VIII. Performance Analysis

Public Transport Planning and Regulation: An Introduction

Planning and Analysis Building Blocks

Schedule Building

Cost Analysis and Financial Planning

Performance Analysis

Focus of Discussion

Measures & Standards

Service Monitoring and Data Collection

Network and Route Design

Fares and Revenue: Policy, Analysis, and Collection

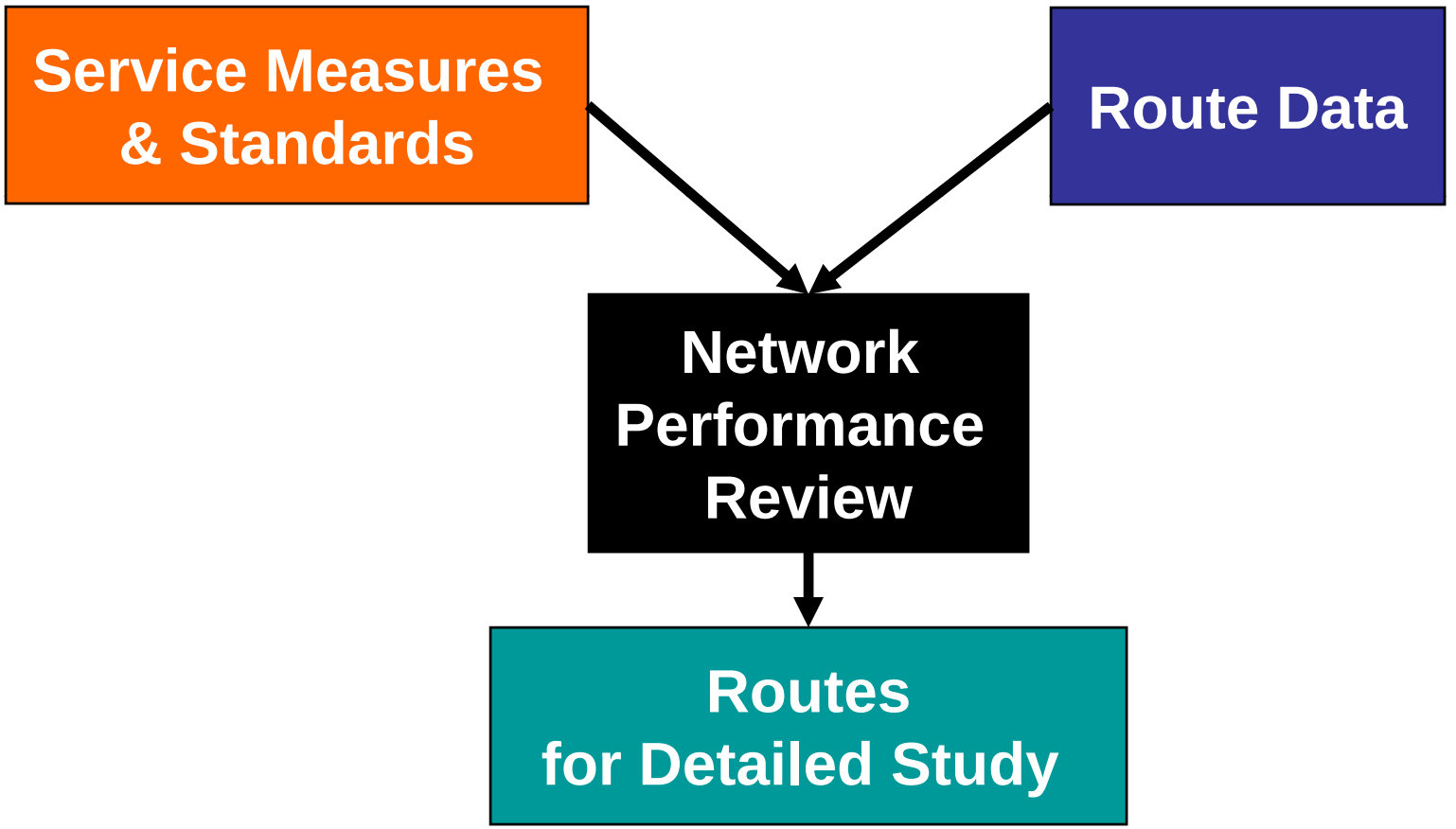
Market Factors and Demand Analysis

Terminology and Basic Relationships

Performance Analysis Should Be Ongoing and Systematic

- **Frequency and Approach**
  - **Regular review of all bus routes**
    - ***Strongly suggested*** **every service schedule change**
  - **Detailed study of selected routes**
    - **Routes with substandard performance**
    - **Routes serving areas with major market changes**
  - **All routes should be examined in detail every 2-3 years**

Network Performance Review



Each Route Is Considered a "Separate Product"

- **Routes serve different travel markets**
- **Routes operate in different environments**

- ***However, do not forget that routes work together to form a network!***

Common Service Problems[1]

- **Low profitability/high subsidies**
  - **Low usage, low fares, high costs**
- **Unreliable service**
  - **Late trips, missed trips**
- **Inadequate capacity**
  - **Crowding, pass-by's**
- **Declining travel speed**
- **Inconvenient transfers**
  - **Too many, poor coordination**
- **Poor safety**
  - **High number of accidents**

[1] Perceived Problems, Evaluate Your Bus System, Urban Bus Toolkit

Typical Service Measures

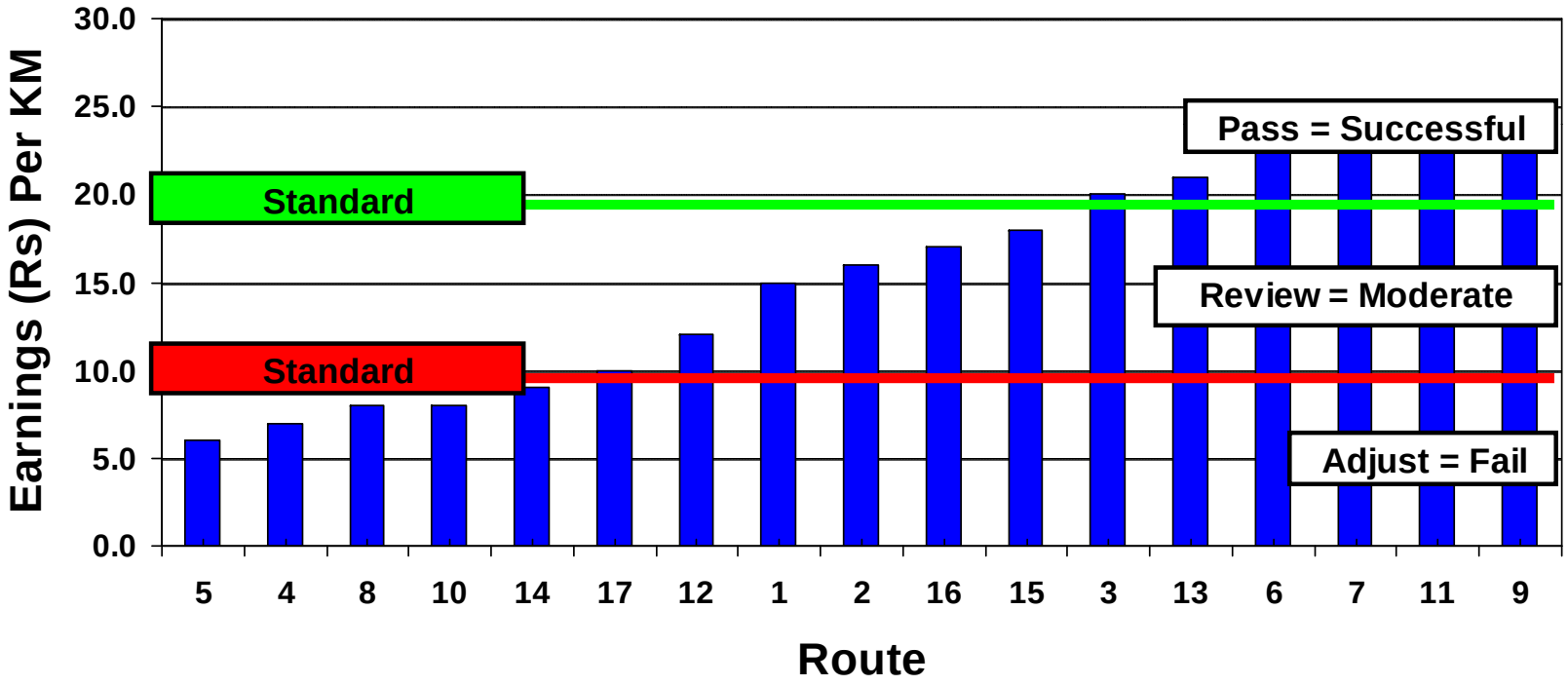
Problem	Measure
Low Profitability/ High Subsidies	Passenger Revenue per Kilometer Passengers per Kilometer Cost per Kilometer Operating Ratio
Unreliable Service	Percent Missed Trips Percent Trips On-Time
Inadequate Capacity	Passengers per Bus at the Maximum Load Point
Declining Travel Speed	Transit Speed as a Percent of Auto Speed
Inconvenient Transfers	Percent Passengers Transferring
Poor Safety	Accidents per 100,000 KM

Select Routes for Detailed Analysis

- **Performance of individual routes are ranked according to key measures**

- **Routes not meeting the performance standards after detailed analysis**

Example of Performance Ranking



Bangalore Metropolitan Transport Corporation "ABC" Route Evaluation

Detailed Study of Selected Routes

- **Two analysis dimensions**
  - **Time period**
    - **Time-of-day**
    - **Day-of-week**
  - **Route segment**

- **Can combine the two dimensions**
  - **Time period/route segment**

Time Period Analysis

- **Time-of-day/day-of-week breakdown of route performance**
- **Average performance analyzed by operating period**

Steps in Time Period Analysis
Capacity Example

1. **Obtain *passengers at maximum load point* and *vehicle capacities* by vehicle trip.**
2. **Define analysis operating periods.**
3. **Sum *passengers at maximum load point* and *vehicle capacities* by operating periods.**
4. **Compute *percent capacity used* by operating period.**
5. **Assess results compared to performance standard**

1. Obtain Data by Vehicle Trip

Arrival Time	Pass. @ Max. Load Pt.	Pass Capacity
7:05 AM	36	76
7:10 AM	44	76
7:15 AM	46	76
7:20 AM	52	76
7:25 AM	56	76
7:30 AM	76	76
7:35 AM	89	76
7:40 AM	95	76
7:45 AM	101	76
7:50 AM	88	76
7:55 AM	56	76
8:00 AM	53	76

2. Define Analysis Operating Periods

Arrival Time	Pass. @ Max. Load Pt.	Pass Capacity	Analysis Period
7:05 AM	36	76	1
7:10 AM	44	76	
7:15 AM	46	76	
7:20 AM	52	76	2
7:25 AM	56	76	
7:30 AM	76	76	
7:35 AM	89	76	3
7:40 AM	95	76	
7:45 AM	101	76	
7:50 AM	88	76	4
7:55 AM	56	76	
8:00 AM	53	76	

3. Sum Data by Operating Periods

Arrival Time	Pass. @ Max. Load Pt.	Pass Capacity	Analysis Period	Pass. @ Max. Load Pt.	Pass Capacity
7:05 AM	36	76	1	126	228
7:10 AM	44	76			
7:15 AM	46	76			
7:20 AM	52	76	2	184	228
7:25 AM	56	76			
7:30 AM	76	76			
7:35 AM	89	76	3	285	228
7:40 AM	95	76			
7:45 AM	101	76			
7:50 AM	88	76	4	197	228
7:55 AM	56	76			
8:00 AM	53	76			

4. Compute Percent Capacity Used

Arrival Time	Pass. @ Max. Load Pt.	Pass Capacity	Analysis Period	Pass. @ Max. Load Pt.	Pass Capacity	Percent of Capacity
7:05 AM	36	76	1	126	228	55%
7:10 AM	44	76				
7:15 AM	46	76				
7:20 AM	52	76	2	184	228	81%
7:25 AM	56	76				
7:30 AM	76	76				
7:35 AM	89	76	3	285	228	125%
7:40 AM	95	76				
7:45 AM	101	76				
7:50 AM	88	76	4	197	228	86%
7:55 AM	56	76				
8:00 AM	53	76				

5. Assess Results Versus Performance Standard

Arrival Time	Pass. @ Max. Load Pt.	Pass Capacity	Analysis Period	Pass. @ Max. Load Pt.	Pass Capacity	Percent of Capacity	Exceed Capacity?
7:05 AM	36	76	1	126	228	55%	
7:10 AM	44	76					
7:15 AM	46	76					
7:20 AM	52	76	2	184	228	81%	
7:25 AM	56	76					
7:30 AM	76	76					
7:35 AM	89	76	3	285	228	125%	
7:40 AM	95	76					
7:45 AM	101	76					
7:50 AM	88	76	4	197	228	86%	
7:55 AM	56	76					
8:00 AM	53	76					

Assessment: More capacity needed between 7:35 AM and 7:45 AM

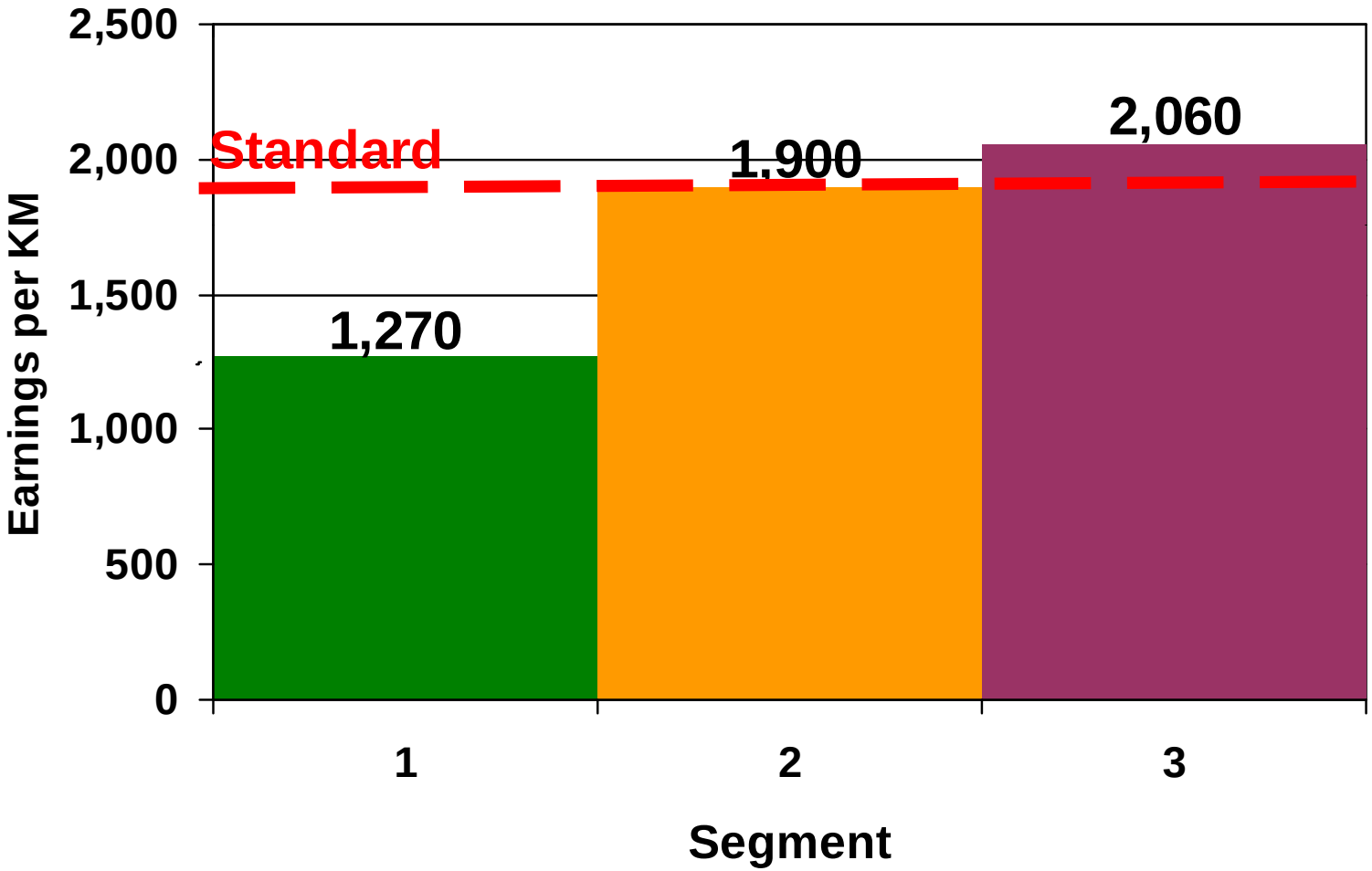
Segment Analysis

- **Breakdown of route performance by route segment**
- **Average performance analyzed by route segment**

Steps in Time Period Analysis
Earnings per KM Example

1. **Obtain *passenger revenues* by bus stop.**
2. **Define route segments.**
3. **Determine *passenger revenues* and *revenue KM* by segment**
4. **Compute *earnings per KM* by segment**
5. **Assess results compared to performance standard**

Segment Analysis Results



Summary

- **Outlined common service problems**
  - **Low profitability/high subsidies**
  - **Unreliable service**
  - **Inadequate capacity**
  - **Declining travel speed**
  - **Inconvenient transfers**
  - **Poor safety**
- **Discussed two-phase analysis process**
  - **Comprehensive review of all routes**
  - **Detailed study of selected routes**
    - **Time period, segment, combination of two**
- ***Remember,* analysis should be systematic and the basis for potential improvements**