

Technical Evaluation of the Buses Terminal – Republic of Sudan (Khartoum State)

Abdel Aziz Hassan Abdel Razig Ali ¹, Adil Abdallah Mohammed Elhassan²,
Hassan Ahmed Mahmoud ³

¹Assistant Prof. Sudan University of Science and Technology (SUST)

College of Engineering, School of Civil Engineering

Department of roads and transport, Khartoum, Sudan

^{2,1}Assistant Professor – Department of Civil Engineering, College of Engineering, Taif University (KSA)

^{2,2}Assistant Professor – Sudan University of Science and Technology (SUST), Khartoum, Sudan

³Master Student, Sudan University of Science and Technology (SUST)

Khartoum, Sudan

Abstract – The Buses terminals are one of the most important infrastructures for transportation, which gives buses freedom of movement to deliver passengers and luggage in safety and comfort from one place to another. Passenger trips between Khartoum State and other states are witnessing a continuous increase in the number of travelers over the years, and Khartoum State has only one Bus terminals, which helped to establish temporary random stops in different areas of the state. In this paper, a technical evaluation of the current status of the land port was carried out by collecting technical information related to the area, number of buses, traffic of services, services and other information, a questionnaire and interviews were also done to evaluate the current status of the Bus terminals and the extent of the travelers' satisfaction with the performance of the Bus terminals, after analyzing the questionnaire there are shortcomings in providing services to travelers and that 40% of the area is completely unused, as the study also found the insistent need to construct a land port in Omdurman city and another in a bahry city, which represent the capital of the Republic of Sudan.

Keywords: Bus terminals, transportation, transportation, Khartoum State.

Date of Submission: 08-01-2021

Date of Acceptance: 24-01-2021

I. Introduction:

Transportation helps shape an area's economic health and quality of life. The transportation system does not only provide for the mobility of people and goods, but also influences patterns of growth and economic activity by providing access to land, transport infrastructure consists of the fixed installations including roads, railways, airways, waterways, canals and pipelines and terminals such as airports, railway stations, bus stations, warehouses, trucking terminals, and seaports. Terminals may be used both for interchange of passengers and cargo and for maintenance [1 - 5].

A bus terminal is defined as an area way from the general flow of road vehicle, which gives buses and coaches the freedom of movement to set down and pick up passengers in safety and comfort [6 - 12].

Khartoum bus terminal (Al Mena Al Bari), located in Khartoum – Alshafa – (Alsough Almhale), it was established in 2005 by the Land Ports Company Limited and is the result of a smart partnership between the Ministry of Planning and Urban Development, Elnefeidi Holding Group and the Social Security Investment Agency with a capital of 28,168,458 SD [6, 13]. It was intended to control the safety of vehicle, combating human trafficking and drugs, Payment of state benefits from taxes and other government fees, provide good service to the citizens, organizing trips to meet the needs of citizens and provide statistics on the movement of citizens which help in planning [14 - 19].

Beside Al Mena Al Bari there are a number of locations providing travel depots from Khartoum State to other parts of the country. The main depots include Shendi in Khartoum North and Alsough Ashaabe and sough Libya in Omdurman as main traditionally organized bus departures locations.

Research problem:

Passenger travel between the Capital and the states have been increasing over the years with the increase in Capital population, intercity road development and improved road transport fleets. And the various bus departure locations had been expanding over time attracting growing traffic towards every part of the

country. According to these increasing managing mobility growths of passenger travel and shipping of goods is seen as challenges in Khartoum State which requires consideration of this subject.

Objective of the study:

The aims of the study are:

- To evaluate the status of (Al Mena Al Bari) in terms of its satisfaction with all trips during the years and the satisfaction of customers and travelers.
- The study also aims to design the local depots to be with the objective of providing efficient and well-organized bus terminals to replace the multitude of unorganized departure locations distributed along the lanes of the various markets (Soughs) in Khartoum, Omdurman and Khartoum North.
- Furthermore, the study aims at easing traffic congestion within and around the various markets hosting bus locations, improve traffic control over bus movements and provide improved passenger and travel services.

II. Materials And Methods:

This study based on the field surveys, data collection and a questionnaire to assess the current conditions for Khartoum bus terminal (Al Mena Al Bari).

Site visit was conducted to Al Mena Al Bari, an assessment of Al Mena Al Bari was carried out in terms of location, accessibility and geometric evaluation. Information on passenger numbers was obtained during the year.

The building has one arrival hall and four departure halls and each hall area is (16 * 68) square meters. Inside each hall there is a cafeteria, bathrooms for women and men, as well as newspaper and magazine kiosks, an administrative office, a ticket sales outlet and an internal radio station. Location is comprised of a mix of uses, including residential, commercial, office, transportation, hospitals, banks, and markets like Al sough Al Mahali. Which can be considering as Central Business District? Figure 1 here under illustrated the location of the terminal.



Figure 1: Location of Khartoum bus terminal.

On the northwestern side of the building there is the Al Mena Al Bari intersection (four legs) which it always congested, on the northeastern side there is T-intersection (three legs) and a bus stop and on the south side there is two T-intersections.

Access to Al Mena Al Bari is gained through a number of ways. Vehicle can come for the east or west through the road link between Alshafa and Jabra, or from the north through (Alshafa Salat) Street or (Mohammed Najeeb) street and on the south side there is (Al Hawa) street.

There are a number of parking lots inside Al Mena Al Bari, but it need to reorganize and repaint. And with the increase in trips and buses parking lots have become insufficient, causing heavy congestion in the gates, for the privacy vehicles there are limited parking around Al Mena Al Bari and during pick hour these become congested.

By using Google Earth figure 2 found that the total area of Al Mena Al Bari is about 70,500 m², and the area that can be used to make parking lot is around 25,600 m², which account for 36% of the total area. There are enough gates to enter and exit buses but not used in the best way.



Figure 2: Available parking space

III. Results:

Questionnaire

To assess the satisfaction of passengers with the Al Mina Al Bari a questionnaire was prepared, checked and distributed among the passengers using the terminal for their transportation. Among 80 persons received the questionnaire the response was from 63 persons which representing 78.75%.

Traffic counting

Data and statistics on numbers of passengers and vehicle trips from Al Mina Al Bari or from local depots were collected from Traffic Police HQ and Al Mina Al Bari statistics.

Appendix.1 shows the Statistics of the number of trips and passengers for both Buses and Vans. Figure.3 shows how bus trips increased with the years and vans trips are showing a negative growth rate during the same period.

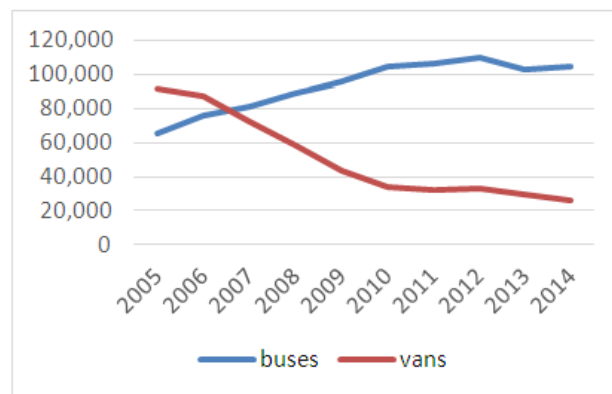


Figure 3: Bus and Van trips distribution

Temporary and random positions:

Appendix.2 shows that the daily traffic counting of various depots. Which indicates that bus travel is from main areas of Ashabe, Libya and Shendi bus locations while Vans are scattered along several locations? Shendi Location is most busy compared to other locations operates more buses and less vans than Ashabe. Shendi has also more passengers than other locations.

Appendix.3 shows that the percentage of traffic for these depots, which reveals that bus trips have two main centers with 57% for shendi and 39% for Ashabe location, Sough Libya has minimal share in bus trips with 4% trips, Veg. market, H. Koko and H. Yosif have no share in the Bus traffic and Vans shares are more widely distributed than Bus shares.

It is observed that locations other than Al Mina Al Bari in Khartoum have sizable traffic. This represents 20% of the total traffic in Khartoum state as seen from Figure 4 and appendix.4, for Omdurman and Khartoum North it is 18% and 15% respectively. Vans category is the main category in this traffic.

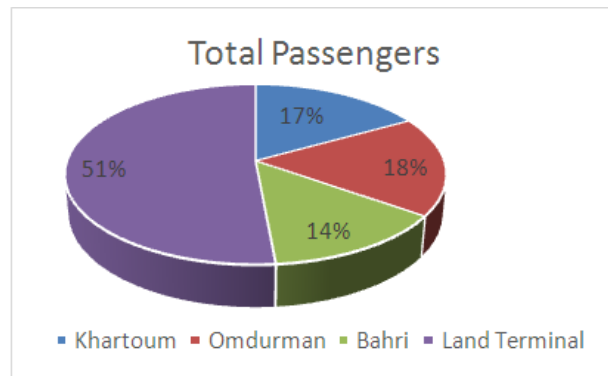


Figure 4: Distribution of passengers

IV. Discussion:

Parking area

The current traffic can be estimated from annual trips of Al Mina Al Bari, and the growth factor was estimated from figure 3, the bus trips increase by rate of 2%, the van trips decrease by rate of 2%.

Table 1: Annual Trips Khartoum North

year	Bus vehicles	Vans Vehicles	Total vehicles	Bus Passengers	Vans Passengers	Total Passengers
2014	104618	25617	130235	4493601	749322	5242923
2015	106710	25105	131815	4481835	702930	5184766
2016	108845	24603	133447	4571472	688872	5260344
2017	111021	24111	135132	4662901	675094	5337996
2018	113242	23628	136870	4756159	661593	5417752

The available parking area = 25,600 m²

Questionnaire:

The information was collected, organized and analyzed using a statistical computer software programmer SPSS.

The satisfaction of passengers from Al Mina Al Bari

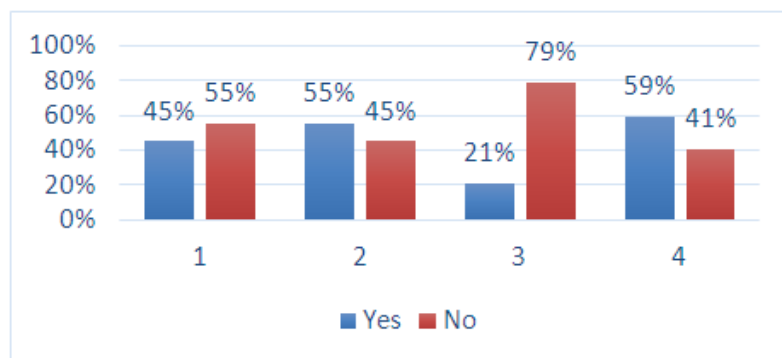


Figure 5.a: Results of questionnaire analysis

Figure 5.a shows that 55% of participants disagreed that the location is suitable, 55% agreed that access is easy, 79% disagreed that parking is available for private vehicles, and 59% agreed that transportation mode is available to leave the terminal.

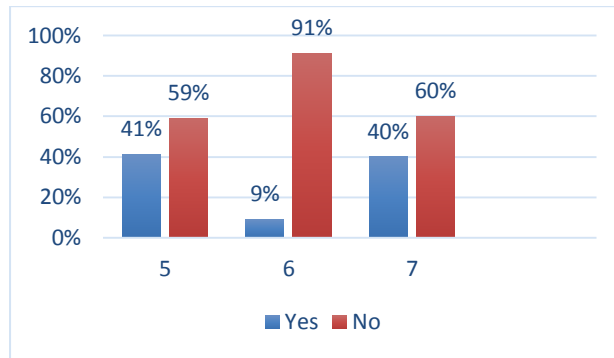


Figure 5.b: Results of questionnaire analysis

Figure 5.b shows that about 60% of participants disagreed that tickets are available at any time and entry fees for the terminal are appropriate, and 91% disagreed that ticket fees are fixed during the year.

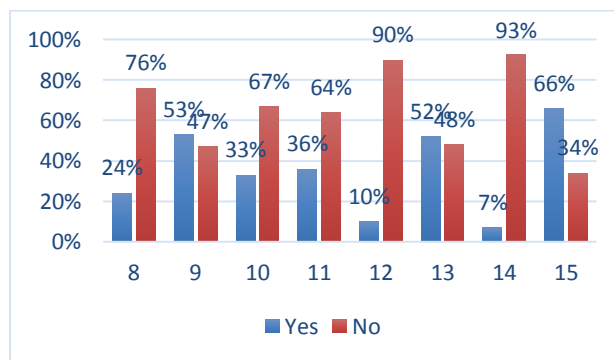


Figure 5.c: Results of questionnaire analysis

Figure 5.c shows that most participants disagreed that public passenger services are adequately available except for the availability of a mosque.

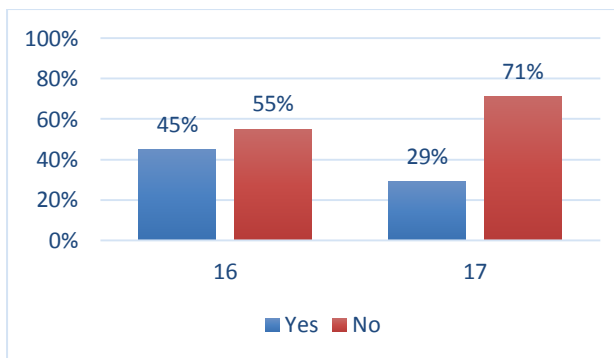


Figure 5.d: Results of questionnaire analysis

Figure 5.d shows that 55% of participants disagreed that there is adequate parking for buses, and 71% disagreed that there are sufficient entrances and exits for buses.

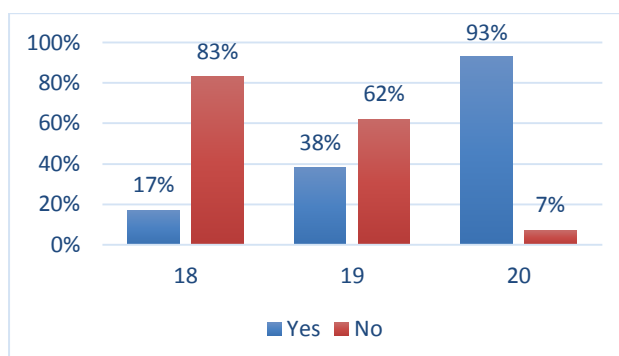


Figure 5.e: Results of questionnaire analysis

Figure 5.e shows that 83% of participants disagreed that all trips originate from the terminal, and 62% disagreed that the terminal meets all trips during the year, and 93% agreed to establish new terminals

V. Conclusions

This research discussed the technical evaluation of the buses terminal – Khartoum State. By analyzing the results of the questionnaire, the following conclusions were obtained:

- ❖ Al Mena Al Bari does not provide public services to passengers adequately. Sale points and entrance gates are congested, shortage in signposts and departure halls are packed with travelers.
- ❖ Parking of private vehicles around Al Mena Al Bari is insufficient, causing congestion and obstructing the entry and exit of buses.
- ❖ One arrival hall is available, causing congestion at the peak period, forcing some buses to stop outside the terminal.
- ❖ There are sufficient spaces inside Al Mena Al Bari to cover trips during the year but need to be reorganized and planned.
- ❖ Temporary and random depots expanded in Khartoum state, and 49% of passengers use it to travel to different states.

References

- [1]. Transportation Planning Capacity Building Program, 2007, The Transportation Planning Process: Key Issues, Washington.
- [2]. <https://en.wikipedia.org/wiki/Transport>.
- [3]. Brudevold, S. A. 1957. A BUS TERMINAL STUDY FOR TACOMA. University of Washington. Washington US
- [4]. Hospital, C. Towers, T. Ave, P. and St, A. 2015. Bus Terminal Design Guidelines. New Delhi, India.
- [5]. Hoque, A. M. 2011. BRTC International Bus Terminal. BRAC University. Dhaka, Bangladesh.
- [6]. Christopher, B. 2005. Transport terminals and Modal Interchanges, planning & Design. Architectural Press & Publication, 2005.
- [7]. Edmond, R. C. 1972. Inter-City Bus Terminal Location Criteria. University of British Columbia. Canada.
- [8]. The Institute of Urban Studies. (2006) Greyhound Bus-Terminal: Analysis of Options for the Winnipeg Downtown Terminal.
- [9]. Al-Mudhaffar, A. Nissan, and K.-L. Bang. Bus stop and bus terminal capacity. Transportation Research Procedia, 14:1762–1771, 2016.
- [10]. TSS-Transport Simulation Systems, 2017. URL <https://www.aimsun.com/aimsun/>. [Online; accessed 3 May 2017].
- [11]. AASHTO. (2010). Geometric Design Guide for Transit Facilities on Highways and Streets, Chapter5 Off-Line Transit Facilities. Washington: American subcommittee on design AASHTO.
- [12]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [13]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [14]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [15]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [16]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [17]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [18]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [19]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [20]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [21]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [22]. Iordanopoulos P., (2010). Intermodal Passenger Terminals: Design standards for better level of service.
- [23]. Dissertation of MSc programme of Planning, Organization and Management of Transport Systems of Aristotle University of Thessaloniki, Greece.
- [24]. Transportation Planning Capacity Building Program, 2007, The Transportation Planning Process: Key Issues, Washington.
- [25]. <https://en.wikipedia.org/wiki/Transport>.
- [26]. Brudevold, S. A. 1957. A BUS TERMINAL STUDY FOR TACOMA. University of Washington. Washington US
- [27]. Hospital, C. Towers, T. Ave, P. and St, A. 2015. Bus Terminal Design Guidelines. New Delhi, India.
- [28]. Hoque, A. M. 2011. BRTC International Bus Terminal. BRAC University. Dhaka, Bangladesh.
- [29]. Christopher, B. 2005. Transport terminals and Modal Interchanges, planning & Design. Architectural Press & Publication, 2005.
- [30]. Edmond, R. C. 1972. Inter-City Bus Terminal Location Criteria. University of British Columbia. Canada.
- [31]. The Institute of Urban Studies. (2006) Greyhound Bus-Terminal: Analysis of Options for the Winnipeg Downtown Terminal.