A MULTI-MODAL PUBLIC TRANSPORT SOLUTION FOR MALE, MALDIVES

11TH CONFERENCE ON COMPETITION AND OWNERSHIP IN LAND PASSENGER TRANSPORT
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Geography

- Male, the island capital of the Maldives, is an archipelago of over 1000 islands in the Indian Ocean.
- This 2 sq km island is home to over 120,000 people.
- Male Urban Area is made up of five main islands as follows:
  - Male – the primary island on which most commercial, administrative and residential activities take place. Is also the most motorised island.
  - Hulhule – the airport island with no residential population
  - Villingili – a newly formed residential island where the use of private motorised vehicles are prohibited
  - Hulhumale – a newly developed residential island where private vehicles are allowed but has no land connection to the main island
  - Thilafushi – an island with only commercial activities
Roadside Survey Locations
Transport Modal Split in Male Urban Area

Total daily return trips by all Households – 121,475
VEHICLE TRAFFIC PATTERNS

- The Male traffic patterns show a longer traffic day of about 17 hours, extending from 6 AM to around 11 PM.

- The traffic flow is quite uniform as most roads carry only around 5 to 6% of daily traffic during each hour.

- This is possibly due to the short distances of travel and workers’ keeping somewhat flexible working hours as is the common practice in the Maldives.

- According to an Origin-Destination matrix that was developed, there are an estimated 37,500 motor cycles and 12,500 car/taxi return trips per day in Male.

- Therefore the vehicular trip rate in Male is estimated to be around 0.4 return vehicle trips per person per day.
Majeede Maghu (National Library)
Hourly Flow Distribution
(Location: RS3:Giyaasudheen School) 0600-2200 hrs [Two Way]
PEDESTRIAN TRAFFIC PATTERNS

- Most of the major roads have between 10,000 to 20,000 pedestrian movements per day.

- It was also found that around 30% of roads have more pedestrians than passengers in vehicles.

- These roads are in commercial areas, areas adjacent to the ferry terminals and in the CBD.

- Furthermore, it was found that more than 100 of the 873 road links in Male have more than 1000 pedestrians and vehicle users per hour.

- Due to socializing and shopping patterns in Male, the heaviest pedestrian movements were observed during 2000 to 2100 hours.
ROAD SPACE UTILIZATION

- When comparing facilities provided for different road users, pedestrians are provided only 3% of the road space, even though they made up 34% of the total number of road users in Male’.

- On the other hand, 4-wheeled passenger and goods vehicles which make up only 25% of the traffic flow, take up 66% of the road space.

- Therefore it can be concluded that a disproportionately high amount of limited road space is taken by these vehicles for both circulation and on-street parking.

- The road inventory survey found that 70% of all cars and vans in Male’ are parked on the street during the day time, while the percentage for motor cycles was less at 53% and for taxis it was 48%.
Distribution of Road Space in Male’
(for circulation & parking)
In Male’ Urban Area there is a clear positive linear relationship between the vehicle ownership and household income. There was however an inversely linear relationship for bicycles and a maximum rate of ownership for taxis at an average household monthly income of between MRf 15,000 to 20,000 per month.

Motor cycles and cars show an elasticity to income greater than one, where the rate of increase in car ownership exceeds the rate of increase in household incomes.

A very conservative estimate of 50% population increase has been made for the next 15 years in Male Urban Area, accompanied by an approximate 60% increase in per capita incomes during this period. This will result in the total vehicle fleet increasing from around 20,000 to 60,000 which would be a 200% increase in 15 years. Even if this was solely confined to motor cycles, it would still cause severe constraints on road space for circulation and more importantly for parking.
Analysis of Vehicle Ownership

- The household survey indicate that the total number of vehicles in Male Urban Area is 22,303. This is consistent with the Vehicle Registration data.

- Of this 77% is motor cycles, while 14% are bicycles. Four wheel vehicles make up only 9% or around 2000 vehicles.

- There is a significant difference in vehicle ownership between Male’ and the newer residential areas in Vilingili and Hulhumale’.

- In Vilingili private vehicles are not allowed. This is reflected in the lower ownership rate, but that fact that it still has a rate around 50% of Male’ indicates that most people still own a vehicle and keep it parked in Male (the MTCC parking provides for this).

- In Huhumale though vehicles are allowed, vehicle ownership is still very low, possibly due to a lack of development in Huhumale which does not warrant much travel within Hulhumale.

- There is a proposal to build a bridge to connect all these islands.
FERRY SERVICE

- Ferry services have long been a part of the Maldivian passenger transportation system. Being a country consisting of a number of small to medium islands in the Indian Ocean, it is well suited for passenger and goods movements by ferry.

- These services were:
  - Male to Hulhumale Ferry
  - Male Villingili Ferry
  - Male- Hulhule Ferry
  - Male- Thilafushi Ferry

- All the above services except the Male-Hulhule ferry were operated as monopolies by SoE the Maldivian Transport & Construction Corporation (MTCC).

- In the case of Male-Hulhule ferry service this service was provided by individual operators working as an association or cartelized union as opposed to a company,
Ferry Utilization Rate (by % of Time)

- Male-Vilingili
- Male-Hulhule
- Male-Hulhumale
- Male-Thilafushi
- This is typical of individual operators in an unregulated market where entry and exit mechanisms are not functioning properly.

- There are at present 52 registered vessels with approximately 40 of them operating daily. This means that all these vessels have to be sustained even if they are not really necessary.

- As per demand computation, this service actually needs only 8 vessels to provide the required frequency.

- Around 40 surplus vessels have to be accommodated every day in order to provide business opportunities and employment.
Quality of Ferry Services

- According to the passenger data analysis, in all ferry services, around 20 to 30 percent of passengers have termed these services as being uncomfortable.

- Between 10 to 40 percent of passengers’ state that the ferry service is too slow for their linking.

- In this analysis, the frequency or the cost was not highlighted as a problem. Surprisingly, even the Male-Hulhule service which has a relatively higher fare was not highlighted as being too costly.

- This is possibly due to the fact that most passengers do not perceive the high cost as they are not regular commuters in the sense that they are only traveling to and from the airport.
TAXI SYSTEM

- The taxi service in Male is satisfactory, but could not handle high peaks or (more particularly spikes) particularly on rainy days. It was noted that there was no other form of public transport system to serve the traffic spikes that were created by ferry terminals, hospitals or schools.

- The taxi system comprises of individually owned taxis that are registered with a ‘call centre’. Taxi permits that are sold annually are purchased by drivers at a premium.
Mean Household Expenditure per Month (Rf) by Mode

Rf per month per Household

Private Ve Taxi Ferry Bus Total

Galolhu Machchangoli Maafannu Heneveiru Vilingili Hulhumale

Annual Expenditure by all Households (Rf Mn)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Hulhumale</th>
<th>Vilingili</th>
<th>Heneveiru</th>
<th>Maafannu</th>
<th>Machchangoli</th>
<th>Galolhu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Ve</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>800</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Taxi</td>
<td>800</td>
<td>1,600</td>
<td>2,400</td>
<td>3,200</td>
<td>2,000</td>
<td>3,200</td>
</tr>
<tr>
<td>Ferry</td>
<td>2,000</td>
<td>3,600</td>
<td>5,400</td>
<td>7,200</td>
<td>6,000</td>
<td>8,400</td>
</tr>
<tr>
<td>Bus</td>
<td>4,000</td>
<td>7,200</td>
<td>10,800</td>
<td>14,400</td>
<td>12,000</td>
<td>16,800</td>
</tr>
<tr>
<td>Total</td>
<td>10,000</td>
<td>18,000</td>
<td>27,000</td>
<td>36,000</td>
<td>30,000</td>
<td>40,000</td>
</tr>
</tbody>
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This is over 1% of GDP

|        | 67.4 | 27.8 | 12.0 | 0.9 | 108.1 |
Conclusion #1: Ferry Services

- Ferries carry around 12% of the transport demand in MUA.

- There is evidence that overall quality could be improved without increasing fares since some costs may be reduced by better scheduling to follow demand patterns. This is because except for the Hulhule service others have lower average load factors.

- In the case of the Hulhule service, there are problems arising from over supply by individual operators and the cartel that has formed. Fares on this route are at least 200% over priced. Ferry utilization is only 20% and both operators and passengers are losers.

- Improvements to the quality of ferry used, terminals and the introduction of inter-modal transport in the form of mini-buses feeding the terminal as well as facilitating park and ride for say bicycles and motor cycles will be advantageous.
Policy Intervention #2: Introduce High Quality Minibus System

- Natural demand points exist at Hulhumale’ and Villingilli terminals, IGMH and ADK hospitals.
- Heavy East-West pedestrian and vehicle flow enables viable bus routes.
- Two potential routing directions have been identified for further study as shown in the next slide.
- Vehicles need to be small 16-20 seater with high roof, low floor and wide doors. 5-10 Standees may be allowed during peak periods.
- Seating arrangements may be redesigned to lateral positioning to provide for easier access/egress.
Conclusion #3- Traffic Management

- Many roads in Male’ have been made one-way. There is evidence from the traffic counts that this needs to be revised since directional splits in the two way roads are disproportionate indicating that road utilisation has become poor. This would mean a system wide approach to road network planning.

- This can be done now that the road inventory survey has been completed. The entire system of one ways should be looked at after considering the capacity of roads links and junctions and not in a case by case basis.

- There is also the need to consider some roads where pedestrian flows are dominant to be redesigned as pedestrian walkways with limited vehicular access.
Male does not need:
- A bridge!
- A LRT!
- Traffic Signals

But Male needs
- Better ferries
- A minibus service
- An One way system and improved pedestrian facilities