January 2020

FORWARD TO ENHANCING INFORMAL TRANSPORTATION STATIONS IN CROWDED CITIES

Mary Felix
, Assistant Professor, Faculty of Architecture, Design and Built Environment, Beirut Arab University, Lebanon,
m.felix@bau.edu.lb

Mostafa ElHefnawi
Assistant Professor, Faculty of Architecture, Design and Built Environment, Beirut Arab University, Lebanon,
m.elhefnawi@bau.edu.lb

FORWARD TO ENHANCING INFORMAL TRANSPORTATION STATIONS IN CROWDED CITIES

Abstract

By observing the planning of developing countries, it is clear that there are several factors that affect the movements and behaviors of transportation. One of these behaviors is the appearance of informal transportation modes, which move along certain paths to fulfil citizens' needs. The phenomenon of informal transportation modes appears due to a lack of formal transportation modes existing, or a weakness in planning that does not consider the users' needs or community behavior. This paper focuses on the location of informal transportation stops, which affect transportation movements and traffic jams, by observing and documenting the location and facilities of informal transportation stops. The reasons and factors that affect the locations of informal transportation stations will be determined in order for them to be considered in future city plans.

Keywords

FORWARD TO ENHANCING INFORMAL TRANSPORTATION STATIONS IN CROWDED CITIES

M. FELIX[1]

M. ELHEFNAWI[2]

ABSTRACT

By observing the planning of developing countries, it is clear that there are several factors that affect the movements and behaviors of transportation. One of these behaviors is the appearance of informal transportation modes, which move along certain paths to fulfil citizens' needs. The phenomenon of informal transportation modes appears due to a lack of formal transportation modes existing, or a weakness in planning that does not consider the users' needs or community behavior.

This paper focuses on the location of informal transportation stops, which affect transportation movements and traffic jams, by observing and documenting the location and facilities of informal transportation stops. The reasons and factors that affect the locations of informal transportation stations will be determined in order for them to be considered in future city plans.

KEYWORDS

Informal Transportation, transportation modes, informal transportation stations.

1. INTRODUCTION

Public transportation is very important to successful urban planning in order to serve the urban population. Public transportation mainly relies on high-density urban areas (Glaeser, Kahn, & Rappaport, 2008). The lack of planned public transportation causes the appearance of informal, alternative modes to fulfil people's needs (Evans, O'Brien, & Ch Ng, 2018). The informal modes of transportation become an essential for billions of people in crowded, growing cities (Evans et al., 2018). Therefore, the lack of formal transportation supply causes the high demand for informal transportation modes (Cervero & Golub, 2007).

Through observation, it can be seen that the informal modes of transportation have created informal locations, used as a sort of informal stations. These informal stations are located in areas that are crowded by people and do not have enough formal transportation to fulfil the needs of the residents. The planning of several cities is not adapted for informal station stops, which is a very big problem because it causes traffic jams and accidents. No one can deny the efficiency of informal transportation as a resource, as it can be used to fulfil the shortage of developing governments' capabilities in the field of transportation supply. The potential sustainability of informal transportation is not a new concept (Evans et al., 2018).

---

[1]Mary Felix, Assistant Professor, Faculty of Architecture, Design and Built Environment, Beirut Arab University, Lebanon
E-mail address: m.felix@bau.edu.lb

2 Mostafa ElHefnawi, Assistant Professor, Faculty of Architecture, Design and Built Environment, Beirut Arab University, Lebanon
E-mail: m.elhefnawi@bau.edu.lb

The main problem is how to manage the informal transportation as an opportunity to solve transportation problems in developing crowded countries in order to control the haphazard nature of the existing informal stops and stations. Therefore, this research aims to document and analyze the causes of locations of informal transportation station points, the effect of informal stations on traffic movement and human safety, and the efficacy of station design comparing with the formal types of stations through two case studies in MINA region which are Cairo, Egypt and Tripoli, Lebanon.

2. TRANSPORTATION BETWEEN FORMAL AND INFORMAL MODES

Formal and informal transportation are the two main types of public transportation modes (Mohareb & Felix, 2017). These two public transportation types have several characteristics that affect city planning.

City streets are mainly designed for formal transportation modes, such as taxis, buses, trucks, light rail transit, heavy rail, trams and other means (Mohareb & Felix, 2017). The government is responsible for providing formal public transportation facilities, such as traffic path directions, stations in designed locations, signals, infrastructure and other aspects facilities (Kumar, Singh, Ghate, Pal, & Wilson, 2016).

Informal public transportation modes are mostly privately run with minor services (Ramadan, 2016). The term 'informal public transportation' demonstrates the informality and illicit context of drivers (Cervero, 2000). The main characteristics of informal public transportation are filling the gaps in formal transportation, flexibility and servicing places related to user needs (Kumar et al., 2016). Several urban problems exist because of informal transportation, such as traffic congestion, disorganized operations, traffic accidents, environmental problems and other intangible impacts (Cervero, 2000; Mohareb & Felix, 2017).

Accessibility is an essential concern in public transportation strategies, which refers to people's capability (using any type of transport mode) of reaching facilities within a specific time. The quality of accessibility has direct and indirect influences on the urban context. One of the factors that can affect the quality of accessibility is the transportation mode's network connectivity, which is correlated to the density of networks, source/destination relationships and the standard of connections between transportation modes (Litman, 2011, 2017; Mohareb & Felix, 2017). Therefore, the main aspect that should be considered when using public transportation is sequential transfer between one transportation mode and another, to complete the journey from one place to another; thus the locations of public transportation stations are very important. The selection of station location should consider catchment area and locate it within a particular time and distance from which the majority of passengers arrive, by walking, accessing other modes, private cars, parking, riding and so on (Chalermpong & Wibowo, 2007; Gutiérrez, Cardozo, & García-Palomares, 2011). The sequential movement of the passenger trip is very important for study in order to cover all user needs in urban areas. The shortage or lack of consideration of the passenger trip sequence allows informal transportation modes to be presented in urban streets, causing several problems. thus informal transportation is a result of formal transportation connectivity deficiency (Transfort, 2015).

3. LOCATIONS, CHARACTERISTICS AND TYPES OF BUS STOPS & STATIONS

According to the literature, the location and design of a bus stop on a roadway should consider street-side factors and kerb-side factors. Street-side factors are related to the roadway and affect bus operations, such as standardization, periodic review, near-side/far-side/midblock placement, visibility, bicycle lanes and thoroughfares, traffic signals and signs, roadway alignment, driveways, location of pedestrian crossings, location of the kerb, street grades and road surface conditions (Fitzpatrick, Hall, Perkinson, Nowlin, & Koppa, 1996). Street-side design directly affects the location of bus stations and stops. The street-side characteristics that affect the bus stop locations are traffic speed, intersection design, street design and the location of deceleration or acceleration lanes.

Kerb-side factors relate to location within the community, compatibility, direct access to bus stop, impervious ground surfaces, proper pedestrian circulation, existing street furniture, environmental treatments, security, lighting, sight line and maintenance (Fitzpatrick et al., 1996).

The main characteristics that should be considered in designing bus stops and stations are stop spacing, location, station length and design features (Levinson, Zimmerman, Clinger, & Gast, 2003). Stop spacing refers to the distance between two consecutive stations. The type of stop spacing can be classified into two main types. The first is close stops (⅛–¼ mile), which results in short walking distances, more frequent stops and a long travel time. Second is a longer distance between stops (more than ¼ mile), which leads to longer walking distances, less frequent stops and less travelling time (Levinson et al., 2003; Transfort, 2015). The bus station or stop's location depends on several factors, such as pedestrian accessibility, available space, traffic patterns, safety considerations, and route and intersection geometry design. In general, there are three common locations in the regular street design, which are near-side, mid-block and far-side (Levinson et al., 2003; Transfort, 2015). Bus station length depends on several factors, such as bus traffic volume, number of waiting buses (in general, between two and five buses), type of bus operation and others (Levinson et al., 2003).

Bus station types are divided into four types. Type I, the sign stop, is a basic stop type consisting of a bus stop sign and a space for waiting without benches. Type II, the bench stop, consists of a bench without shelter, a bus stop sign, a rubbish bin and a bike rack. Type III, the shelter stop, has all the elements of Type II in addition to a bus stop shelter, and it may also have internal light and an advertising board. Type IV, the station stop, has all the components of Type III, in addition to real-time digital signage of the next bus, a ticket machine and a unique shelter design (Transfort, 2015).

4. TRANSPORTATION STATIONS ANALYSIS MODEL

From the previous literature review the research suggest a model to evaluate the efficacy of informal transportation modes and stations as shown in the following table - table 1.

The first column shows the transportation mode such as taxies, minibuses and others. The second column shows the mode specifications in terms of type of mode (formal / informal), exit of planned station or random stopping, mode availability, trip round type (fixed / unfixed) and type of transportation trips (inside/ outside city). The third column shows the station type (type I,II,III or IV) according to the exist facilities (bus stop sign, bench /s, shelter, bike racks / parking, trach receptacle, interior lighting, advertising panels, ticket machine, real time next bus signage and a unique shelter structure). The fourth column the station impact on traffic flow, pedestrian safety, integration with formal transportation sequences, integration with other informal transportation sequences.

Table 1 Transportation stations analysis model

Transportation Mode	Mode specifications					Station type - facilities										The station impact on			
	Type of mode : Formal / Informal	Exit of planned station or random stopping	Mode availability	Trip round type: Fixed / Unfixed	Type of transportation trips (inside/ outside city)	Bus stop sign	Bench /s	Shelter	Bike racks / parking	Trach receptacle	Interior lighting	Advertising panels	Ticket machine	Real time next bus signage	A unique shelter structure	Traffic flow (√ = negative effect)	Pedestrian safety (√ danger)	Integration with formal transportation sequences	Integration with other informal transportation sequences

5. METHODOLOGY

This paper will analyze, through observation, several locations of informal transportation stops and stations in order to define the causes of the locations of informal stops and their effect on traffic movement and human safety.

The main modes of transportation that the research focuses on are minibuses and microbuses as the most common types of informal mode of transportation, neglecting other informal modes such as tuk-tuks, motorbikes and so on. This is because minibuses and microbuses can be easily organized and turned into formal transportation by managing their deficiencies, such as routes, frequency, stop location and stations, user information and fare control.

The selected areas of the case studies were chosen to cover several causes and types of informal station and gathering point, based on the results of passenger questionnaires. The study focuses on two cites in the Middle East (Cairo in Egypt and Tripoli in Lebanon); these cities located in MENA region, had similar cultural behavior, political atmospheres, environmental conditions, and suffered from the similar problems of informal transportation.

The suggested framework consists of two phases. First was creating a Google Form questionnaire as a pilot study to monitor passenger needs, existing types of gathering point, location, facilities, and advantages and disadvantages of informal stations. Second was selecting the most popular informal station location types based on the questionnaires and applying this to real locations, which could be deeply studied in terms of documenting and analyzing the present informal stopping points and stations, and criticizing their effect on road traffic flow, passenger safety and integration with formal transportation sequences, if they exist.

After presenting the case studies, the research discusses the criteria that should be considered when creating a formal station for informal transportation modes, in order to control the haphazard nature of the existing informal stops and stations.

6. USER NEEDS SURVEY RESULTS

The questionnaire created by using google form tool and sent to around 400 persons who are usually using public transportation modes on daily bases. The questionnaire fulfilled by 248 person from Cairo Egypt and 150 from Tripoli Lebanon.

The questionnaire was based on public transportation users in two countries: Egypt and Lebanon. Due to the students and workers sectors, the majority of daily users of public transportation are between eighteen and sixty years old and of both genders, as shown in Figure (1).

The questionnaires completed by Egyptian and Lebanese passengers leads to the following: fifty-nine per cent of passengers have to use more than one mode in a sequential movement to carry out their daily trips. Egyptian passengers prefer the metro and informal modes to make their trips. On the other hand, most Lebanese passengers do not use any of the formal public buses; furthermore, Lebanon does not have a rapid transit system.
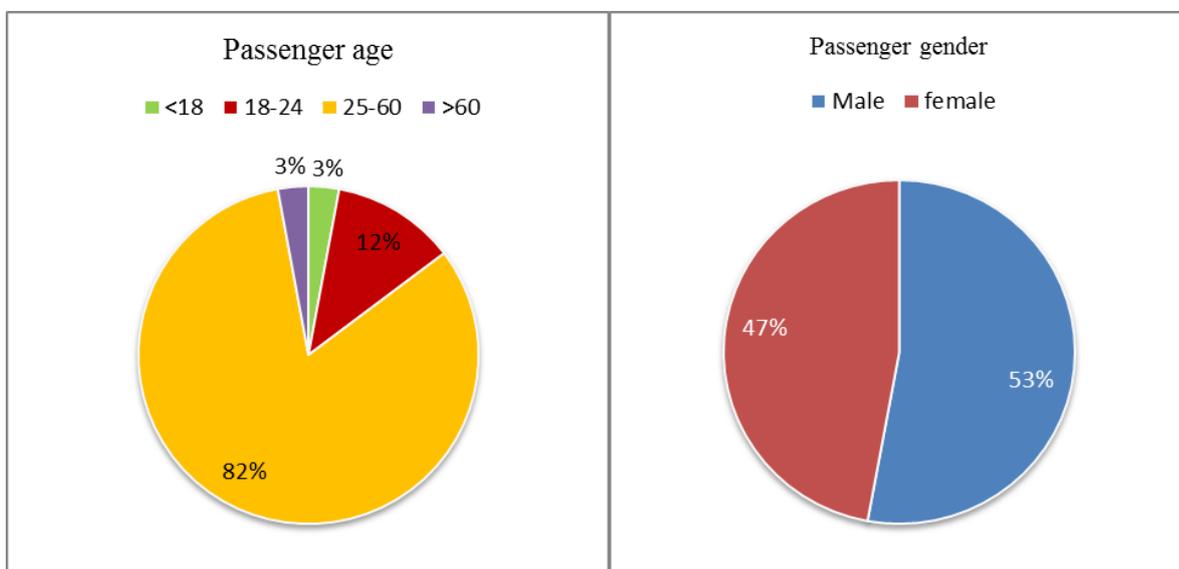
Fig. 1: questionnaire results in terms of passenger age and gender

Twenty-three passengers use walking to move from one station to another to complete their trips. Around fifty-eight per cent of passengers use informal public transportation modes in their daily trips, such as minibuses, microbuses, informal taxis and tuk-tuks.

Sixty per cent of passenger find a sequential relationship between transportation stations and stops, either directly or by walking for less than ten minutes. Results of questionnaire are illustrated in figures 1, 2, 3, and 4.
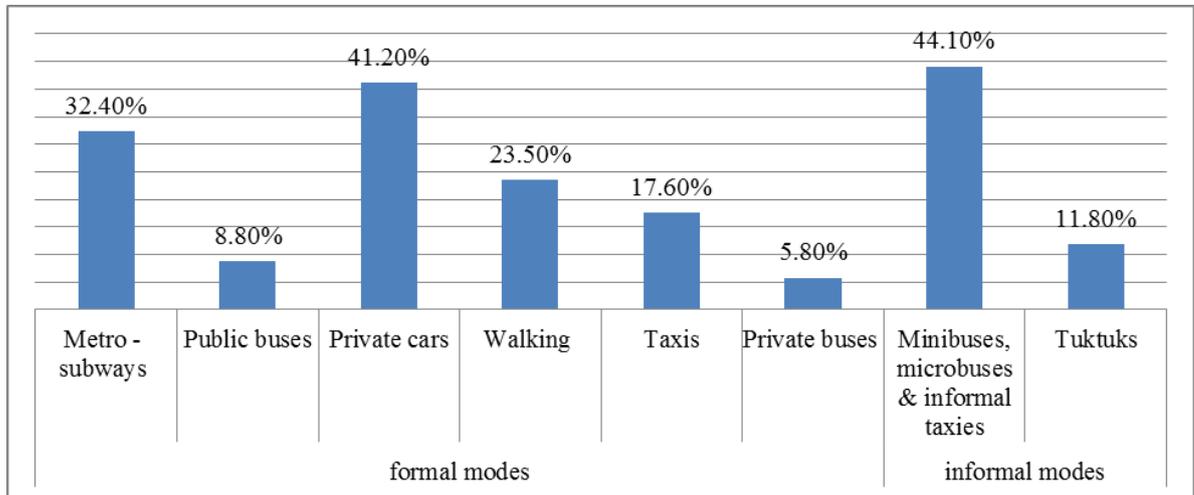

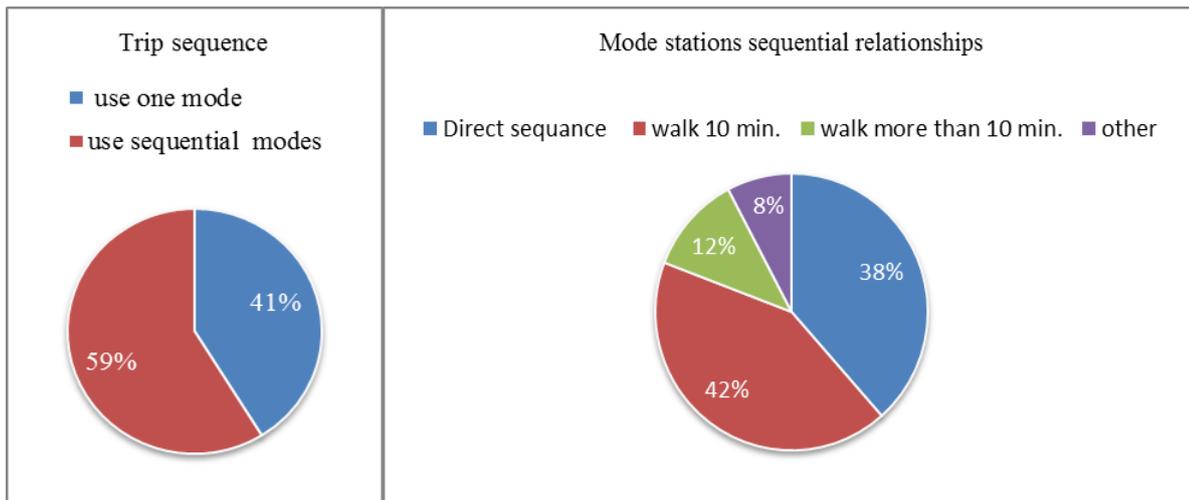**Fig. 2: Types of Formal and Informal Modes used Daily by Passengers**

Fig. 3: sequence of transportation trips and sequential relationship of mode stations
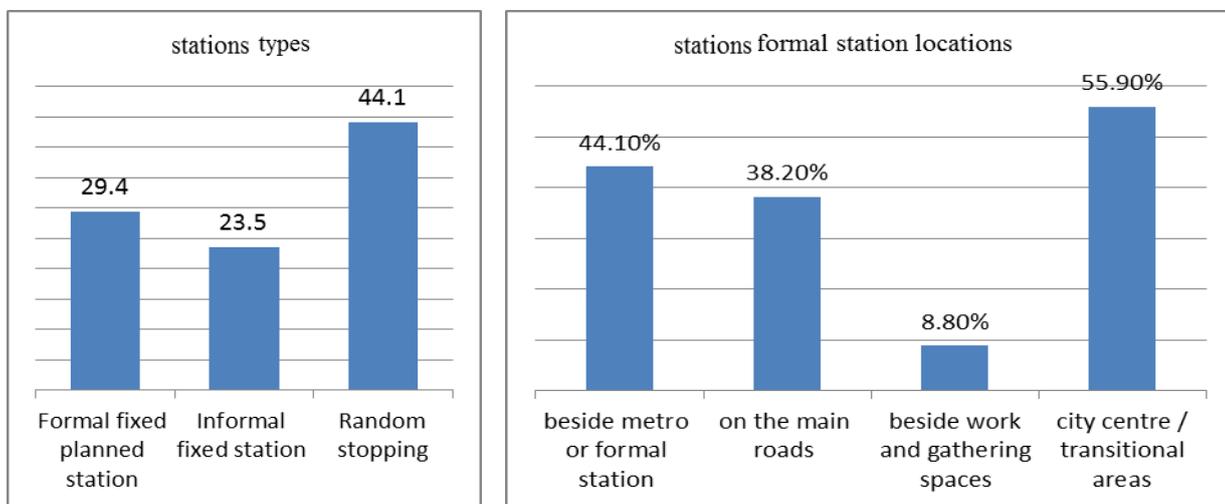

Fig. 4: stations types used by passengers and locations of informal stations

Users classified stations into three main types. First is formal fixed stations, which include metro stations and some planned stations. Second is informal fixed stations for minibuses, microbuses, old vehicles and tuk-tuks. Third is random stopping by request.

The surveys showed that the locations of informal stations are not related to land uses such as work places or gathering areas, as shown in Figure (4). The main factor that affects the location of informal transportation stations is completing the sequence of traveler trips, so around fifty-nine per cent of passengers use informal stations located in city centers, which act as a transitional place between several trips. Further, around forty-four per cent of passengers use informal stations located beside metro stations or other formal stations to fulfil the gap in the formal transportation network. Other passengers, around thirty-eight per cent, use random stopping or fixed stations located on the main city roads.

7. CASE STUDIES

The case study areas were selected in order to present several types, and represented the common locations of informal stations based on the questionnaire results above. The two most popular areas of informal fixed stations are in the city center, as a transitional area between several trips, and beside metro station exits.

The first case study was selected in Cairo, Egypt, in areas around metro stations exit. The second case study was selected in Tripoli, Lebanon, in El-Tall Square in the city centre, as a transitional station between several trips inside and outside the city.

7.1 Case study 1: Cairo Egypt - around Metro Stations

Formal modes of transportation in Cairo do exist in general, but the shortage of formal transportation integration results in some weaker areas, which have caused the appearance of informal transportation modes.

Metro, public buses represent the main formal transportation modes in Cairo with various facilities, and taxis. The most efficient formal transportation mode is the metro because of its speed, frequency, capacity and connecting several districts with long distances. This is because many people depend daily on the metro as public transportation in Cairo.

The Cairo metro is divided into six lines, three of which are currently functioning, while the others lines are under construction, as shown in figure (5).
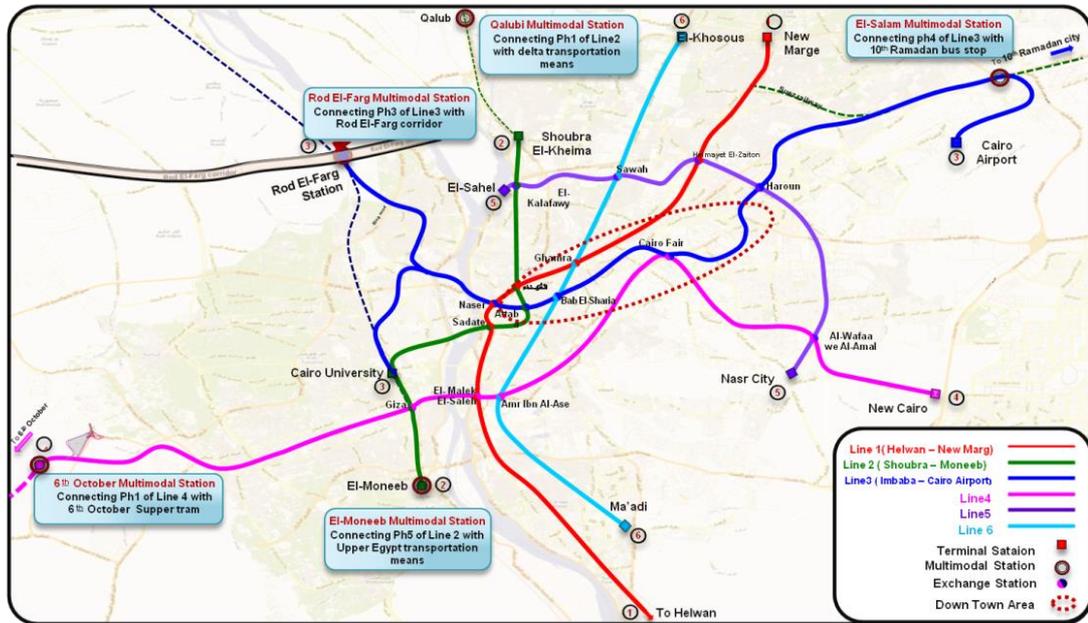

Fig. 5: the six Cairo metro lines (ref. http://www.tadamun.co/wp-content/uploads/2017/03/TAD_UIS_UM_HISTORY_2.png)

7.1.1   Documentation

The connectivity between existing lines is acceptable for connecting far-away districts together, but on the other hand, inside the district itself, there is no integration between the metro station exits and formal public bus stations. This absence of integration between formal modes (metro and buses) creates a gap, fulfilled by informal transportation modes such as minibuses, microbuses and tuk-tuks to manage passenger needs.

Informal transportation next to the metro stations exits usually creates fixed areas for informal stopping, managed by the drivers themselves. There are no physical stations for informal transportation modes, but they take place one or two lanes away from the street. The movement pattern of informal modes, in terms of stopping, parking and moving, affects the street flow for a kilometer before and after the metro station exits. Most informal transport modes wait to reach their turn to fill the seat capacity before leaving the informal stopping station, and some others stop at the side of the street to pick up passengers in any lane.

Therefore, an informal station lane exists, detracting from the movement lanes, and thus decreasing the street's efficiency in conducting the necessary traffic movement. Other types of drivers favor stopping, moving rapidly to shift to another lane. As a result, the informal transport modes can take up two or more lanes of the roadway's mobility lanes next to the metro stations exits as shown in figure (6).

Fig. 6: areas around Cairo metro station exits

7.1.2 Stations Analysis

Table (2) shows the transportation modes and stations analysis around Cairo's metro station exits, in terms of transportation mode specifications, existing station types and stations' impacts on traffic flow, passenger safety and integration with formal and informal transportation sequences.

Table 2 Transportation modes analysis around metro stations

	Mode specifications					Station type - facilities											The station impact on			
	Type of mode : Formal / Informal	Exit of planned station or random stopping	Mode availabi-lity	Trip round type: Fixed / Unfixed	Type of transpo-rtation trips (inside/ outside city)	Bus stop sign	Bench /s	Shelter	Bike racks / parking	Trach receptacle	Interior lighting	Advertising panels	Ticket machine	Real time next bus sign	A unique shelter structure		Traffic flow (√ = negative effect)	Pedestrian safety (√ danger)	Integration with formal transportation sequences	Integration with other informal transportation sequences
Private cars	Formal	Random stopping																		
Taxi	informal	Random stopping	Always available	Fixed / unfixed path	Inside trips												√	√	√	√
Micro-bus	informal	Informal station	Always available	Fixed round	Inside trips												√	√	√	√
Mini-bus	informal	Informal station	Always available	Fixed round	Inside trips												√	√	√	√
Buses	formal	Formal Station	Not available	Fixed round	Inside trips	√	√	√		√										
Tuk-tuk	informal				Local short trips												√	√	√	√

7.1.3 Criticism of Case Study 1

As seen in the last table, the main problem that causes traffic conflicts around metro station exits in Cairo is the lack of integration between formal transportation mode stations. Despite the existence of buses as a formal transportation network, the fixed round of buses does not integrate with the exits of metro stations. Therefore, the absence of any formal modes to connect passengers between metros and other places generates a gap, which is fulfilled by informal transportation modes. Informal modes in Cairo are divided into two types, namely legal (such as minibuses and microbuses) and illegal (such tuk-tuks and old means of transportation). The legal types always generate informal stopping and stations next to metro station exits on the main streets, but the illegal types are mainly located in informal urban settlements to cover the narrow roads' accessibility.

Due to the informality of transportation, station facilities for passengers do not exist at all in informal stations. Further, the random movement and stops of transportation modes cause random movements of pedestrians, which in turn cause traffic jams.

The integration between formal metro stations and other informal mode stops is highly efficient in covering all areas of the city to satisfy passengers' needs.

7.2 Case study 2: El-Tall Square, Tripoli, Lebanon as a Transitional Station

Tripoli is the largest city in north Lebanon and is one of poorest cities in Lebanon (Allès, 2012). Regarding the deficiency of formal public transportation inside the city, the majority of Tripoli's population depends mainly on informal modes of transportation to make their daily journeys. In Tripoli, there are three main areas for transportation gathering spaces: El-Tall Square, El-Nour Square and El-Behsas Street. These three nodes have the majority of bus stops and stations, dedicated to either inside or outside the city, as shown in Figure (7). El-Tall Square is a transitional station between north Lebanon and the other places inside and outside Lebanon. Transportation journeys from Tripoli to Akkar, Koura or Beirut count as inside Lebanon, in addition to long journeys and local trips inside Tripoli itself. In addition, there are journeys outside Lebanon to Homs, Tartus and other places in Syria.

Fig. 7: Three main Transportation Gathering Spaces in Tripoli

7.2.1 Documentation

El-Tall Square is the most crowded place in Tripoli, due to the high density of public transportation stops, which serve both inside and outside Tripoli. Despite the importance of public transportation in Tripoli, there are no designed transportation stations or stops. As shown in Figure (8), the informal modes of transportation generate informal stations and stops to fulfil users' needs.

The informal transportation modes in El-Tall Square can be divided into three main types, namely mini-buses, microbuses and taxis. Journeys to Beirut use mini- and micro-buses but other journeys, such as to Syria, use taxis for four passengers, while journeys inside and to nearby places outside Tripoli use old Mercedes taxis for five passengers. Trips inside and outside Tripoli are based on fixed, conventional rounds to fulfil user needs.

The informal stations are spread across the context of El-Tall Square. These stations take up one to two lanes of roads, producing problems in parking and traffic movement congestion. No stations or stopping areas are designed for or have any facilities for passengers.

Informal transportation modes always wait for passengers and have a sequenced role for hiring and moving. Further, the passenger pays the charge of transportation directly to the driver, so there is no need for waiting areas or ticketing places.

Fig .8: Location of informal transportation stations inside El-Tall Square

7.2.2 Stations Analysis

Table (3) shows the transportation modes analysis in El-Tall Square in terms of transportation mode specifications, existing station types and stations' impacts on traffic flow, passenger safety and integration with formal and informal transportation sequences.

Table 3 Transportation Modes Analysis of El-Tall Square

	Modes specifications					Station type - facilities											The station impact on			
	Type of mode : Formal / Informal	Exit of planned station or random stopping	Mode availabi-lity	Trip round type: Fixed / Unfixed	Type of transpo-rtation trips (inside/ outside city)	Bus stop sign	Bench /s	Shelter	Bike racks / parking	Trach receptacle	Interior lighting	Advertising panels	Ticket machine	Real time next bus signage	A unique shelter structure	Traffic flow (√ = negative effect)	Pedestrian safety (√ danger)	Integration with formal transportation sequences	Integration with other informal transportation sequences
Private cars	Formal	Random stopping															√		
Taxi	Informal	Informal station / random stopping	Always available	Fixed/ unfixed path	Outside/ Inside trips											√	√		√
Micro-bus	Informal	Informal station	Always available	Fixed round	Outside trips											√	√		√
Mini-bus	Informal	Informal station	Always available	Fixed round	Outside trips											√	√		√

7.2.3 Criticism of Case Study 2

This case study area has many conflicts between the existing transportation modes, station designs and stop locations, which cause hours of crowding for the traffic passing through it.

As seen in Table (3), the majority of transportation modes are informal modes, which have no planned stations. The informal modes of transportation are always available to take passengers, with fixed and customary rounds.

Station facilities for passengers do not exist in the whole area of the square, except for a very small number of benches for seating, rubbish bins and some shading from elements of plantation. The locations of the modes' stops have a bad effect on the traffic flow; for the informal modes, two lanes of the street are used for stopping, leaving only one lane for passing traffic in the area, in addition to the random stopping of passing taxis, which blocks the traffic flow.

The random movement and stops of transportation modes also cause the random movement of pedestrians, which in turn has caused several accidents in this location.

There is high integration between transportation sequences in this area – for example, someone coming from Akkar can easily find another mode to Elkora or Beirut, directly within five minutes' walking. Therefore, the El-Tall Square acts as a transitional station between all areas to connect with Tripoli center.

8. DISCUSSION

The informal modes of transportation is a great opportunity for developing countries as shown in the research. It can fulfill the absence or shortage of formal transportation without any more economical obligation for development governments. However, the threats of informal transportation are mainly appear in its informality behavior of movement and stopping in urban, which affect the urban movement and pedestrian safety. This research discusses the meaning of formal and informal modes of transportation, concept of transportation accessibility, location, and optimum types of transportation station. From the theoretical part, the research create a model, which can evaluate other types of informal transportation modes stations.

To test the efficiency of the model, the study make a questionnaire as a pilot study to understand the location of informal transportation stations according to users of informal modes travelling habits. As a results of the questionnaire, the study found that the most places attract informal transportation modes to stop in are two main types. First, in the gab space between two formal transportation modes stops (such as beside metro stations). Second, in the city centre as a transitional area between several trips.

The two case studies selected are located in MENA region, had similar factors such as cultural, political, environmental, and suffered from the similar problems of informal transportation. The results of the analysis shows that the absence of any designed station for informal transportation. However most of them depends on the attracted points and coursing several problems for urban crowding and human safety. On the other hand the formal transportation modes have kind of stations could be type I or II and also it is safer for urban and pedestrian.

As a recommendation of this study the informal modes are capable in movement paths which fulfill users' needs to fulfill the absence of formal modes in some paths. But the stations of informal modes should be considered in city planning related to user needs and predict its location in new cities planning according to deep evaluation of previous experiences .

9. CONCLUSION

In both areas of the case studies, there is an absence of formal transportation sequences to fulfil passengers' needs. This gap creates several solutions by locating informal transportation modes in the areas according to passengers' needs.

Informal transportation modes generally depend on rapid stopping or generating informal stations to collect people. The informality of stops and stations is a major threat to creating sustainable plans for development in the case study countries.

On the other hand, informal transportation is an opportunity to fulfil passenger transport needs without any more responsibility for the cities' governments. However, for the sustainability of cities to succeed despite the use of informal transportation modes, the government should design planned stations for informal modes of transportation to solve this problem.

Through surveying and observation, it is evident that the main areas where informal transportation stops and stations are located are in the city centre, as a transitional place between several trips in addition to formal transportation stations, in order to fill the gaps in formal transportation sequences and avoid rapid stopping on the main roads. However, the land use aspect (such as next to workplaces or other gathering spaces) is not considered as a factor in selecting informal fixed stations by drivers of informal modes of transport.

The absence of planned stations for informal modes causes several problems in terms of traffic flow and pedestrian safety, as well as sustainable, environmental, social and economic problems for crowded developing cities such as Cairo in Egypt and Tripoli in Lebanon.

REFERENCES

- Allès, C. (2012). The private sector and local elites: the experience of public–private partnership in the water sector in Tripoli, Lebanon. Mediterranean Politics, 17(3), 394-409.

- Cervero, R. (2000). Informal transport in the developing world: UN-HABITAT.

- Cervero, R., & Golub, A. (2007). Informal transport: A global perspective. Transport Policy, 14(6), 445-457. doi:https://doi.org/10.1016/j.tranpol.2007.04.011

- Chalermpong, S., & Wibowo, S. S. (2007). Transit station access trips and factors affecting propensity to walk to transit stations in Bangkok, Thailand. Paper presented at the Proceedings of the Eastern Asia Society for Transportation Studies The 7th International Conference of Eastern Asia Society for Transportation Studies, 2007.

- Currie, G. (2005). The demand performance of bus rapid transit. Journal of public transportation, 8(1), 3.

- Evans, J., O'Brien, J., & Ch Ng, B. (2018). Towards a geography of informal transport: Mobility, infrastructure and urban sustainability from the back of a motorbike. Transactions of the Institute of British Geographers.

- Fitzpatrick, K., Hall, K., Perkinson, D., Nowlin, L., & Koppa, R. (1996). Guidelines for the location and design of bus stops. Transit Cooperative Research Program Report, 19.

- Glaeser, E. L., Kahn, M. E., & Rappaport, J. (2008). Why do the poor live in cities? The role of public transportation. Journal of urban Economics, 63(1), 1-24.

- Gutiérrez, J., Cardozo, O. D., & García-Palomares, J. C. (2011). Transit ridership forecasting at station level: an approach based on distance-decay weighted regression. Journal of Transport Geography, 19(6), 1081-1092. doi:https://doi.org/10.1016/j.jtrangeo.2011.05.004

- Kumar, M., Singh, S., Ghate, A. T., Pal, S., & Wilson, S. A. (2016). Informal public transport modes in India: A case study of five city regions. IATSS Research, 39(2), 102-109. doi:https://doi.org/10.1016/j.iatssr.2016.01.001

- Levinson, H., Zimmerman, S., Clinger, J., & Gast, J. (2003). Bus rapid transit: Synthesis of case studies. Transportation Research Record: Journal of the Transportation Research Board(1841), 1-11.

- Litman, T. (2011). Evaluating accessibility for transportation planning. Victoria, BC: Victoria Transport Policy Institute.

- Litman, T. (2017). Evaluating Accessibility for Transport Planning: Victoria Transport Policy Institute.

- Mohareb, N., & Felix, M. (2017). Affordable and Common Modes of Transportation in Developing Cities and Their Effect on the Sustainability of Streets. Procedia Environmental Sciences, 37, 319-329.

- Ramadan, A. (2016). INFORMAL TRANSPORT IN MENA. WE DON'T KNOW ENOUGH, MENA CTE Journal, 35-41.

- Transfort. (2015). Bus stop design standards & guidelines doi:http://ridetransfort.com/img/site_specific/uploads/Final_Design_Standards.pdf.