An analysis of Ahvaz bus services system and its place in urban transportation, as well as the role it plays in reducing the traffic congestion within the central core of the city

K. Lotfi, S. A. Tabatabaie & M. Tohidi
Ahvaz Islamic Azad University, Iran

Abstract

The city of Ahvaz is the capital of Khouzestan province and is situated in the southwestern part of Iran. Because of the presence of heavy industries, and oil fields, Ahvaz is considered as one of the most important cities in Iran. Its population is estimated at 1000000, and it has a tendency to attract migration from other parts of the country. Structurally speaking, most facilities and public amenities and services are situated in and around the city center, which inevitably attracts most of the traffic to the city center.

Of all the transportation systems in Ahvaz, the network of bus services is responsible for moving 38% of the passengers from one place to another each day.

The following statistics are the findings of a study carried out to determine what modes of transport people are currently using in Ahvaz: Private cars 13.81%, taxis 16.34%, minibuses 5.8%, buses 38%, motorbikes and bicycles 6.57%, others 29.47% [1].

The findings also indicate that each day 300000 journeys take place by bus [2]. Furthermore, around 90% of all journeys end in the commercial center of the city, which, considering the physical structure of the city, creates environmental problems, as well as causing unnecessary and unwanted journeys.

This article, whilst analyzing the state of the public transport system in Ahvaz, will also examine the network of city bus services. In addition, the article will study the place and role of this network in the city and try to offer useful plans and solutions to the problems associated with city center congestion.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

1 Introduction

The phenomenon of traffic and transport in general, which stems from economic, social, structural, environmental and cultural factors, has not been created by itself. It was the requirements of much needed moves and shifts for the many daily tasks, which has caused the creation of such phenomenon.

Existing transport facilities in the underdeveloped countries can not cope with the increasing demands of a population, which has grown rapidly. Not only supply has not increased alongside the demand, but also, in some cases it has shrunk significantly.

In Iran decision-makers have forgotten the principles of transport policy as mentioned below:

- To specify travel centers.
- Forms of having access to them.
- The elements which play vital role for this purpose.

Such policy, which is limited only to the activities of buses, is insufficient, too dependent on other unknown factors, and without specific planning. Although relevant authorities are aware of the problems associated with the traffic congestion, but lack and shortage of necessary (funds), unscientific approach to the issue, lack of policy regarding rural migration and rapid growth of urban population, increasing use of private cars instead of public transport, etc., have all added to the problem.

At present buses are the main means of transport, and are expected to remain so for a very long time. This is due to the fact that in most cities in Iran, the buses are more flexible than other transport means, and most certainly are cheaper. Furthermore, most cities in Iran have an old structure, which can only cater for bus use.

Considering the fact that now a days bus is the most efficient mode of transport, and is used daily by low and middle income sections of the society, its importance and significance becomes ever more clearer. Today, after years of research and study, most experts in the field of public transport.

2 Bus service and its place in the urban transportation in the world

This largely depends on the social, economic and political relationships, particularly on dominant ideological philosophy in the country, and can be analyzed in the following four categories [3].

2.1 Advanced capitalist countries

Until 1970s private car was the dominant means of transport in the industrialized societies such as U.S.A. Expansion of suburbs, out of town shopping centers and other centers for leisure and educational activities, required private car. However, with the oil crisis of 1973 and damage done to the environment by increase traffic, forced the government to review its transport policy. Therefore,

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

a lot of money and effort has been redirected toward improving public transport, and is still continuing today.

2.2 Socialist countries

In such countries the emphasis of transport policy was largely to encourage public transport use, away from private car. City planning in such countries is carried out in such a way to favor decentralized public services.

2.3 Middle of the road countries

Such policy involves a mixture of both public and private. The planning is carried out in such a way that improved public transport does not hinder the private means of transportation. High costs of keeping a car, such as petrol, insurance, and taxes, have forced commuters to use public transport. However, since the quality of such services are of a high standard, people use them willingly. Most European and Asian countries follow such policy. Japan is a good example.

2.4 Developing countries

Such countries, for various reasons such as political and economic dependency, do not have a clear and well-defined transport policy. Much of their activities depend on the existing daily realities. Therefore, corrective measures are applied only when the solution is diverted from its natural and logical path. In such societies, instead of trying to improve public transport in general, the emphasis has been placed upon buses to solve the problem. These buses with the minimum of service quality are expected to carry much of the burden associated with passenger transportation.

3 City of Ahvaz

Ahvaz is located in the southwest of Iran. This city is the center of Khouzestan province. In population terms Ahvaz is ranked fifth and in terms of area, it is ranked Second City in Iran. Ahvaz is divided into two western and eastern parts. Urbanization growth in this city has been high [4].

Table 1: Population growth in Ahvaz (1956-2000).

Year	1956	1966	1976	1986	2000
Population	120000	200375	334399	619966	1000000

Due to the structure of the city streets (the checkered nature of these streets), in the east and west they are more or less parallel or vertical to the Karoon river,

and the streets furthest away from the river are largely affected by the passing roads and the city railway.

The city center is the only major point for commerce and other service activities. On the other hand, the two bridges that connect west side of the city to the east cater for most of the traffic along this route. Because of shortage and lack of main connecting network, increased population and employment, expansion of the city toward residential, industrial, and commercial areas, and also lack of systematic development and mixture of uneven application together with the clash between local and passing traffic, are all part of ever increasing transport and traffic problem.

3.1 Study of various transport systems in Ahvaz

Means of transport in Ahvaz include taxi, private cars, minibus, and bus. Studies by firms of consultant engineers show that, of these private cars account for 13.81% of the journeys, taxis 16.34%, minibuses 5.8%, buses 38%, bicycle and motor-bikes 57%, and the rest (29.47%) by other means.

3.1.1 Ahvaz bus network

Ahvaz bus company has a network of approximately 254 km, of which 35km belongs to out of city network, and 219 km to inner city [5].

Of the active routs 5 operate outside, and 67 Operate inside the city. The shortest line belongs to the Daghaghele with 4.5 km, and the longest Anafche with 35 km. The operation of this system is divided between the west and east side of Karoon river. Each section has one manager and few patrols. The central transportation unit supervises their activities.

Organizationally, this body has a council, an executive board, and a chief executive, and is part of the city council.

Over the last few years some of the buses have been given to private firms, and as a result it is now operating as a joint venture by public-private bodies.

3.1.2 Number of buses

Ahvaz Bus Company shifts 300000 passengers daily using 256 buses. This figure represents one bus for 1172 passengers. In other words, considering the population of Ahvaz and suburb (1200000) , for every 4687 there is one bus, whereas, this figure should be one bus for every 3300 passengers. Therefore, it means that Ahvaz needs 360 additional buses. Taking into account the population growth, Ahvaz needs extra 13-15 buses each year.

3.1.3 Situation of passenger transportation within the network

Within Ahvaz, buses make 12% of journeys and 88% of inner city journeys. Table 2 shows the number of journeys by buses over the years. Figures show that in 1994 passenger transportation compared to 1993 has had a 48% increase. One reason could be the addition of a large number of buses to the existing fleet. The figures also show that Ahvaz has the capacity for further increases to its fleet. This will undoubtedly increase its share of the market.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

Table 2: The Number of travel by bus.

Year	Passengers	Annual rate of increase(%)
1988	20098000	-
1989	97960000	39.12
1990	28260000	1.07
1991	40018000	41.61
1992	47310000	18.22
1993	70000000	47.92
1994	76244000	8.92
1995	86427000	13.35
1996	81044424	-6.33
1997	86684079	6.95
1998	85500742	-1.4
1999	86850908	1
2000	86900000	.05
2001	87000000	.11

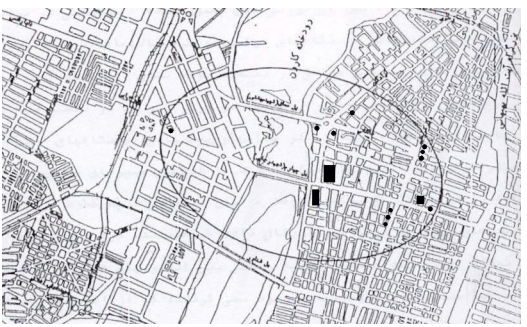

Figure 1: Bus stations in the city center.

3.1.4 Central stations and terminals

The City of Ahvaz has two bus terminals and three central stations. All the terminals and stations are situated in the city center and all the journeys from various parts of the city end up in the city center.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

Considering the checkered plan of the city—especially in the center—and the narrowness of the streets, bus movements are very difficult, especially at rush hours. There are no designated streets for the buses in the city.

3.1.5 Bus stops

Bus stops are not designed according to the recognized standards, and because residential areas are spread over large areas, and also variation in the structure of the routes, there is a tendency for too many bus stops along the routes, which inevitably leads to reduction in the average speed of the buses.

4 Problems associated with the bus system

Studies indicate that because of lack of acceptable standards, variations in terms of distances of journeys are too great. For example one journey covers a distance of more than 35 km, and another less than 4 km. Structure of the city and uneven distribution of population create further difficulties.

Almost 90% of journeys end up in city center. As well as traffic congestion and environmental damage, this causes unwanted journey. For example a passenger who has to get from A to B, must pass through city center, which is not necessary and it can be avoided.

Shortage of bus terminals is another problem. The city—as mentioned before—has two small terminals. The proximity of these terminals with the central stations, and their concentration in the city center, cause even more problems.

Studies further prove that some buses in some routes carry more passengers than their actual capacity, whilst others carry less than their actual capacity. This indicates that the planning and organization is wrong and need to be looked at again. Also, the proximity of bus stops along the routes causes significant reduction in the speed of the buses.

5 Planning for the Ahvaz bus network

Since giving priority to public transport in planning the transport policy of the city is of highest importance, correct and sensible planning will improve the efficiency of the transport system.

In Ahvaz, today, various transportation means operate without any logical relationship, and without coherent policy. Although buses remain the first choice for most people, specially the lower income families, but because 90% journeys end up in city center, and lack of designated bus routes due to narrowness of the roads, there is a tendency for traffic congestion caused by the buses.

However, it must be said that the buses are not solely responsible for the problem. Lack of planning and not giving priority to buses during rush hours, leaves most buses stuck in the city center traffic. This causes earlier than normal damage to the buses, time wasting, and public dissatisfaction with the system.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

Considering the above facts and studies carried out over three years, in order the efficiency, the plan for the decentralization of central stations is recommended (C.B.D.).

After further studies and gathering more information and figures from all the routes, some areas just outside the city center have been chosen to relocate bus stations and terminals.

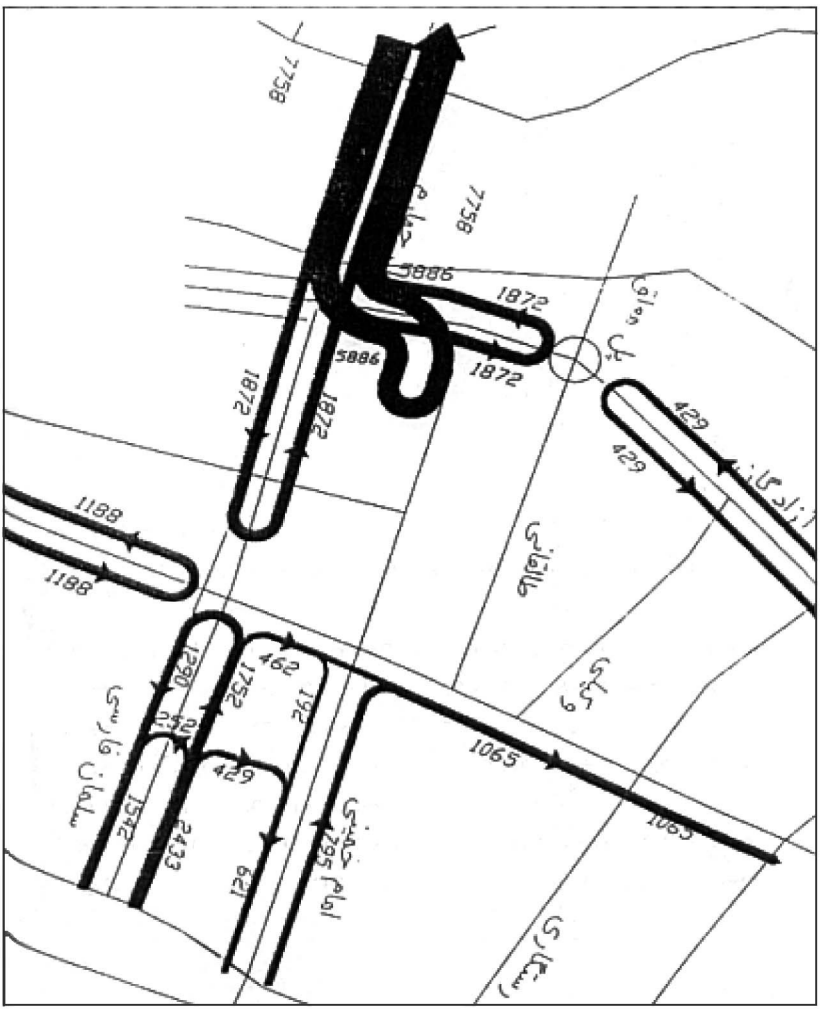

Figure 2: The volume of traffic caused by traveling buses in the city center (equal cab).

The buses coming from various departure points end their journey in these recommended new stations. The passengers are then transferred into the city center by buses that travel through especially designated routes.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)

Implementing this plan would reduce the traffic caused by buses, and stop the buses travelling into the city center either empty or with only a few passengers on board.

Some important objectives of the plan are as follows:

1- Reduction in city center traffic.
2- Increasing the efficiency of bus service.
3- Reducing the wear and tear of the buses.
4- Increasing the average speed of the buses.
5- Increased service for various parts of the city.
6- Reduction in the people's time wasted.

Since the city of Ahvaz is divided by Karoon River into two parts (east and west), the plan recommends that the bus operations be divided into two regions (1 and 2) i.e. east and west of Karoon River.

In zone 1 (east of the river) it is estimated that in average 9690 vehicles is added to the city center traffic each day. For the decentralization of the central stations, four central stations (terminals) around the central core are considered.

The same figure for the zone 2 is 7758 vehicles. The figures will rise even more if the number of hours those vehicles stop in the city center are taken into account.

Buses operating on this zone use two bridges (Naderi and fifth bridge) to get into the city center. But, because most passengers get of the bus before the Naderi bridge-which is in the center of city. They continue their journey into the center either empty or half-empty.

Thus, in order to reduce the traffic around the Naderi Bridge, the plan recommends that the main stations are located, from where the passengers could continue their journey into city center by buses along specially designated routes

6 Conclusions

Implementation of the above plan would increase the efficiency as well as number of passengers and it would also reduce the waste of time. As mentioned above, at the moment the volume of bus traffic involves some 15375 vehicles per day. Whereas, if the recommended plan is implemented, this would reduce to mere 5700.Furthermore, the plan will ensure that a small number of buses would enter the city center. Therefore, in case of breakdown of system, only a few buses will get stuck in the traffic.

Other conclusions drawn are as follows:

A- Shortening of the routes.
B- Increased average speed of the buses.
C- Reduced traffic burden on the city Center Bridge.
D- Increased efficiency of the buses.
E- Reduced wear and tear.
F- Reduced air and noise pollution.

As we all know, to increase the efficiency of the passenger transport system, responsibilities and jurisdiction of all the public transport vehicles (taxi, minibus, bus and etc) must be made clear. Therefore, it is necessary for the ton-hall to take

responsibility for coordination of all the transport means so that they complement each other. In addition, city planning and correct distribution of public service applications would decrease the burden of traffic in the city. Also, for increased efficiency of bus service.

Following suggestions are presented:

1-Creation of express lines along especially designated routes.
2-Printing and publishing time tables.
3-Traffic control systems such as especial traffic lights.
4-Giving priority to buses along the routes by creating especially designated bus routes.
5-Reduction of passenger waiting time at the departure point and destination.

References

[1] Andishkar engineering consultants, Ahvaz transportation and traffic master studies, 1997 .
[2] Lotfi, K, Bus services planning in Ahvaz,M.Sc.Thesis,1996.
[3] Dezhdar, F, Public transportation system in theory and practice,Tehran,1993
[4] Population and housing census, plan and budget organization, Iran, 1998.
[5] Ahvaz bus services firm, information center.

Urban Transport X, C. A. Brebbia & L. C. Wadhwa (Editors)