# The role of cycle rickshaws – low cost means of transport in old part of a city

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ABSTRACT: In India, cycle rickshaws play a very important role in the city. Since cycle rickshaws are non-polluting, they are being increasingly recognized as a major mode of transport in a developing country like India. These include old city areas of large metropolitan cities such as Delhi, besides other small and medium cities. In this study, cycle rickshaw emerges to be cost effective feeder mode. The study attempts to examine the impact of cycle rickshaw on a heterogeneous traffic flow and proposes options to augment the role of cycle rickshaws.

RESUME: En Inde, les cycle-rickshaws jouent un rôle très important dans la ville. N'étant pas polluants, on les reconnaît de plus en plus comme un mode de transport de premier plan dans ce pays en voie de développement. Cela vaut pour des zones d'urbanisation ancienne de grandes villes comme Delhi, mais aussi pour des villes de taille petite et moyenne. Dans cette étude, le rickshaw apparaît comme un mode de rabattement efficace en termes de coût. Cette étude vise à évaluer l'impact du rickshaw sur un flux de trafic

## 1 INTRODUCTION

The Cycle rickshaw, which is a tricycle designed to ferry people is still fairly common in smaller Indian towns and villages, as well as large metropolitan cities such as Delhi. Over the years, it has been witnessed that there is a significant growth in the number of cycle rickshaws in India. This indicates that there is a substantial role being played by this mode for certain type of trips.

The recent trend has indicated that all over the world there is a stress on shifting to non-motorized mode of transport wherever possible. This is especially important in a city such as Delhi, where the growth of vehicles is very high. The problem of pollution and congestion in Delhi seems to be worsening, despite local road improvement programs.

In such a situation, the promotion of non-motorized vehicles is being hailed as the alternative for non-consumption of fuel. The advantages that are being cited in support of the former are that:

1 they are ideal and cost effective for short distance travel,
2 they do not require petroleum fuel and are thus inherently non-polluting, and
3 they provide employment at a very low capital cost.

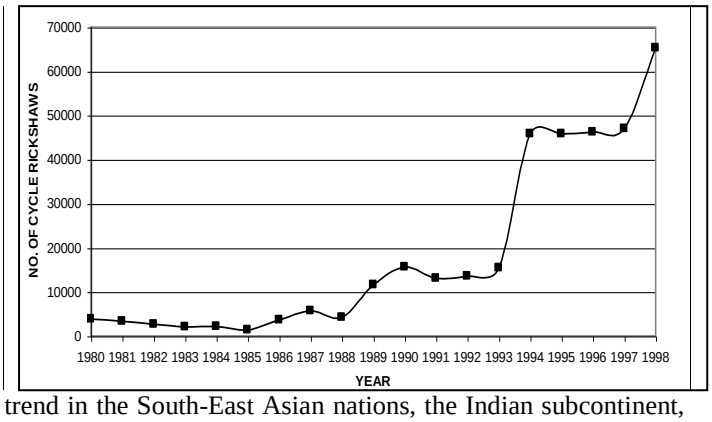
Thus it is an important mode of transport taking into view its environmental sustainability, as well as its capability to tap the surplus manpower available in India. Besides these, it is also noted that they form a suitable mode for movement in old city areas, which have narrow lanes and demonstrate an organic pattern of development.

## 2 EVOLUTION OF CYCLE RICKSHAW

Cycle rickshaw emerged into the scene in 1920s. Singapore had 10,000 cycle-rickshaws in the beginning of the Second World War. The number of cycle-rickshaws flourished till late 1960s, after which it steadily declined in this part of Asia. Jakarta demonstrates the example of the drastic shift towards faster modes. Their number rose to 100,000 in 1970. However by 1972 these were restricted to the city center, and were finally banned by 1980. 50,000 cycle-rickshaws were dumped in to the sea. (Anand, 2000).

Fig 1: Growth of Registered Cycle Rickshaw

Cycle rickshaws appeared in India in the 1930s. Unlike the




trend in the South-East Asian nations, the Indian subcontinent, especially India and Bangladesh have high volume of cycle rickshaws. Delhi has the largest number of cycle rickshaws, about 400,000, followed by Dhaka between 200,000 to 300,000.(Anand, 2000)

Delhi has the largest population of cycle rickshaws in the world, and it has been growing steadily over a period of time as can be seen from figure 1. However these ply primarily in the area controlled by the Municipal Corporation of Delhi. Cycle rickshaws are banned in the New Delhi Municipal Corporation

area, while a negligible number, about 200, ply in the cantonment area. (Anand, 2000).

# 3 WALLED CITY AREA OF DELHI

Emperor Shahjahan of the Mughal Dynasty, built Shahjahanabad, with its great palace, called the Red Fort, in the year 1638. This was to be the new Capital of his empire. Since that time, it has been the most significant component of the city of Delhi. Even today, functioning as a city within a city, it is one of the busiest areas of the Capital. Covering a total of 568 ha, the walled city, as it is called now, is located in parts of the planning division A and C of the Master Plan of Delhi. The Major roads touching the area are Netaji Subhash Marg in the east, Shyama Prasad Marg in the north, Shradhanand Marg in the west and Asaf Ali Road to the south as can bee seen in figure 2. (Budhiraja, 1999).

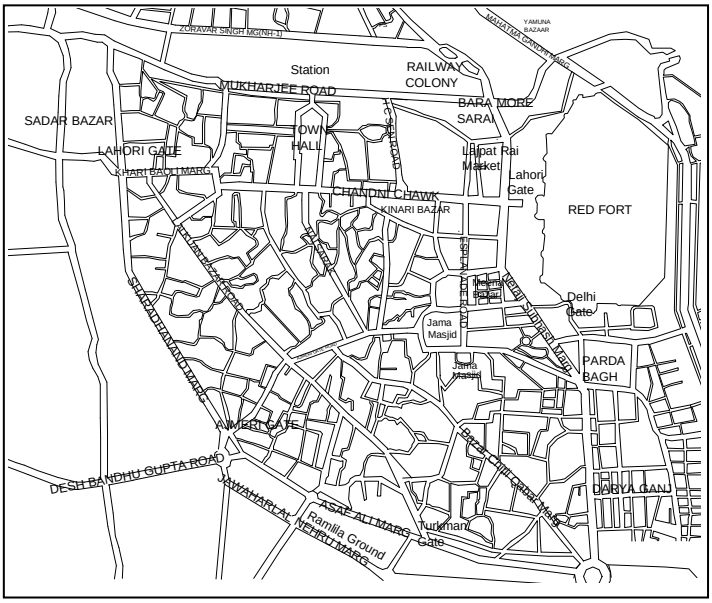



Figure 2: Walled city area

## 3.1 *Demographic Characteristics*

The walled city area has grown significantly demographically. However the recent trend has demonstrated a decline in the population of the area. From a population of 361,162 in 1971, the population in the area decreased to 312,840 by 1991. This shows a decline of about 13.3%. Even then, the density of the area is 615 persons per hectare, which is much above the planned 105 persons per hectare. (Budhiraja, 1999).

## 3.2 *Land Use Characteristics*

The trend of decrease in the population in the area may be explained by the rapid growth of commercial activity. From 1961, when there were 22,000 commercial units, by 1981 these were about 1,55,000 in number, a growth of about 700%. The residential area has also declined from 300 ha in 1961 to 180 ha only. Also the land use distribution indicates a significant percentage of area under commercial and warehousing uses, indicating traffic attraction zones. (Budhiraja, 1999).

The land use indicates only that 5% area is under the internal roads. This indicates narrow roads, with lower right-of-way. This is in contrast to the requirements arising from the heavy traffic demand generated by the existing land use. Also, while this network was primarily designed to cater to non-motorized mode of transport, it is presently catering 10 different types of modes, including motorized mode of transport. This indicates a high level of heterogeneity in the traffic composition.

## 3.3 *Cycle Rickshaw Scenario in the Walled City*

The Walled city had an official figure of 7,959 cycle-rickshaws plying in the area. This is based on the license system existing in the city till some time back. However, the unofficial figure was over 100,000. While the network characteristics of the area support the movement of the cycle rickshaws, they are causing a drop in the speeds of the overall network. However the present attempts at regulating the flow of cycle rickshaws have been met with failure. (Upadhaye, 1999).

## 3.4 *Network of the Study Area*

For the purpose of the study area, the network that has been identified is of the length of 34.102 km. Their distribution as per road characteristics is shown in table 1.

Table 1: Length Of Different Types Of Roads

| Category of roads | Characteristics | Length | Percentage |
|---|---|---|---|
| I | 6 Lane Roads | 4.123 | 12.1% |
| II | 4 Lane Roads | 4.258 | 12.5% |
| III | 4 to 5 m Roads | 9.993 | 29.3% |
| IV | Narrow Lanes | 15.728 | 46.1% |
| Grand Total | | 34.102 | 100.0% |

While heterogeneity of traffic is observed primarily in category I and II of roads, cycle rickshaws ply on first three categories of roads.

## 3.5 *Conclusions*

Shahjahanabad is presently a center of commercial activity. These commercial activities are spread all along the major roads in and around the study area. This acts as a major attraction for traffic. Also, owing to increase in overall urbanization of the city, increasing commercial activity, and the inherent road characteristics of the study area, there is an extremely heterogeneous traffic in the study area. All these factors are combining together to result in a number of problems. These are subsequently causing loss of time, health, and money, to the society.

# 4 TRAFFIC & TRAVEL CHARACTERISTICS

## 4.1 *Traffic volume characteristics*

The traffic volume entering the walled city area varies over the entire period of the day. The peak hour volume entering the walled city in the morning is observed to be 21,706 PCUs (or 15,950 vehicles) between 12:00 P.M. and 1:00 P.M., and during the evening it is 23,771 PCUs (or 17,765 vehicles) between 7:00 P.M. to 8:00 P.M.

A similar trend of traffic pattern is observed for the traffic leaving the walled city area. The peak hour volume leaving the walled city is observed to be 19279 PCUs (or14282 vehicles)

between 12:00 P.M. and 1:00 P.M., and during the evening 20314 PCUs (or 15456 vehicles) between 6:00 P.M. to 7:00 P.M.

The study of the composition of traffic reveals that cycle rickshaws entering the study area have a significant share accounting for 34% of the total share of the traffic volume. Cycle rickshaw constitutes 29.8% of the total traffic leaving the study area.

Throughout the day, cycle rickshaws and two wheelers constitute the maximum number of vehicles plying in the study Area. Cycle rickshaw varies between 26% and 35% share of the total traffic flow.

### (1) Factors Affecting the Speed of Traffic Flow

It has been observed that the speed in the area is very low. In some cases, it is lower than the walking speed. The low speed is directly resulting in additional cost being incurred by the society in terms of pollution cost and congestion cost. Table 2 shows the estimated cost worked out in relation to speed of vehicular traffic. (Krishna, 1989; Kumar, 1991; Murtaza, 1997).

TABLE 2: COST GENERATED

| Road | Time (Hrs) | Pollution Cost* | Congestion Cost* | Total Cost* |
|---|---|---|---|---|
| Chandi Chowk | 0800 to 2000 | 114.16 | 14.02 | 128.18 |
| H. C. Sen Road | 0800 to 2000 | 58.04 | 0.42 | 58.48 |
| Netaji Subhash Marg | 0800 to 2000 | 467.92 | 61.72 | 529.62 |
| Shradhanand Marg | 0800 to 2000 | 59.14 | 3.38 | 62.54 |
| S.P. Mukherjee Mg. | 0800 to 2000 | 98.1 | 7.72 | 105.82 |
| Total | | 797.34 | 87.28 | 884.64 |

* Cost in 1,000 Dollars

From further analysis, it was concluded that impact of cycle rickshaws is very significant on the speed of the traffic flow of the network as compared to the other components. The relationship between cycle rickshaw and the speed on the internal network was as follows:

$$S = -0.0103(VC) + 35.625$$

where S = Speed of the traffic flow, VC = volume of cycle rickshaw

### 4.2 *Role of cycle rickshaw in the walled city*

Within the walled city, after walk trips, cycle- rickshaw forms the most significant mode used for travel. Comparing the trip length frequency distributions of the walk trips and cycle rickshaws, it is observed that after a distance of 750m, the trend shifts from walk trips to cycle rickshaw trips. The usage of cycle rickshaws is predominantly over a radius of 1.5 km. This is shown in figure 3.

The use of cycle rickshaws is observed to be primarily at interchange between the modes of transport and for shopping purposes. This indicates that cycle rickshaws are being utilized for transporting people from the inner areas to the bus stops, three-wheeler stations, etc. on the major networks. This choice of cycle rickshaws is irrespective of the income group to which the people belong. Even those who own vehicles show a high dependence on cycle rickshaws, especially those who own cars. However, a decline is observed where the ownership is of two-wheelers.

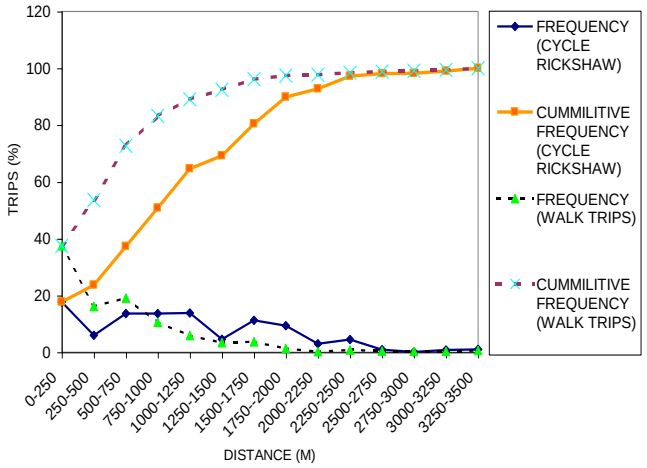



Figure 3: Comparative Trip Length Frequency Distribution Between Cycle Rickshaw and Walk Trips

In view of high percentage of trips, and a low radius of catchment area, it may be inferred that that this mode primarily finds utility in making short trips.

## 5 ISSUES

After having made an in-depth study, there are a number of issues relating to cycle rickshaws identified. These are as under:

1 Cycle rickshaws are the predominant dispersal mode plying in the walled city area. Interchange is one of the prime requirements for using cycle rickshaws.
2 After a distance of 750m, the share of walk trips reduces, and the cycle rickshaw trips increase.
3 Cycle rickshaws cannot be removed totally as certain areas in the region are suited to this mode of transport only. However their numbers need to be controlled.
4 Factors favoring the cycle rickshaw are:
   a. Willingness of user to pay the fare of cycle rickshaws.
   b. Purpose of the trip.
   c. Distance traveled.
5 Cycle rickshaws are responsible for decreasing the speed of the vehicular flow. This is resulting in the increase in the pollution and congestion cost.
6 Any measure to control the number of cycle rickshaws involving regulation has not worked so far by any agency.
7 The control over the pullers has not been made.

## 6 PROPOSALS

From the above discussion, it is established that cycle rickshaws are the most effective mode of transport available presently in the Walled City area, which is characterized by intensive land utilization, as well as narrow lanes available to support it. However, it is established that in the present condition of traffic flow, they are indirectly causing burden in the form of pollution and congestion cost. Thus the proposals focus on control of the number of cycle rickshaws in the area, but not to eliminate it all together.

### 6.1 *Identification of zones for movement of cycle rickshaws, and movement of other modes*

The most significant problem that is arising is from the heterogeneity in the traffic composition. An attempt is required to make the traffic more homogenous. For such an effort, an alternate network is required for the cycle rickshaws. Such a network may ideally be on the internal road network of Walled City area. The network is going to be such as to connect the major origin-destination points and be accessible to parking lots. It should be linked with Chandni Chowk. The advantage with this is that it allows the cycle rickshaws to ply on any of the other internal networks if required. An example has been shown in figure 4.

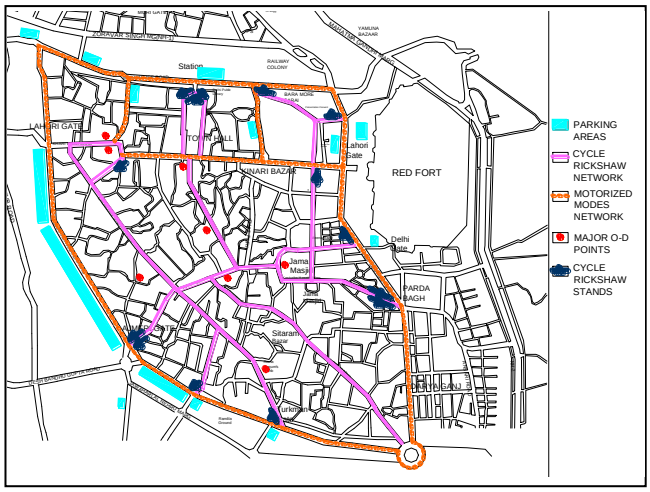



Figure 4: Proposed Network for Cycle Rickshaw Movement

### 6.2 *Controlling the number of cycle rickshaws plying in the Walled City*

While the network identification would work towards reducing the heterogeneity of the traffic, the network would still continue to experience pressure from the immense number of cycle rickshaws presently catering to the area. Also the previous efforts that have been made to restrict the movement of cycle rickshaws have been primarily regulatory, which have not met with much success. Thus there is a different approach that needs to be attempted, other than regulation.

One such possible option is that of pricing. This may be levied for the entire network, as well as for just the main peripheral and through roads. For these cases either a uniform pricing system may be applied for all cycle rickshaws, or different permit fees structure could be charged for, one for the through roads, and the other on the peripheral roads.

### 6.3 *Other recommendations*

1 Trolleys may be introduced, which would be given on rent. The people coming for shopping may hire it at bus stops, parking lots, or at entry point of the markets, and carry their own goods, rather than need a cycle rickshaw.
2 Better information signage and locational maps to be put at various places to allow convenient pedestrian movement.
3 The measures suggested above could also be extended to the other slow moving vehicles though presently their share is not as much as cycle rickshaws.

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