activity causes severe congestion on campuses and in the surrounding area, especially in urban university locations. Tripoli University campuses are multi-modal and complicated, combining automotive traffic, public transportation, and pedestrians into a single transportation system. This poses a serious problem for university campuses. Vehicular congestion in a campus setting creates several significant conflict areas that range from pedestrian safety to traffic and transit operations. The university has the greatest influence on the surrounding neighborhoods. Innovative transportation approaches can diffuse from higher education to other parts of society.**

The aim of this study is to understand the main transportation system used at Tripoli University and document a systematic approach to analyze the problems associated with university campus transportation systems and develop solutions to this problem.

The research question how can Tripoli University students reach the university campus in less time and more safely?

The methodology used in the research will also generate a questionnaire online for students and staff collecting data from other studies and gain knowledge from other countries' solutions. Effective university campus design has the biggest impact in this area. The expected outcome will be a Based on the findings, this study proposed a mode of transportation that would aid in the discovery of effective solutions to the problem, reduce the amount of time spent traveling every day at the university, and create an integrated university campus.

Index Terms: **Transportation modes, time, Tripoli city, congestion university campus master planning, campus culture.**

I. INTRODUCTION

Over the last several decades, more transportation infrastructure has been needed in Tripoli due to a large population increase. Tripoli does not have any public transportation system, so people use private cars to drive themselves from home to other destination places, or they use minibuses as a second solution. Students at Tripoli University had to deal with a lot of traffic problems because of their use of these modes of transportation and the lack of public transport.

The article will investigate the issue of transportation for students in a university in Tripoli to aid the university administration in improving the system and encouraging investments in the transportation sector. This article will help to identify and predict the difficulties. This paper will look at the university's mobility system and focus on how we might build a good transport system to the campus. The goal is to find the best modes of transportation for the university. One of the most important issues in the campus's mobility plan was that various forms of transportation, such as people, vehicles, and buses, create a safe and quiet environment suitable for the learning environment.

1.1. Research problem

The problem that this thesis attempts to study may be stated in the research question: -
How can Tripoli University students reach the university campus in less time and more safely?
What is the best mode of transportation for students at Tripoli University?

The major focus in these chapters will be on the relationship's area between the location of the university and the transport modes.

1.2. Research methodology

To identify key issues, a review of literature, case studies, and research initiatives is used, while a multi-layered methodology based on primary data analyses, direct observations, and surveys is used to design and implement a new service and assess the use of existing services. The proposed framework can be used to encourage additional research into novel strategies. Data was acquired through a site visit and an online questionnaire for 100 participants with the purpose of assessing how long it takes a student to go from his house to his faculty. The investigation's conclusions showed a wealth of information and indicators, the most important of which is that students at the University of Tripoli spend a significant amount of time every day seeking parking spots or waiting in lines to enter the school.
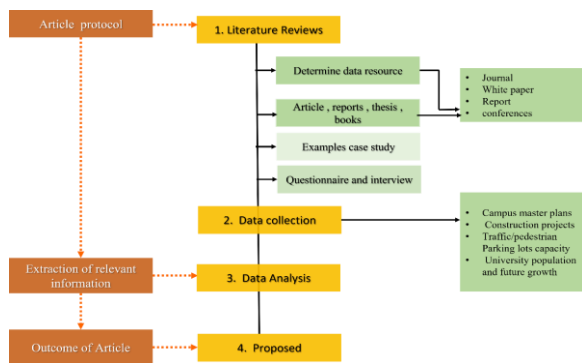
Figure 1. Research methodology

II. TRANSPORTATION ON UNIVERSITY CAMPUS

Tripoli has a good roadway system. The city was connected to other areas of the country. The city's road system is made up of motorways, expressways, arterials, and collector roads. There is a strong correlation between the city's high car ownership rate and the amount of traffic generated by private automobiles. According to 2006 vehicle registration statistics, more than 413 people per 1,000 inhabitants in Tripoli own a car, which contributes to the city's traffic bottlenecks. Many universities realize that, as a major travel attractor, traffic congestion does not just stay on campus; it can spread outward and have a significant impact on the mobility of the surrounding areas (Brown-West 1996). Thus, several campus officials have attempted a coherent and coordinated planning effort with a regional or municipal transportation system. The City of Tripoli, the University of Tripoli Campus A and surrounding areas were challenged by many transportation issues, including parking, traffic, and public transportation. The campus did not develop a long-range development plan as a guideline for the continued development of the area. The campus was devolved by stages or individual planning based on urgent needs or necessary use. While campus transportation planning issues faced by university officials may be diverse in nature, one of the primary challenges lies in providing sufficient parking space and implementing strategies to mitigate traffic congestion in and around parking lots (Brown-West 1996; Tsai 2004). For instance, in general, many universities have classes starting early in the morning, influencing faculty, staff, and students to arrive at campus within a short time window. Concentrated traffic arrivals create substantial queues of spillback emanating from parking facilities to neighboring arterials or even freeways. A common element of campus design master plans is to close certain parts of the campus core to pass-through traffic with the goal of creating a more pedestrian-friendly environment that minimizes vehicle-pedestrian conflicts, improving safety and walkability (Sisson 2008). Some universities were initially designed to be auto-free campuses, such as the University of Arizona and Stanford University. I am considering closing the entire campus core in conjunction with a campus main entrance realignment. The common rule of thumb for campus design is to limit average walking time to 10 minutes. However, as campuses grow larger, maintaining a balance between vehicle accessibility and walking time becomes a challenge (Young, Miller et al. 2004).

III. TRIPOLI CITY

3.1. population and climate

Libya's capital city, Tripoli, has a population of 1,169,790, a 27 percent share of the country's total population, and is situated on the Mediterranean Sea.

Tripoli's 2021 population estimate is 1,169,790. Tripoli had a population of 105,876 in 1950. Since 2015, Tripoli's population has risen by 4,705, or 0.40 percent per year.
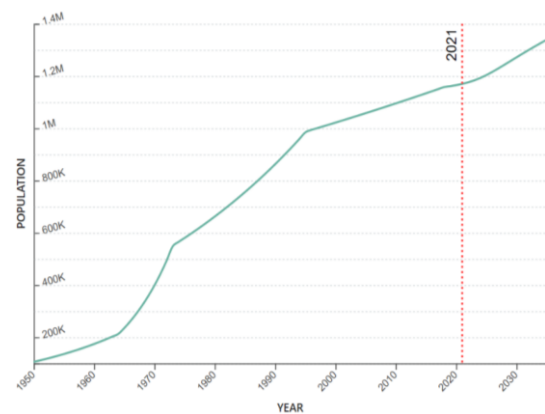

Figure 2. Tripoli population forecast

The climate and average weather year-Round in Tripoli Libya in Tripoli, the summers are hot, muggy, arid, and clear and the winters are cool, windy, and mostly clear. Over the course of the year, the temperature typically varies from 49°F to 92°F and is rarely below 44°F or above 101°F. Based on the beach/pool score, the best time of year to visit Tripoli for hot - weather activities are from early June to early October.
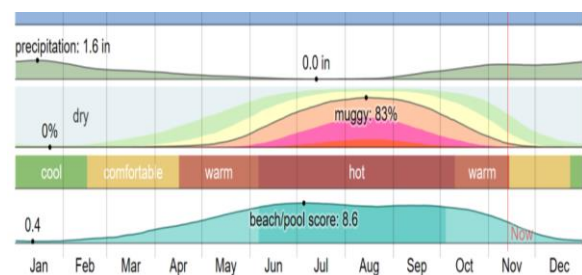

Figure 3. Tripoli yearly weather

IV. TRIPOLI UNIVERSITY CAMPUS

Tripoli University is Libya's major university and is in the city's central business district. Founded as a part of the Libyan University in 1957, it was renamed the

University of Tripoli in 1973. Undergraduate, master's, and doctoral degrees are the degrees awarded by the university. The universities include faculties of Engineering, Economics, Agriculture and Natural Resources Management, the Faculty of Computer and Information Science, the Faculty of Science, the Faculty of Law, and the Faculty of Sport Sciences and Physical Education, Veterinary Medicine faculty, Medical Technology faculty, Pharmaceutics and Therapeutics faculty, The language faculty, a dental school, an arts and media studies college, and a science faculty.

4.1. Data collection

More than 33703 students are now registered at the institution as of this writing, according to data from the general registrar's office. For the 2019-2020 academic year, the yearly growth rate for university students according to the general registration office is equal 20%. the greatest daily gathering of people's movement in Tripoli Students, instructors, and staff at the University of Tripoli campus make it. An average of 20,000 people from a variety of districts come to the university campus every day, making it 60% of Tripoli's university population. A group of people participate and fill out a questionnaire online. We had 100 people participate in a survey we prepared specifically for this purpose, and the information gathered was by performing this study. Using these questions. Tripoli's transportation infrastructure may be assessed in real time. We prepared this form Focus on the following points:

1. Discovering how students get to university
2. Be aware of the travel time from the student's home to the campus and back.
3. The time it takes to find a parking spot at the university
4. We observed the morning and evening peak hours.
5. Tripoli's public transportation infrastructure is functioning well.

V. RESULTS

Most of the forms that were given out online have been returned. Taking into consideration the elimination of missing or blank forms, 95% of participants answered. That is a very good percentage. Analyzing begins by using a qualitative analysis method by using the Microsoft Excel Sheet program. It consists of two working papers that enable us to enter data from respondents and interpret your data by formatting a scorecard.

96 percent of those polled were dissatisfied with the city's current transportation system. This is an optimistic sign that more research should be conducted. Because the preliminary findings clearly show that performing this research is important, as well as how much the sample responded, it is obvious that this study's value is evident at first glance. According to Tripoli University's data research, around 60% of students utilize private cars, which is a considerable percentage when compared to the other modes of transportation used by students.

Table 1. display the modes of transportation utilized by male and female students, and the proportion of each kind.

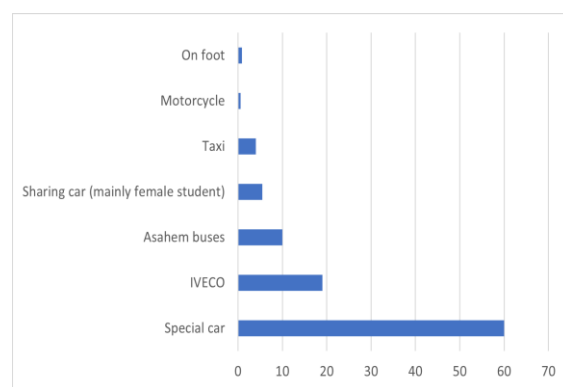| No	The type of transportation used	Usage %
1	Special car	60
2	IVECO	19
3	Asahem buses	10
4	Sharing car (mainly female student)	5.5
5	Taxi	*4*
6	Motorcycle	0.6
7	On foot	0,9
	Total	100

Figure 4. modes of transportation utilized by male and female students

According to Table (2), the number of male students who use private automobiles is more than the number of female students, and it is well-known that most of the female students are transported by their parents, which results in the weariness of another citizen and his or her delay in work. Due to the secrecy of the city and the status of its people, religious, social, and customary, all students utilize private cars.

Table 2. Transportation modes and percentages for both sexes are shown in the table.

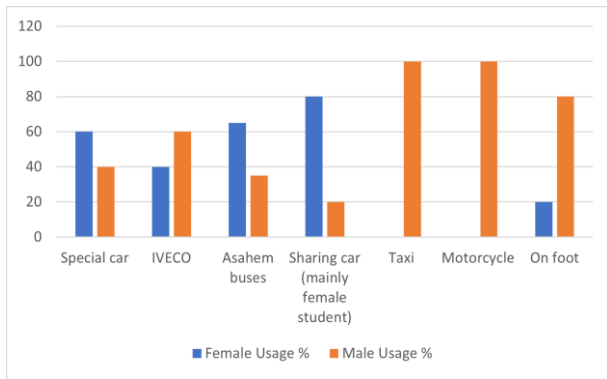| No	The type of transportation used		Usage %
1	Special car	60	40
2	IVECO	40	60
3	Asahem buses	65	53
4	Sharing car (mainly female student)	80	20
5	Taxi	-	100
6	Motorcycle	-	100
7	On foot	20	80

Figure 5. Transportation modes and percentages for both

It's common knowledge that traffic congestion on metropolitan streets are mostly caused by the excessive usage of private vehicles. In addition, it should be highlighted that students are the only ones that utilize taxis for transportation. As previously said, taxis are mostly not often utilized by college students due to their low financial resources. Because this type is too costly for most of students, many turn to public transportation which may be exhausting and lead students to be late for lectures because of its unpredictable schedule. In the table below we present the average time spend by pupils for going to university and coming back home, the table show some important district in Tripoli city.

Table 3. shows that the average distance travel by each student

District name	Average time spent by pupils for going	Average time spent by pupils to come back home	Distance in Km
suq aljumuea	30	45	7.0
City center	32	47	6.0
hayu l'andalus	42	52	9.0
ghut alshieal	50	75	18
alsiyahia	80	110	18
alhadaba	45	40	5
tariq almatar	37	48	16
alsiraaj	60	90	19
jinzur	65	90	22
aldaewat al'iislamia	42	92	13
Average	**48.3**	**68.9**	**13.3**

The table (3) shows that the average distance travel by each student is around 13.3 kilometers. There is a 48.3-minute average travel time from a student's home to the university, and a 68.9 -minute return time, meaning students spend an average of 58.6 minutes traveling to and from the campus, as well as back again. It takes a university student an average of 73.6 minutes a day to go to and from class, and that includes 15 minutes of wasted time searching for a parking spot for his or her own vehicle on campus. 82 percent of students arrive at the university during the morning rush hour, which is when most students are on their way to their classes. 8:00 and 9:00 a.m., as shown in Table (4).

Table 4. Shows the peak hours in the morning

Hours	7:00- 8:00 am	8:00-9:00 am	9:00-11:00 am	11-12:00 pm
	50%	30%	15%	5%

Related to the results on the table no 4 the peak hours in the morning from Seven to nine in the morning around 80% they arrived at the same time to university.

Table 5. Shows the peak hours in the afternoon

Hours	12:00- 1:00 pm	1:00- 2:00 pm	2:00- 3:00 pm	3:00- 5:00 pm
	20%	40%	30%	10%

Between (One o'clock to three o'clock) in the afternoon, as indicated in the table, male and female students returning from the university city to their house around 70 % they go out at the same time to university.

The result from the question related to where you parked your car on the university campus; for girls, the highest number in the parking lot, then open land that means the girls came very early morning more than boys; for boys, the highest number on the street side, then open land. This creates a significant parking issue, causing congestion on campus in the morning and afternoon.
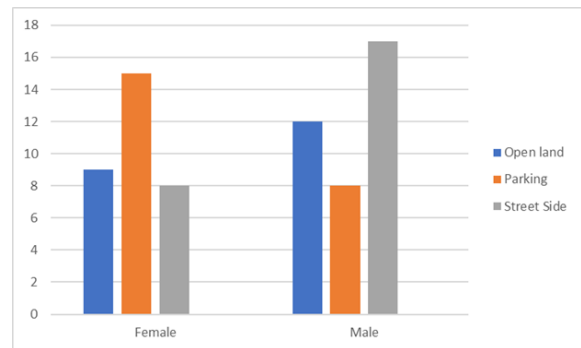

Figure 6. Shows where the student park the cars

It was therefore determined that, based on a sample, the proportion of male and female students utilizing various modes of transportation was utilized. As a result of the research (Table 1), the total number of students in all the faculties of the university on campus was projected onto the total number of students. The following points may be extracted from the data, which can be utilized for the following computations and analyses:
- Between the institution and other parts of the city, college students often travel around 13.3 kilometers on average.
- Students spend an average of 73.6 minutes each day traveling to and from university.
- The average pace of transportation is 11 kilometers per hour.
- University of Tripoli data shows that there are more people on campus each day than there are enrolled in the university, because the campus gates allowed all to entering.
- The annual rate of increasing from 15 - 20 %, it's a big number need to take in our consideration.

VI. DISCUSSIONS

To create a new and inexpensive means of transportation to repair the transportation route. They can be accessed in independent stations without obstructions; they are easy to reach, and their current performance level can be adjusted. Countries have advanced intellectually since a long time ago. It is necessary to find a solution to the transportation problems because the demands of the multimodal public transportation networks are getting worse every day, and the integration between this network and the increasing population are all factors that exacerbate the problem. On this basis, it is necessary to raise the level of services, public confidence, and the current cultural level of citizens.

Rapid public transport buses are the cheapest, cheapest, and fastest solution, and are a good way to transport students to and from the institution. They are easy to implement and do not require any additional infrastructure. Each vehicle can carry the equivalent of 42 students. 802 buses would be needed to transport university students if everyone went at the same time. The number of university students for the 2019-2020 academic year was calculated assuming that 70% of students take express transit to and from the university and that the bus has a capacity from 42 to 45 passengers. The 13.3-kilometre round trip takes about 25 minutes for the bus, and students no longer must find a place to park their cars, which takes about 15 minutes each time they get to university, which reduces their stress levels dramatically. In addition, they will not drive the car and expose it to its many risks, which would also reduce their stress. We can suggest the coastal road in Tripoli, the corridor near Sajeel Al-Bahr for metro buses, and keeping the other lane for the regular vehicle, and providing many stations in front of the main arterial roads intersecting with the coastal road, one of the most important arterial roads, which is 48 meters wide, is the railroad, University Road to be the Metrobus line It passes through Martyrs' Square until it reaches the island of Al-Furnaj. This line helps students arrive in a short time, more comfortable and safer .This is a preliminary idea to solve the transportation problem for students as well as citizens, and this project needs a detailed study to implement it. Then student they can take bus shuttle which will be fixed inside the university to avoid the congestion inside campus, for student who comes by private car the can park and ride busses.

Bus rapid transit (BRT) systems are found in cities throughout the world. Their operating flexibility and their ability to be built quickly, incrementally, and economically underlie their growing popularity. The systems vary in design, operations, usage, and effectiveness. Collectively, the case studies on BRT provided on the CD-ROM accompanying this volume give a wealth of information on BRT and how it should be planned and implemented. the table shows on the experiences of some urban areas in North America, Australia, Europe.

Table 6. Shows some countries success using BRT   system in some area

Area name	Country	Population (Million)
Boston	USA	3.0
Houston	USA	1.8
Sydney	Australia	1.7
Leeds	United Kingdom	0.7
Rouen	France	0.4
Istanbul	Turkey	15.0

The best example with the biggest number of populations for this type of transportation metrobus in Istanbul. The Metrobus (Turkish: Metrobüs) is a 50 km (31.1 mi) bus rapid transit route in Istanbul, Turkey. The system has 45 stations that follow the city's ring road via Avcılar, Zincirlikuyu and the Bosphorus Bridge to Söğütlüçeşme using dedicated bus lanes for almost the entire length the route, The system mainly follows the city's ring road, with a fully separated right-of-way between Avcılar and Zincirlikuyu and between the eastern end of the Bosphorus Bridge and Söğütlüçeşme. There are no intersections with a dedicated bus lane in each direction with few passing lanes.[4] Buses drive on the left-hand side of the bus lane, so that their doors, designed for conventional operation with door to the right-hand side of the vehicle, open onto the bidirectional central platforms. That service very succusses with 15 million population plus big number of tourists travelling every year.

Figure 7. proposal line of rapid bus system in Tripoli to university

Figure 8. Istanbul metro bus system

The second example, Gold Standard BRT has many characteristics that make it worth including: -Agility. BRT is a highly agile system that connects neighborhoods better than a traditional hub-and-spoke rail system. BRT doesn't require tracks and connects seamlessly to bike and pedestrian transit, and its dedicated lanes (separated from traffic) are easily plowed during snow. -Cost-effectiveness. Because BRT does not include complex track infrastructure, it requires less upfront capital to construct. BRT can on average be up to seven times more affordable than light rail, per mile. -Immediacy. BRT can be implemented more quickly than rail systems, relieving pressure on the aging train and trolley infrastructure. BRT systems, is to make several potential corridors in which BRT could reduce congestion on the T, serve underserved communities or groups, provide more direct connections between neighborhoods, and bolster planned future development. Through a comprehensive technical analysis.

VII. CONCLUSION

• Campuses University is like small cites include all types of infrastructures and functions we can find in the city, populations in some university campus more than some cites, which means the solution on university campus will be a good idea as a small model for all city latter.

• We findings also revealed that 92 percent of the research participants thought the city's transportation system was to blame.

• According to the survey and analysis, almost 98 percent of the participants are dissatisfied with the city's present transportation system.

• According to the findings of the study, over 60% of Tripoli University students use private automobiles to get between their homes and their university institutions.

• The data study revealed that around 80% of Tripoli Campus students arrive at the university between 8:00 to 10:00 a.m.

• By summarizing the findings of the study, around 85 percent of Tripoli University students depart between one and three o'clock in the afternoon.

• The average speed in the current transportation system in the city is 11.0 kilometers per hour. In the proposed alternative system, it is expected that it is 45 kilometers per hour, which is a fourfold increase

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BIOGRAPHIES

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