ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2521-0904 (Print)
ISSN: 2521-0440 (Online)
CODEN: EHJNA9

Engineering Heritage Journal (GWK)

DOI: http://doi.org/10.26480/gwk.01.2024.07.12

REVIEW ARTICLE

BUILDING THE PUBLIC TRANSPORTATION SYSTEM IN LIBYA

Rabia Almahdi Ali Khalil

Faculty member at the Higher Institute of Science and Technology Azzahra
****Corresponding Author Email: monm.hamad@yahoo.co.uk***

ARTICLE DETAILS

Article History:

Received 18 November 2023
Revised 20 December 2023
Accepted 24 January 2024
Available online 26 January 2024

ABSTRACT

Traffic congestion resulting from the escalation in the number of vehicles in cities, as a result of the increase in population and building density, requires the provision of appropriate infrastructure, especially transportation and logistics systems, that meet the necessary needs of the population, to meet the current multiple challenges, through the introduction of various means of transportation. This is done according to plans that complement each other, such as using environments that encourage pedestrians and cycling and their own lanes, light rail, metro, rapid buses, in addition to public transport buses and others, through the development of high-level road projects, such as annual and main roads and others, in a way Integrated with city planning, and adopting modern technology such as smart applications in transportation, which will facilitate access and participation in developing the city, and achieving transportation integration. Therefore, the research problem is that there is no clear vision of the developments in transportation systems that have increased over time, whether public transportation systems or private transportation, which should be made possible through sustainable planning and design standards in cities. The importance of research is highlighted in trying to diagnose the obstacles of current transportation systems and their contemporary developments, and trying to evaluate them and maximize their potential by applying international standards and approved studies in this field.

KEYWORDS

Transportation Systems, Integrated, Public Transportation, Environmentally Friendly.

1. INTRODUCTION

Cities around the world suffer from traffic congestion, which causes delays and inconvenience to residents and travelers. This congestion is due to the increase in the number of vehicles on the streets, because of the increase in population and the increasing density of construction in urban areas.Cities face a challenge in providing adequate transportation and logistics infrastructure that meets the needs of residents and contributes to overcoming the problem of traffic congestion (Button and Hensher, 2018). Therefore, various solutions are offered to improve transportation systems in cities, and these solutions include developing different means of transportation such as walking, cycling, and public transportation such as buses, metro, and light trains.In addition, meeting multiple challenges in the field of public transportation requires the integration of city plans with transportation plans, and the adoption of modern technology such as smart applications to facilitate and improve transportation operations. Success in improving transportation systems is ensured by implementing advanced road projects and designing them to high standards, providing designated parking areas and facilitating access to public transportation.Therefore, this topic is one of the most important issues that cities face at the present time, and research and studies in this field are of great importance in identifying the obstacles facing current transportation systems, evaluating them, and developing them using international standards (Khisty and Khisty, 2004; Institute of Transportation Engineers, 2010). This introduction aims to highlight the importance of research in this field and the positive impact it can have in improving the quality of life in cities and facilitating the movement of residents and travelers (McCarthy, 2011; Tumlin, 2012).

The transportation situation in Libya is an important issue that faces challenges and needs attention and development. Efficient and sustainable transportation is key to achieving comprehensive development, enhancing urban-rural connectivity, and promoting trade and mobility.Libya is witnessing major challenges in the field of transportation, because of several factors (Alhodairi, 2012). One of these factors is the deterioration of road infrastructure, bridges and logistics facilities, which negatively affects vehicle safety and speed of movement. The country also suffers from a lack of reliable and efficient public transportation, affecting access to basic services, employment and education opportunities.In addition, Libya suffers from security and political challenges affecting the transportation sector (Elmansouri et al., 2020). The conflicts and political unrest that the country witnessed affected the stability of transportation and the operation of logistics networks.To overcome these challenges, it is necessary to develop comprehensive strategies to improve the transportation situation in Libya (Abuhamoud and Rahmat, 2010). Work must be done to improve and maintain road infrastructure and provide efficient and reliable public transportation. Cooperation between the public and private sectors must also be strengthened to promote investment in the transportation sector and infrastructure development.Moreover, efforts should focus on enhancing the use of technology in the transportation sector, such as mobile applications and geographic information systems, to improve traffic management and provide transportation services more efficiently and smoothly.With the development and improvement of the transportation situation in Libya, economic development can be enhanced and the quality of life for citizens can be improved. This requires cooperation and coordination between the government, the private sector

Quick Response Code	Access this article online	
	Website: www.enggheritage.com	DOI: 10.26480/gwk.01.2024.07.12

Cite The Article: Rabia Almahdi Ali Khalil (2024). Building the Public Transportation System in Libya. *Engineering Heritage Journal, 5(1): 07-12.*

and the local community, in addition to sustainable investments in the transportation sector (Ismail and Elmloshi, 2011).

2. Integrated Transportation Systems

The transportation systems operating within cities and within the (TOD) system are diverse. There are many types approved in all public transportation systems that operate in cities in general, and city centers**.**Especially, which require integrated streets to accommodate these systems, or special paths to isolate the movement of a particular system, as well as special bridges and tunnels to accommodate these systems, be compatible with them, and work to meet all requirements that provide ease of movement and comfort for transportation systems, and this is reflected in the Citizens' choices in transportation, as the choice of a specific mode of transportation in a given location depends on land use efficiency, building density, as well as population density (Abuhamoud et al., 2011).

2.1 Integration of land use planning and transportation systems

The rational distribution of types of land uses affects the facilitation of travel patterns. Transportation is a demand of people motivated by the need to reach a specific place if it does not require heading to another place after that, and that integrating land use and transportation planning is a means to achieve that goal of transportation, as it ensures the accuracy of land use planning, reaching the goals of integrated planning and reducing negative impacts on the environment**.**Transportation and land use, as well as ensuring the required activities. Resulting from treating land use planning, often in a method of separating activities, with the intention of reducing the negative effects of one activity on the other activity. The majority of the world's capitals have launched the principle of land use planning and application. To transport traffic instead of land since the beginning of the twentieth century, the integrated road network was designed to serve the same place, by isolating its negative effects and ensuring high levels of travel. Collective transportation by motorized transportation, as the primary means of transportation (Abuhamoud et al., 2011).

3. Means of Transportation in Cities

Means of transportation are divided into two main sections (public means of transportation and private means of transportation) as follows**:**

3.1 Public transportation

Several features that make it the most efficient in a specific location in the city rather than others characterize each mode of public transportation. Therefore, the research will address public transportation modes and analyze their most prominent planning characteristics in urban areas.

3.1.1 Buses

Buses are a flexible means of transportation that can adapt to changing travel patterns. They can be used to cover the main trip, as well as arrival and outbound trips, as well as feeder trips to other types of modes, such as light rail, metro, and rapid transit buses. Thanks to the cost of activities, they it can serve both high and low density areas, with relatively acceptable buses, and delivering people close to their homes and destinations, compared to other means of public transportation (Imbayah et al., 2023). The distance between bus stations (stopping points) is usually (0.25-0.5) km, which translates to a high concentration of travelers, and buses whose systems have priority, such as a dedicated route or buses with high occupancy. High corridors are able to transport similar volumes at a lower cost than rail, as demonstrated for example by Bus Rapid Transit (BRT)**.** For example, in the proposal for the Integrated Transport Plan (2030) for the Emirate of Abu Dhabi, buses were working to deliver citizens to their homes, which are not reached by other mass transport systems (train, metro, and tram). It is also worth noting that the city center of Sydney currently depends on more Of the 1,000 buses, to meet the need for travel, it nevertheless suffers from overcrowding as well. Therefore, stops for public transport buses must be available every (0.25 - 0.5) km. Note that buses operating within Libyan cities does not adhere to specific stops, with failure to arrive at a specific time within the main area, lacks designated routes, overlaps with private cars, and is affected by traffic congestion, and this has had a negative impact on the effectiveness of public transport buses in providing access within a regular schedule, And not continuing to work (Elmnifi et al., 2019).

From a social and economic standpoint, bus riders generally benefit from cheap fares, and in fact the majority of travelers who use buses belong to low-income groups, compared to, by users of other public transport modes in general, such as heavy railways, and private transport in particular. In general, low-density cities that contain multiple commercial areas, and buildings with a maximum height of 2-5 floors, cannot be fed by transportation systems with large numbers of passengers that are suitable for the capacity of the system. Therefore, these cities require transportation systems capable of transporting (15,000 to 25,000) passengers. Passenger (in each direction per hour and with special corridors, and such systems do not require a change in the nature of the city, and this can be met with systems that fit this momentum through transportation systems via rapid transit buses and modern buses (Elmnifi et al., 2024). Figure (1) shows the buses systems (by express buses and modern buses) in cities, as well as their types and routes (flexible, specific, and completely isolated). Buses can operate on the same routes as private cars, or provide priority to them by specifying a specific route, and it may be the path is completely isolated from private car paths, and this depends on the number of passengers to be transported within the path (number of passengers, building density, and number of cars on the road). Certain streets designated for pedestrians and public transportation are also identified, and this often depends on the street's effectiveness. In general, buses are capable of transporting medium numbers of passengers (15,000 - 25,000 passengers) in each direction when special bus routes are available. It is preferable to use them in areas where the height of occupied buildings is (2 - 5 floors). They are also used as buses to feed other means of transportation (metro, And light rail (LRT), and bus rapid transit (BRT) (Almselati et al., 2011). This is what Libya currently lacks, according to current research studies, in which momentum is high, especially after expectations of an increase in traffic momentum in the coming era, as work is required to identify special routes. Rapid transportation, which will be one of the solutions that must be available in the heart of large cities to transport passengers and feed other public transportation systems.

Figure 1: The buses systems.

3.1.2 Transit Rapid Bus

Rapid transit buses are characterized by being (flexible and high-performance), which means rapid transportation that combines a variety of physical operating elements and systems, which leads to a permanent integrated system with the impression in the memory of citizens of its quality and unique characteristics. Latin America is considered one of the best The systems using (BRT), which are distinguished by their high speed, large capacity, and quality of service, are competitive with all other modes of transportation, but the best quality systems are the (metro and light rail) networks. Their large carrying capacity compared to private cars and small and medium buses distinguish rapid transit buses. With the use of (BRT), special paths must be provided within the street in addition to stopping stations for every 1 km. Their construction is less expensive than light rail and metro. They can be used to connect. Easily separated areas, which can be an important part of the integrated transportation systems of Libyan cities, linking multiple regions, and within the main roads and

streets suitable for the cities. The capacity of buses varies and varies between 30 and 270 passengers. This is due to developments in the field of technology and the specific capacity of operating buses. The amount of momentum depends on based on the need for a specific capacity to meet the city's transportation requirements; Figure (2) shows bus models and their capacity.

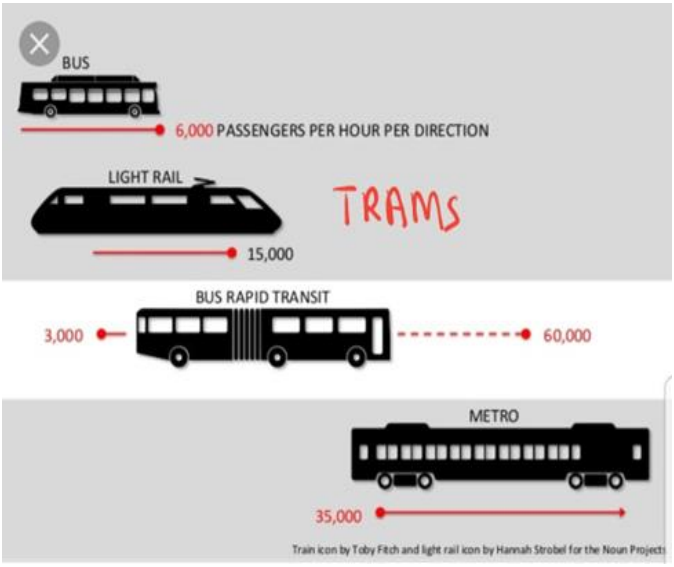

Figure 2: BRT bus models and their capacity.

3.1.3 Metro and Rail Heavy

Heavy railways and metro, the backbone of the transportation system in major cities, often constitute heavy transportation and metro are effective in transporting large numbers of people efficiently in city centers. However, this mode is not the appropriate solution for transportation in penetrating local streets with low building density. For residential areas in the suburbs, where the logical presence of buses plays a greater role in the smooth flow of movement compared to bus services on the main streets where railways are located, and the travel situation by heavy rail and metro is usually better, for a number of reasons (the relative simplicity of the network) due to the absence of emergency stops (an isolated route and special stops), and travel is relatively faster in the journey to city centers due to their separation from street traffic (metro and relatively higher reliability usually underground) thus avoiding congestion above ground, and of large size (large carrying capacity), as well as means The comfort provided in the stations, and the relative ease for passengers by locating to ensure the high frequency of the stations and explaining the network design**,**heavy railways require relatively large amounts of capital, and are well suited to areas with high population density, where modern-day urban sprawl creates an obstacle**.**Introducing fixed route systems, the reason for this is that low-density areas spread outward and thus weaken the passenger volume economies that fit the metro's capacity**.**

Note that railways and the metro in large capitals share common features, which are (to transport large numbers of people in urban areas, and are powered by electrical energy), which is one of the advantages of this system, which means its environmental friendliness, and the metro provides a high service frequency compared to other systems on a timetable basis. The time of arrival and departure is specified, and the distance between stops, (distance between stations) is approximately (1-2 km)**.** We point out that the cost of the metro infrastructure is much higher than the costs necessary to construct other modes of public transportation in the city in general (Almselati et al., 2011). The costs of building heavy railways are estimated at about (5) times the cost of light rail (LRT) and the construction costs are about (10) times the costs of custom construction for buses. The development of the densely crowded city center in terms of population, with a large proportion of citizens, demonstrated the necessity of introducing transportation systems with high-rise buildings, as it is a very central commercial area that can transport more than (40,000 people) within one hour in each direction. This can usually be done by elevated railway systems on poles (depending on the width of the street), or underground railway systems (Verma and Ramanayya, 2014).

The metro system is also considered the most effective and accommodating of the number of passengers within city centers (more than 40,000 passengers per hour in each direction), and it operates very smoothly as it does not intersect with transportation systems the other (usually underground, and can be suspended), and is constructed in city centers with high population and building density (more than 5 floors), to reduce momentum above the ground, and the distance between stations is about (1-2 km), noting that the metro is the most expensive compared to other systems, so it is used when the specifications mentioned above are available. Commercial and crowded city centers are the most there is a need for rapid public transportation systems, with a large carrying capacity, that do not affect pedestrian movement and other transportation systems on the roads, such as the metro, as its route for the future stage is determined based on the expansionary urban plan drawn up for Libyan cities, especially large ones such as Tripoli and Benghazi.

3.1.4 Tram and Rail Light

Light rail is most suitable in the inner city areas, and the distance between stations is short (0.75 - 1.5) km**.** The path of light rail systems tends to be along the street (a private and isolated path), that is, sharing the street space with individual means of transportation, such as cars, bicycles, and pedestrians, and the latest systems tend to operate at a degree of separation of the alignment of the paths (such as utilizing the light rail path (For most parts of Sydney). Despite the potential for bottlenecks between the (LRT) system, cars, and bicycles, which hinders the performance of light rail services and pedestrians, they can be overcome by isolation, and often mixed traffic (where streets are cut in half), and this can lead to a decrease in the performance efficiency and reliability of each system.

Unlike other means of transportation, it transports large numbers of citizens on one side and stops at intersections, as is the case with other means of transportation (Verma and Ramanayya, 2014). Figure (3) shows the train suspended on poles and its effect on the road due to its isolation from the car tracks and its track, as well as for the tram and the light train**.** Light rail (LRT) are systems that operate within cities to transport passengers. They usually have a specific and independent route on the road, with stopping stations at distances ranging from (0.75 - 1.5 km). They are often used within cities whose streets are wide or dedicated (providing a special route). The light railway may be raised on poles in cases of traffic and population congestion (allowing other means to move underneath it), but in the event that the stations are unable to accommodate the number of passengers during peak hours, the underground metro system is relied upon (Singh, 2012).

Figure 3: The train suspended on poles.

3.2 Private means of transportation

3.2.1 Walking

The vast majority of trips in and out of other modes of transport are made by walking, and this mode requires significant infrastructure requirements compared to other modes**.**It is noted that the distance of up to 2 km (about 20 minutes) is reasonably covered by walking, and may be able to compete with public transportation. The typical walking speed for a normal healthy adult is about 6 km/hour, or 1.67 m/s. However, the effort for certain groups and the decrease in walking speed for people of average physical fitness and adverse weather conditions, such as high temperatures or rain, and the effects resulting from load Luggage (such as shopping, laptops, etc.), all affect walking performance (Singh, 2012)**.** Thus, a person walking may be able to maintain walking at a constant speed (6 km/h) for only 20 minutes, but over 30 minutes this rate drops to (5 km/h) and over an hour, the speed drops to (4 km/h). For planning purposes, the average walking speed (3 km/h) is adopted as assumed in cases of walking distances less than half a radius (400 m to 800 m).

3.2.1.1 Difficulties facing walking

- A very remote destination that is difficult to reach .
- There is no specific pedestrian path. The walking path does not lead to the desired destination.
- Fear of being robbed or attacked, fear of loose animals.
- Bad weather (lack of places to protect from weather conditions), poor chances of crossing the streets safely.
- Fast and crowded traffic areas, poor lighting system.
- Unattractive and noisy surroundings, cyclists on pedestrian paths.
- Carrying heavy items such as shopping for the elderly, the sick and children[18].

We point out here that the city center of Baghdad currently includes all of these obstacles. Therefore, solutions must be developed for these obstacles in the city's neighborhoods, its great history, its extensive activities, and its strategic location in the crowded Libyan cities. We stress the need for city centers to maximize the idea of pedestrians for the purposes of shopping and reaching work places, all the way to the city. Reducing pressure on the escalating traffic congestion.

3.2.2 Bicycle facility

Cycling, like walking, is environmentally friendly and can provide great health benefits. However, we notice the inconvenience to cyclists (compared to other means of transportation), and as a result most citizens have stopped using this mode, as well as a large number of accidents, risks, and theft of bicycles (Singh, 2005). Factors can be addressed to improve the safety of cyclists (the security situation, control and organization of movement routes), and the average elderly person in most developed countries of the world, including Australia, travel by bicycle for about 12 km per week as a result of the total operational cost of transportation per kilometer compared to a small car. One of the conditions for integration between cycling and public transportation is by providing facilities, which increases the number of bicycles at intersections (such as washing and storing bicycles), rather than side paths, on the use of this means if these services are available. Figure (4) shows the isolated bicycle paths And special places to stop.Note that in many Western countries and some countries of the Far East, special stations are approved as parking lots for renting bicycles for all citizens, and by organizing monthly or seasonal tickets to secure use around the clock, and most residential, commercial, and industrial areas enjoy this system (Onokala and Olajide, 2020).

Figure 4: The isolated bicycle paths and special places to stop.

Many countries in the world are moving to encourage transportation by bicycle due to its positive impact on the environment, public health, economic aspects, etc. Therefore, the transportation network for bicycles is an integrated, thoughtfully planned path, and its encouraging environment requires that cyclists adhere to driving rules at intersections and other places. The social aspect is widely influential on the extent to which society accepts this medium or women riding bicycles in particular, especially Eastern and Islamic societies, including Libyan society.

3.2.2.1 Obstacles to riding bicycles

- Lack of skills and reassurance, especially when cyclists ride in shared traffic spaces
- Legislative and cultural controls, low income, as well as social acceptance of this phenomenon.
- Legislative factors and laws are the key governing factor that affects the use of bicycles, for example, in crowded places or dense urban areas, as well as the speed limit for buses.
- Safety features even for people who cycle regularly.
- Environmental factors include urban design and infrastructure for cycling. Weak infrastructure for cycling represents a strong obstacle for women, who constitute up to 20% of the total number of cyclists in some developed countries[19].

3.3 Private vehicles (cars)

Since the invention of the vehicle, no other means has had an impact on economic development and growth at the level of the car, more than its size, and it quickly became an integral part of the movement of citizens and personal goods, far from being relatively unlimited flexibility for transporting passengers and goods, and does not need to wait as a public transportation General, waiting time and transition from one mode to another, especially in the presence of heavy goods. However, one aspect of congestion in urban areas is the presence of an increase in the number of cars (exceeding the planning and carrying capacity of the streets), and thus the utility of private vehicles is negatively reflected in the cities. Figure (5) shows the high traffic congestion of some Libyan cities Benghazi and Tripoli.

Figure 5: The high traffic congestion of some Libyan cities Benghazi and Tripoli.

Note that the continuous increase in the number of cars in Libyan cities in general, such as Benghazi, Tripoli, Sabha, and Misrata in particular, has had a negative and significant impact on the speed of vehicles in the city, and has resulted in many forced stops. However, it is still the only and dominant means of transportation on the roads in all Libyan cities due to the lack of means of transportation. Therefore, sustainable public transport must be provided mainly, and private cars and taxis must be provided in a complementary manner.

4. Review of The Reality of Public Transportation Systems in Libya

After reviewing the most prominent factors and foundations of public transportation systems in cities and their centers, identifying the main factors for testing each transportation system and the extent of its success in meeting the city's needs on the one hand, and identifying the obstacles that must be addressed appropriately, therefore, the research will address a summary of the reality of public transportation systems operating in Libya, Which is limited to public transport buses affiliated with the Ministry of Transportation, and a study of the proposed public transport systems for the next stage, which were identified in the comprehensive development plan (2025), in accordance with the study of the Libyan government's plan.

5. Operating Public Transport Buses

Private vehicles for public transport in Libya within the General Company for Transporting Passengers and Delegations (and private vehicles within the Internal Transport Department), are responsible for public transport buses, and the company is committed to registered and fixed routes with it and operates on specific and often specific routes, as the buses operating within the company are divided into several sectors, from which it is clear that the percentage of buses is less than half, 40 buses operating out of a total of 150, the rest are idle or damaged, and the largest part working in this sector is private companies that own a fleet of buses operating between cities or within the capital, Tripoli, and Benghazi.

5.1 Public transportation systems adopted in future studies in Libya

5.1.1 Metro

The first and second line of the Tripoli metro project enters underground into the city center and takes the most important roads characterized by high traffic volume and tall buildings, and the second line to the city of Benghazi, where it passes through the city center and the main streets ,Figure 6 shows the metro plan for Benghazi and Tripoli.

5.1.2 Train

The general train runs outside the borders of the center of the cities through which it passes, as the train tracks pass from the beginning of the first coastal city to the center and then to the west, at a rate of 15 stations, but so far this important project has not been implemented by the government.

Figure 6: Shows the metro & Train plan for Benghazi and Tripoli.

6. Conclusion

Transportation systems for each location in a city differ from others based on their uses (industrial, residential, commercial), etc., and are integrated with each other to work in a convenient and appropriate manner**.**

Transportation systems vary in their capacity, as well as their cost and locations within the city (buses 6,000 people per hour, rapid transit buses (6,000 - 11,000) people/hour, light rail (6,000 people/hour, and others), and adopting a specific type that depends on density. Population, structural, etc.

Public transport buses are characterized by being flexible in operating within central areas, and low-density areas in general, and having stops every (0.25 - 0.5) km. They are characterized by their reasonable prices for all citizens, in addition to the cost of establishing them compared to other transportation systems (metro and trains). Buses are sufficient for the areas. Its building heights are (2-5) floors, and it works in better integration with the metro (delivering people to metro and train stations, etc.), and its path can be within the road with private cars or have priority on a specific path, in addition to the possibility of isolation, and it depends Determine its path exactly to the path on normally heavy traffic.

Bus rapid transit (BRT) buses have distinctive characteristics and are fast. To perform their activities accurately, it is necessary to provide their own routes. They accommodate twice the number if they are dual-articulated, and they need special stops for approximately every (1) km.

The metro is the backbone of transportation in major cities and central areas. It is considered the fastest in cities due to its isolated path (usually underground), and does not stop except at stations, and has a large capacity that transports more than (40,000) passengers per hour in each direction, and has a timetable. It is fixed in movement between stations, but it is considered to be of high cost compared to other transportation systems, and is used in high-density areas (more than 5 floors).

Trams and light railways: They are important in cities, and their stations are between (0.75 - 1.5) km, and they have a special track, but they divide the street into two parts if it is run within a track on the ground, and it is possible to make

(When carrying out maintenance on the tram, it is possible for buses to operate on the same route designated for the tram and buses together, instead of the tram).

Walking a distance of (2) km or (20) minutes is acceptable for pedestrians, and for planning purposes it is (4 km/hour) as a typical case, and public facilities must be provided for every (400 - 800) m, and bus stations must be provided at a distance of (600) m, The train is 1 km away.

Providing an encouraging, appropriate, and safe environment for pedestrians, as walking is the best environmentally friendly, healthy, and economical means of transportation.

Providing regular and special paths for bicycles, providing parking and washing places for bicycles, as well as ensuring driving skill, and providing appropriate environmental factors that encourage cycling as well as the health aspect for cyclists.

Developing a sustainable, integrated, and environmentally friendly transportation strategy is an important foundation and an appropriate basis for future generations.

The necessity of developing appropriate plans for the possibility of each public transportation system working individually and with high accuracy, in addition to increasing the strength of those systems if they work in integration with other public transportation systems, meaning (the possibility of each transportation system working individually, and the possibility of it working with other systems in an integrated manner).

References

Abuhamoud, M.A.A., and Rahmat, R.A.O., 2010. Influencing modal shift to public transport for sustainable urban development in Tripoli (Libya). In 2010 The 2nd International Conference on Computer and Automation Engineering (ICCAE), 4, Pp. 72-75. IEEE.

Abuhamoud, M.A.A., Rahmat, R.A.O.K., and Ismail, A., 2011. Modeling of transport mode in Libya: A binary logit model for government transportation encouragement. Australian Journal of Basic and Applied Sciences, 5 (5), Pp. 1291-1296.

Alhodairi, A.M., 2012. Is Public Transport System in Libya Sustainable?. In Proceedings of 1st Conference on Sustainable Planning for the Reconstruction of Libya. Benghazi, Libya pp. 1-11.

Almselati, A.S.I., Rahmat, R.A.O.K., and Jaafar, O., 2011. An overview of urban transport in Malaysia. Social Sci, 6 (1), Pp. 24-33.

Button, K.J., and Hensher, D.A. (Eds.). 2018. Urban Transport and Land Use. Edward Elgar Publishing**.**

Elmansouri, O., Almhroog, A., and Badi, I., 2020. Urban transportation in Libya: An overview. Transportation research interdisciplinary perspectives, 8, Pp. 100161.

Elmnifi, M., Almaktar, M., Vambol, S., Sydorenko, V., and Mykhailov, V., 2024. Agricultural waste in Libya as a resource for biochar and methane production: An analytical study. Ecological Questions, 35 (2), Pp. 1-20.

Elmnifi, M., Alshilmany, M., and Abdraba, M., 2019. Potential of municipal solid waste in Libya for energy utilization. globe, 11, Pp. 13.

Imbayah, I., Ahmed, A.A., Alsharif, A., Khaleel, M.M., and Alarga, A., 2023. A Review of the Possibility Integrating the Solar System into the Libyan Railway Transportation. African Journal of Advanced Pure and Applied Sciences (AJAPAS), Pp. 171-180.

Institute of Transportation Engineers. 2010. Transportation Planning Handbook (3rd ed.). Wiley.

Ismail, A., and Elmloshi, A.E., 2011. Existing transportation scenario in Tripoli, Libya. Australian Journal of Basic and Applied Sciences, 5 (9), Pp. 1288-1295.

Khisty, C.J., and Khisty, B.C., 2004. Transportation Engineering: An Introduction. Prentice Hall.

McCarthy, P., 2011. Transportation Economics: Theory and Practice. Wiley.

Onokala, P.C., and Olajide, C.J., 2020. Problems and challenges facing the Nigerian transportation system which affect their contribution to the economic development of the country in the 21st century. Transportation Research Procedia, 48, Pp. 2945-2962.

Onokala, P.C., and Olajide, C.J., 2020. Problems and challenges facing the Nigerian transportation system which affect their contribution to the economic development of the country in the 21st century. Transportation Research Procedia, 48, Pp. 2945-2962.

Singh, S.K., 2005. Review of urban transportation in India. Journal of public transportation, 8 (1), Pp. 79-97.

Singh, S.K., 2012. Urban transport in India: issues, challenges, and the way forward. European Transport/Trasporti Europei, 52.

Tumlin, J., 2012. Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities. Wiley.

Verma, A., and Ramanayya, T.V., 2014. Public transport planning and management in developing countries. CRC press.