ANALYSING PASSENGER PERCEPTIONS OF PUBLIC TRANSPORT
A CASE STUDY OF BEST - MUMBAI

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STRUCTURE OF PRESENTATION

• RESEARCH BACKGROUND

• SERVICE QUALITY CONCEPT AND MODELS

• CASE STUDY AREA

• DATA COLLECTION & ANALYSIS

• RESULTS

• CONCLUSION AND RECOMMENDATIONS
RESEARCH BACKGROUND

- NUTP – Highlighted need of moving people.
- Increase in population and thus private vehicles on road as well as decrease in PT ridership
- Attracting more passengers is critical, and retaining existing passenger is equally important.
- No consideration of passenger’s view point in measuring SQ of PT.
- Hence to retain existing and attract more passengers, knowing what is important for them is very important.
RESEARCH OBJECTIVES

• To understand the concept of service quality and determinants that affects the needs of a public transport passenger.

• To review available service quality models for evaluating public transit services from passengers view point.

• To analyse the service quality of buses in Mumbai using the existing service quality models.

• To provide suitable suggestions and recommendations for improving service quality of public transport.
## RESEARCH METHODOLOGY

### RESEARCH OBJECTIVES

- To understand the concept of service quality and determinants that affect the need of a public transport passenger.
- To review available service quality models for evaluating public transit services from passengers viewpoint.
- To analyse the service quality of buses in Mumbai using the existing service quality models.
- To provide suitable suggestions and recommendations for improving service quality of public transport.

### QUESTIONS

- What is service quality?
- What are the attributes that define service quality of a bus system?
- What should be the approach of knowing priorities of people and which features should be considered?
- What is the hierarchy of different features of bus service required by a passenger?
- How the service quality can be improved further keeping passengers perception in mind?

### Literature study

- What are different models available for measuring service quality?

### On site surveys
SCOPE AND LIMITATIONS

• Study is focused on *user’s perception*.

• Users perception is captured on BEST buses with 218 *on-board primary surveys*.

• Surveys are done on 5 *routes* covering the area under WADALA Depot *for 4 days considering weekdays* (Tuesday-Friday).
WHAT IS SERVICE QUALITY??

• “SERVICE is an act or deed or performance”, Berry (1985).

• Service quality is an abstract and elusive construct and can be measured based on technical as well as functional performance.

• It is measured at delivery end i.e. by knowing the users view.

Features of Service Quality

- Intangible: Akin to performances rather than objects.
- Inseparable: As it is provided on the spot, and not manufactured remotely.
- Heterogeneous: Varies from producer to producer, consumer to consumer and also with situations.

Berry (1985).
PERCEPTION AND SATISFACTION

- **Perception** is basically *opinion of a user* about the service after using and comparing with what he expected and experienced in past.

- Customer satisfaction is an *emotional reaction* which depends on consumer’s expectations about the service and perception after experiencing it.

- It is a state of mind of when consumer’s feelings about disconfirming expectations is coupled with feelings about previous experience of the service.
MODELS FOR MEASURING SERVICE QUALITY

• SERVQUAL MODEL

• KANO MODEL

• CUSTOMER SATISFACTON INDEX
A five scale instrument to measure service quality is given in SERVQUAL model to measure passengers perception. This five dimensions of service quality are:

- **Tangibles** – physical features
- **Reliability** - perform service as promised
- **Responsiveness** - willingness to help
- **Assurance** - knowledge and courtesy of employees and
- **Empathy** - understanding what customer feels
• According to KANO not all features are alike and can be classified in different categories:

1. Must-Be: basic requirements

2. One dimensional: Satisfiers, directly proportional to customer’s satisfaction.

3. Attractive requirements: Delighters, neither expected nor demanded by the customer.

4. Indifferent features: no interest for this feature, no effect on satisfaction or dissatisfaction.
CUSTOMER SATISFACTION INDEX

- **Customer Satisfaction Index** indicates *percentage of people satisfied* with the service attribute and the extent till which the service supplied matches users expectation.

- Calculated by first computing *Weighted Importance Factor (WF)* and *Weighted Satisfaction Score (WS)*.

  \[
  WF = \frac{\text{Mean of self-stated importance}}{\text{Sum of all means of importance}}
  \]

  \[
  WS = WF \times \text{Means of satisfaction scores for each feature}
  \]

  \[
  CSI = \frac{WS}{\text{Highest Score}} \times 100
  \]
SUMMARY OF LITERATURE REVIEW

• ServQual model – It categorize various features into 5 most important categories.

• Kano Model - It helps in hierarchically defining features.

• Customer Satisfaction Index – It further helps in giving rankings to different features based on their satisfaction & importance level for users.
DATA COLLECTION APPROACH

LITERATURE REVIEW
Selection of important dimensions and features for service quality.
SERVQUAL MODEL
(TANGIBLES; RELIABILITY; RESPONSIVENESS; ASSURANCE; EMPATHY) + KANO MODEL
Identification of study area
Identification of survey method

DATA COLLECTION & ANALYSIS FOR CASE-STUDY
SECONDARY DATA
Previous reports
Performance sheet
Route information
Selection of survey routes
Selection of sample size

PRIMARY DATA
Opinion surveys of passengers
Socio-economic data
Hierarchy of requirements
Satisfaction & Dissatisfaction Co-efficient
### Determinants of Service Quality in Public Transport

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Determinants</th>
<th>Feature of</th>
<th>Feature no.</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Bus</td>
<td>1</td>
<td>Condition of bus</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Bus</td>
<td>2</td>
<td>Cleanliness in bus</td>
</tr>
<tr>
<td>3</td>
<td>Tangible</td>
<td>Bus-stop</td>
<td>3</td>
<td>Cleanliness at bus stop</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Bus-stop</td>
<td>4</td>
<td>Seating space at bus stop</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Bus</td>
<td>5</td>
<td>Comfortable seating in bus</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Bus</td>
<td>6</td>
<td>Seating space during peak hour</td>
</tr>
<tr>
<td>1</td>
<td>Reliability</td>
<td>Bus</td>
<td>7</td>
<td>Arrival of buses at scheduled time</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Bus</td>
<td>8</td>
<td>Break down of buses on road</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Bus-stop</td>
<td>11</td>
<td>Waiting time at bus stops</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Bus</td>
<td>18</td>
<td>Maintaining journey time (reaches destination)</td>
</tr>
<tr>
<td>1</td>
<td>Responsiveness</td>
<td>Bus-stop</td>
<td>9</td>
<td>Information of buses at bus stops</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Bus</td>
<td>10</td>
<td>Information about next stops in the buses (audio or video)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Bus</td>
<td>12</td>
<td>Information about change in schedule and fare in advance</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Bus</td>
<td>13</td>
<td>Information about bus services on web</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Employee</td>
<td>19</td>
<td>Complaints are solved at the promised time</td>
</tr>
<tr>
<td>1</td>
<td>Assurance</td>
<td>Bus</td>
<td>14</td>
<td>Safety inside buses</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Bus-stop</td>
<td>15</td>
<td>Safety at bus stops</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Employee</td>
<td>16</td>
<td>Behaviour of drivers and conductors</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Employee</td>
<td>17</td>
<td>Driving skills of driver</td>
</tr>
<tr>
<td>1</td>
<td>Empathy</td>
<td>Bus</td>
<td>20</td>
<td>Bus timings to your convenience</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Bus</td>
<td>21</td>
<td>Bus routes are according to your need (Connectivity)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Bus</td>
<td>22</td>
<td>Fares (compared to affordability)</td>
</tr>
</tbody>
</table>

Adopted from various sources + pilot surveys
Public transport system in Mumbai is very vast having suburban rails, buses by 3 municipalities, public taxis and auto-rickshaws as well as metro and monorail.

Motorised mode share of public transport is 88%.

The mode share of buses is 26% with a daily ridership of 45 lakhs on BEST buses.

BEST is the oldest bus service in India running since 1947 owned by state government.

Fleet size of 4800 buses and 415 bus routes.

It has one of the highest bus staff ratio of 8 to 9 people per bus.
CASE STUDY – BEST, MUMBAI

- BEST is operating bus service in Greater Mumbai as well as in Mira-Bhayandar and Thane.
- The service is being operated by 26 bus depots situated in different zones of the city.
- These depots take care of operations and management of buses across Greater Mumbai.
- The different types of routes operated in Mumbai are:
  - Trunk routes
  - Feeder routes
  - East-West connectors

Sources: Secondary survey
DEPOT SELECTION

• WADALA depot was selected for conducting primary surveys as well as secondary data on following basis:
  ➢ Based on location (city zone – north central)
  ➢ Wadala depot is one of the biggest and centrally located depot in Mumbai with an area of 31700 sq.m. and a parking space for 300 buses.
  ➢ It operates 24 routes (including all types of routes mentioned before) with a fleet size of 169 buses and a total staff of 934 persons.
  ➢ Also suggested by BEST deputy manager traffic/transport planning department.

Sources: Secondary survey at Wadala depot
ROUTE SELECTION

- Different routes for the primary surveys are selected based on criteria's below:
  - Route coverage
  - Route span
  - Ridership

<table>
<thead>
<tr>
<th>Route no.</th>
<th>Type of route</th>
<th>Route span (kms)</th>
<th>Passengers per bus per day</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 LTD</td>
<td>Feeder route connecting monorail stations too and limited service</td>
<td>10.6</td>
<td>666</td>
<td>30</td>
</tr>
<tr>
<td>69</td>
<td>Trunk connecting centre and south</td>
<td>12.6</td>
<td>1011</td>
<td>50</td>
</tr>
<tr>
<td>151</td>
<td>Feeder route</td>
<td>12.8</td>
<td>913</td>
<td>45</td>
</tr>
<tr>
<td>168</td>
<td>East west connector</td>
<td>14.2</td>
<td>1095</td>
<td>55</td>
</tr>
<tr>
<td>440 LTD</td>
<td>Trunk (wadala-borivali station)</td>
<td>28.4</td>
<td>827</td>
<td>40</td>
</tr>
</tbody>
</table>

Sources: Secondary survey – performance sheet of Wadala depot

5 routes selected for primary surveys
PRESENT PERFORMANCE EVALUATION METHOD (Secondary data from field visit)

Evaluation of a route is done mostly through financial performance measurement with following indicators:

1. **CRI (Cost Recovery Index)** = \( \frac{CPPK \text{ (Cost Paisa per Km)}}{EPPK \text{ (Earning Paisa per Km)}} \)

2. **TC (Total Cost)** = **FC (Fixed Cost)** + **VC (Variable Cost)**

The routes are classified based on the recovery of the costs they spend. These categories are:

- **Class A routes**: those routes which recover both variable and fixed costs.
- **Class B routes**: those routes which can recover only fixed costs and not variable costs.
- **Class C routes**: those routes which are not capable of recovering any of the fixed or variable costs.

Performance is measured based on operational and financial indicators. No consideration of user based service quality measurement.
Soci-economic data collected was found quite balanced with all type of user groups captured.
**KANO EVALUATION METHOD**

| FUNCTIONAL QUESTION | If, Condition of bus is good, How will you feel? | 1. I am impressed  
2. It must be like that  
3. I am neutral  
4. I can live with it  
5. Intolerable |
|---------------------|-----------------------------------------------|------------------------------------------------------------------|
| DYSFUNCTIONAL QUESTION | If, Condition of bus is bad, How will you feel? | 1. I am impressed  
2. It must be like that  
3. I am neutral  
4. I can live with it  
5. Intolerable |

**CUSTOMER REQUIREMENTS**

<table>
<thead>
<tr>
<th>FUNCTIONAL QUESTIONS</th>
<th>DYSFUNCTIONAL QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Like</td>
<td>Q</td>
</tr>
<tr>
<td>2. Must-be</td>
<td>R</td>
</tr>
<tr>
<td>3. Neutral</td>
<td>R</td>
</tr>
<tr>
<td>4. Live with</td>
<td>R</td>
</tr>
<tr>
<td>5. Intolerable</td>
<td>R</td>
</tr>
</tbody>
</table>

1. Functional questions: positive questions
2. Dysfunctional question: negative question

1. M = Must be
2. O = One dimensional
3. A = Attractive
4. I = Indifferent
5. R = Reverse
6. Q = Questionable
## RESULTS

<table>
<thead>
<tr>
<th>FEATURE NO.</th>
<th>FEATURES</th>
<th>GENDER</th>
<th>AGE-GROUP</th>
<th>INCOME GROUP</th>
<th>FREQUENCY OF TRAVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Femal</td>
<td>&lt;20</td>
<td>20-40</td>
</tr>
<tr>
<td>7</td>
<td>Arrival of buses at scheduled time</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>14</td>
<td>Safety inside buses</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>15</td>
<td>Safety at bus stops</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>22</td>
<td>Fares (compared to affordability)</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>18</td>
<td>Maintaining journey time</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>11</td>
<td>Waiting time at bus stop</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>20</td>
<td>Bus timings to your convenience</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>13</td>
<td>Information about bus services on web</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>Condition of bus</td>
<td>O</td>
<td>O</td>
<td>A</td>
<td>O</td>
</tr>
<tr>
<td>2</td>
<td>Cleanliness in bus</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>A</td>
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<tr>
<td>8</td>
<td>Breakdown of buses on road</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<td>12</td>
<td>Information about change in schedule and fare in advance</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<td>17</td>
<td>Driving skills of drivers</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6</td>
<td>Seating space during peak hour</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>Cleanliness at bus stop</td>
<td>A</td>
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<td>A</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Information of buses at bus stops</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Comfortable seating in bus</td>
<td>A</td>
<td>O</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Information about next stops in the buses (audio or video)</td>
<td>A</td>
<td>O</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>21</td>
<td>Bus routes according to your need</td>
<td>A</td>
<td>O</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>Seating space at bus stop</td>
<td>A</td>
<td>O</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>19</td>
<td>Complaints are solved at the promised time</td>
<td>i</td>
<td>A</td>
<td>O</td>
<td>A</td>
</tr>
</tbody>
</table>
CLASSIFICATION OF FEATURES

M – Must-be: basic necessities

O – One dimensional: directly proportional to satisfaction

A – Attractive: Delighter or impressive feature

I – Indifferent: no effect on satisfaction

GENERAL CLASSIFICATION

M → O → A → I

Arrival of buses at...
Safety inside buses
Safety at bus stops
Fares (compared to...
Maintaining journey...
Waiting time at bus...
Bus timings to your...
Information about...
Condition of bus
Cleaning of bus
Breakdown of buses...
Information about...
Behaviour of drivers...
Driving skills of drivers
Comfortable seating...
Information about...
Bus routes according...
Seating space at bus...
Seating space during...
Cleanliness at bus stop
Information of buses...
Complaints are...

Attractive requirements are:
- BUS feature: Comfortable seats in bus; Seating space in bus during peak
- BUS STOP feature: Seating space at bus stop; Cleanliness at bus stop.

Must-be requirements are:
- Reliability: Arrival time; Journey time and Waiting time
- Safety
- Fares and Information on web

One dimensional are:
- Condition and Cleanliness of bus
- Behaviour and driving skills of drivers
- Breakdown of buses
CLASSIFICATION BASED ON GENDER

M – Must-be: basic necessities

O – One dimensional: directly proportional to satisfaction

A – Attractive: Delighter or impressive feature

I – Indifferent: no effect on satisfaction

All Must-be requirements are same.

Females are more sensitive towards comfort; on board information and bus connectivity.
CUSTOMER SATISFACTION Co-EFFICIENT for General Classification

Extremity of satisfaction = \(\frac{(A+O)}{(A+O+M+I)}\)

Extremity of dissatisfaction = \(\frac{(O+M)}{(A+O+M+I)}\)
# CONCLUSION

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group</th>
<th>Income Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>F</td>
<td>Both</td>
</tr>
</tbody>
</table>

**Must Be**

- Safety
- Fare
- Time
- Comfort
- Safety
- Fare
- Time
- Bus route connectivity
- Information
- On web

**One Dimensional**

- Comfort
- Route
- Vehicle Quality
- Staff
- Behaviour
- Advance
- Information
- Off-vehicle quality
- On board information

**Attractive**

- Comfort
- Complains
- Crowding
- Route
- Connectivity
- On board Information
- Off-vehicle quality
- Information
- Crowding
- Off-vehicle quality
- Complaint

**Indifferent**

- Complains
- Complain

**VEHICLE QUALITY (CONDITION OF BUS)**

**SAFETY, TIME & FARE**

**OFF – VEHICLE QUALITIES (BUS STOP), AVAILABILITY OF INFORMATION, CROWDING ONBOARD**
CONCLUSION

• **Reliability features** are *Must-Be* (most important) features for passengers irrespective of their gender, age-group etc.

• **Tangible or physical features** (condition/cleanliness of bus and bus stop) are *One-dimensional* feature for users.

• Some of the Tangible features like *(comfort / less crowding)* as well as *empathy features (behavior of drivers)* are Attractive features.

• The features like response to their complaints are indifferent features.
## RECOMMENDATIONS

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>TIME</th>
<th>SAFETY</th>
<th>STAFF BEHAVIOUR</th>
<th>CROWDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journey time</td>
<td>If not maintained, drivers and conductors are penalised</td>
<td>Regular Inspections are done, but no step to reduce it</td>
<td>考虑适当</td>
<td>No provision for this feature.</td>
</tr>
<tr>
<td>Headway (15-20mns)</td>
<td></td>
<td></td>
<td>Not considered</td>
<td>Non operational fleets should be included during peak hour</td>
</tr>
<tr>
<td>In bus</td>
<td>No measures taken for passengers safety on bus as well as at bus stop.</td>
<td></td>
<td>Training programmes should be organised for staff.</td>
<td></td>
</tr>
<tr>
<td>At bus-stop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **TIME**
  - Journey time
  - Headway (15-20mns)

- **SAFETY**
  - In bus
  - At bus-stop

- **STAFF BEHAVIOUR**
  - Not considered

- **CROWDING**
  - No provision for this feature.