



# Transit Performance Evaluation – **Approaches and Way Forward**

in  
**81<sup>st</sup> IRC Annual Session**



**Presenter**

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# Presentation Outline



## Introduction

Problem Statement

Major Existing Approaches

Generalized Approach

## Indian Practices

Through standards, guidelines, reports etc.

Pitfalls and Scope of Mitigations & Improvisations

## Comprehensive Assessment Approach

Conceptual Framework

- Service Quality Index
- Ways to Incorporate Stakeholders

## Conclusion

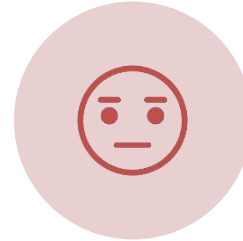
# Performance Evaluation

- ❑ Transit Agencies Objective: widened from provision of service to
  - ✓ Improving Quality of Service – Consumerism Approach
  - ✓ Enhancement of Ridership (Profits)
  - ✓ Competitiveness
  
- ❑ To provide effective and efficient public transport
  
- ❑ “The ability to improve transit performance relies to a great extent on the ability to measure it” (*Obeng et al., 1986*).
  
- ❑ Application of Transit Performance Evaluation (TPE) (*Transportation Research Board, 2003*)
  - ✓ Monitoring of the Service by Service Provider
  - ✓ Transit Economic Evaluation
  - ✓ Development of Service Design Standards
  - ✓ Communication of Achievements and Challenges
  - ✓ Defining Community Benefits

# TPE Approaches



**Efficiency and Effectiveness:**  
Transit operation related



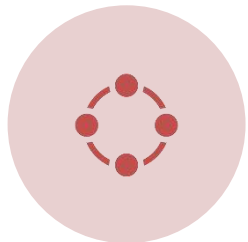
**User Perception:**  
Importance and Satisfaction levels attributed to service quality



**Level of Service**



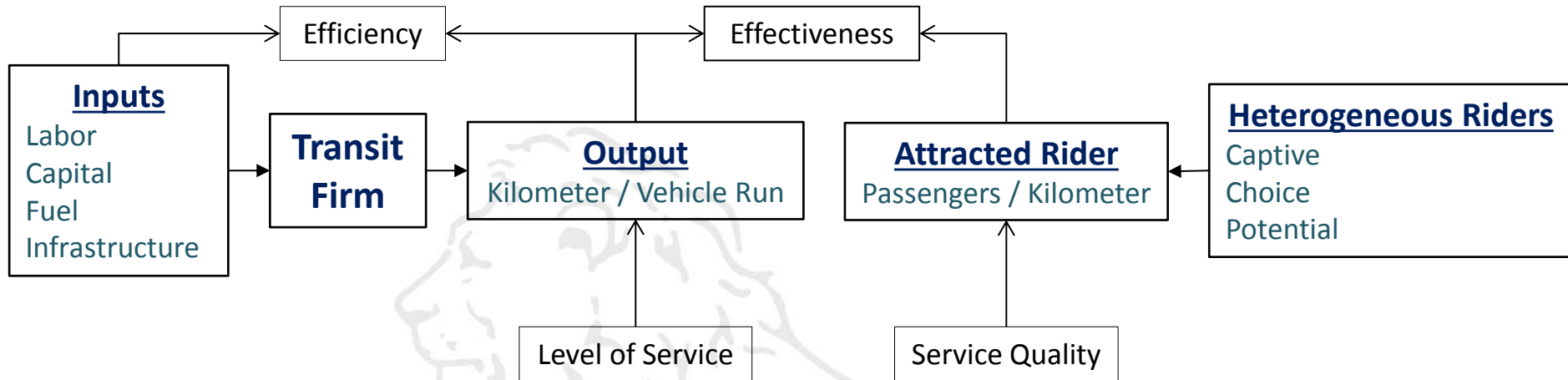
**Combination of User & Operational:**  
Quantitative and Qualitative



**Multiple Perspective:**  
Combines the previous two approaches and transit affected outcomes together.

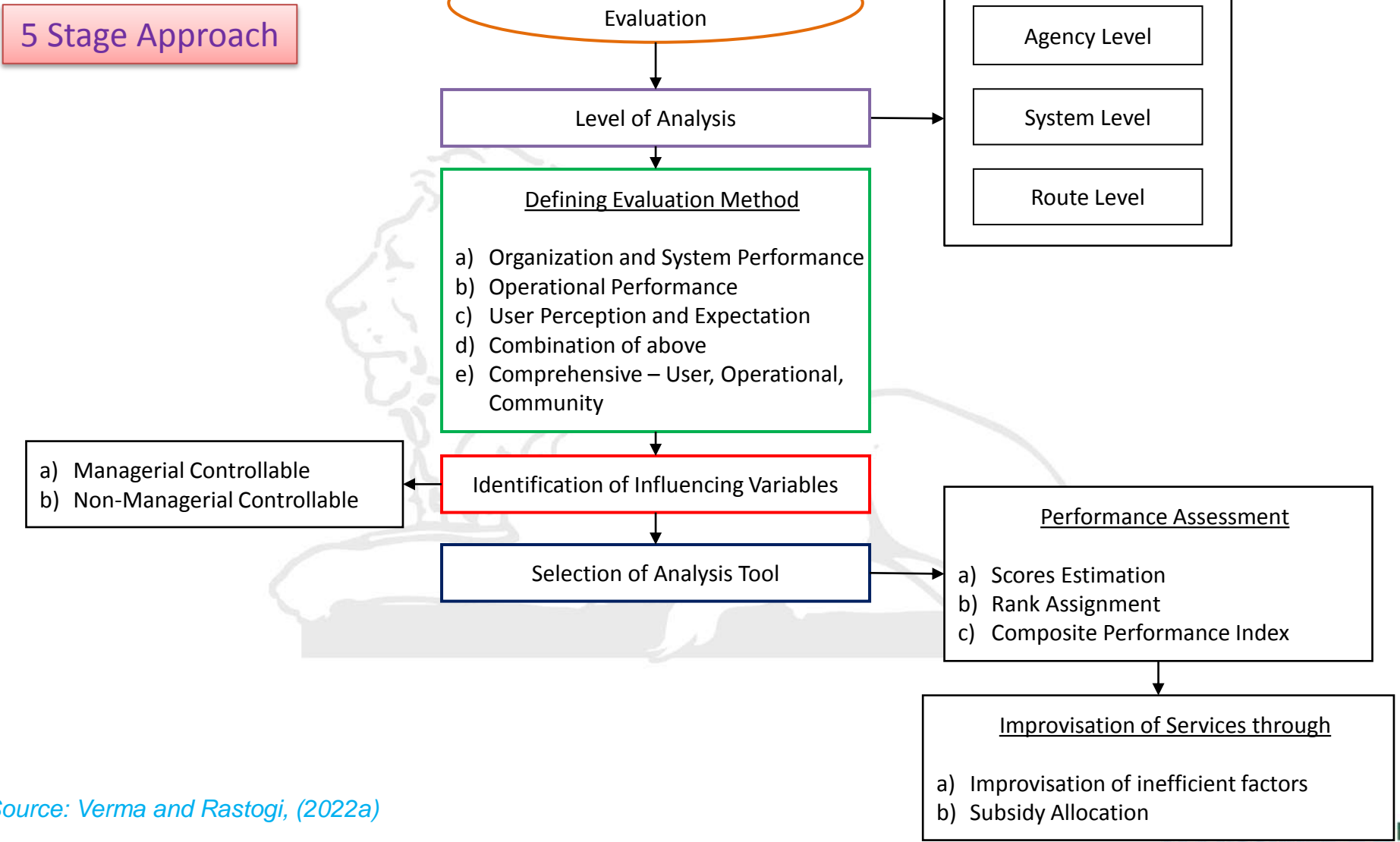
# Discussion and Inferences

## Representation of Performance Domains



- ❑ Diverse interrelated criteria, Multiple factors and their hierarchical interrelations related to
  - ✓ Stakeholders
    - ❖ Operator and User
    - ❖ Transit professionals – Industry, Policy Makers etc.
    - ❖ Community
  - ✓ System Environment and
  - ✓ City Characteristics
- ❑ Development of universal index comprising different hierarchical indices can be the solution.
- ❑ Weightage incorporated from stakeholder’s opinion.

# Generalized Approach



Source: Verma and Rastogi, (2022a)

# Indian Practice, Guidelines, and Standards

## Periodic Evaluation Methods

- Review of the Performance of State Road Transport Undertakings (SRTUs) – Annual Publication
- DMRC – Service Quality Feedback Survey

## Guidelines

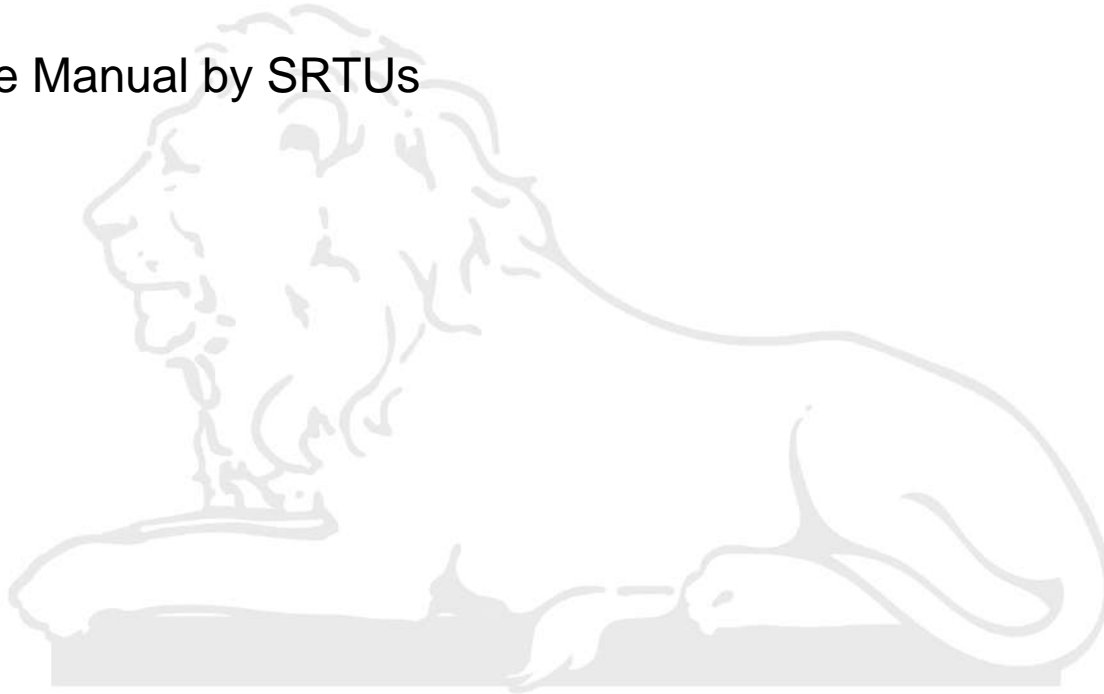
- Service Level Benchmarks for Urban Transport – User Manual by MoUD, Government of India (2013)
- Best Practice Manual by Association of SRTUs

## Standards

- IRC SP: 131 – 2022
- IRC: 124 – 2017

# Approaches in India

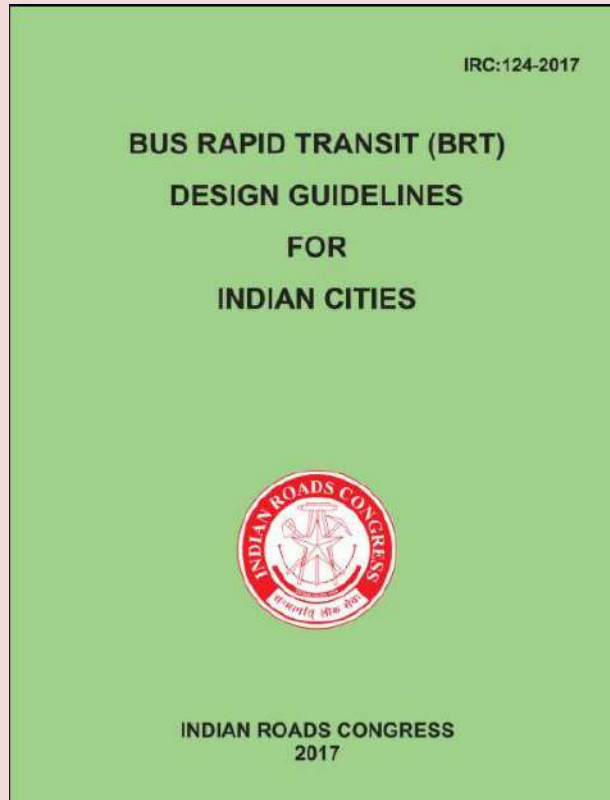
- ❑ Review of the Performance of 54 State Road Transport Undertakings
  - ✓ Revenue, cost structures and Net profits/losses
  - ✓ Determines operational efficiency through physical and operational parameters.
  
- ❑ Best Practice Manual by SRTUs



# Approaches in India ... Cont'd

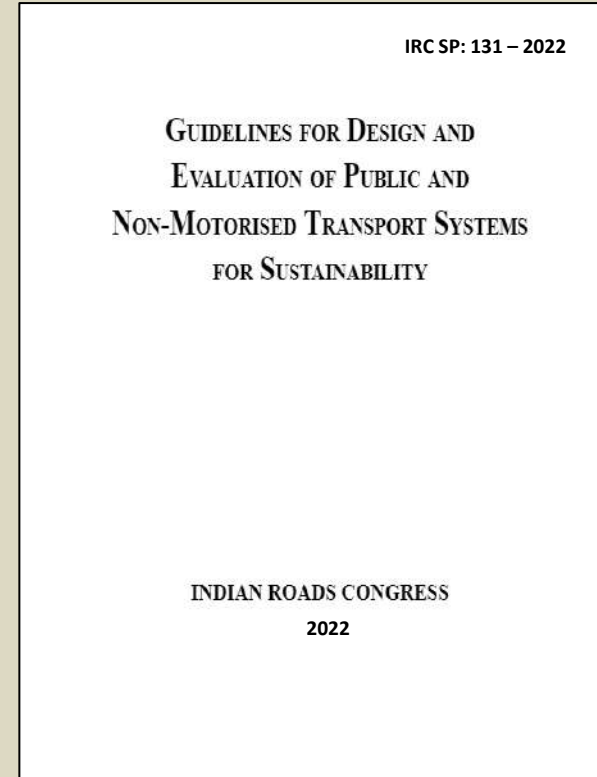
- ❑ Urban transport's service quality are **estimated as a whole** (including **pedestrian, paratransit, public transports**) as service level benchmarking.
  
- ❑ **DMRC Service Quality Feedback Survey**
  - ✓ 9<sup>th</sup> Edition by The Transport Strategy Centre (TSC), London (COMET Benchmarking Group) – Mar 2022
  - ✓ 8<sup>th</sup> Edition- Aug 2022
    - i. Availability & Accessibility
    - ii. Facilities offered to customers
    - iii. Information
    - iv. Quality of services
    - v. Customer Service
    - vi. Outside Metro Area
    - vii. Security, Safety & Comfort

# Approaches in India ... Cont'd



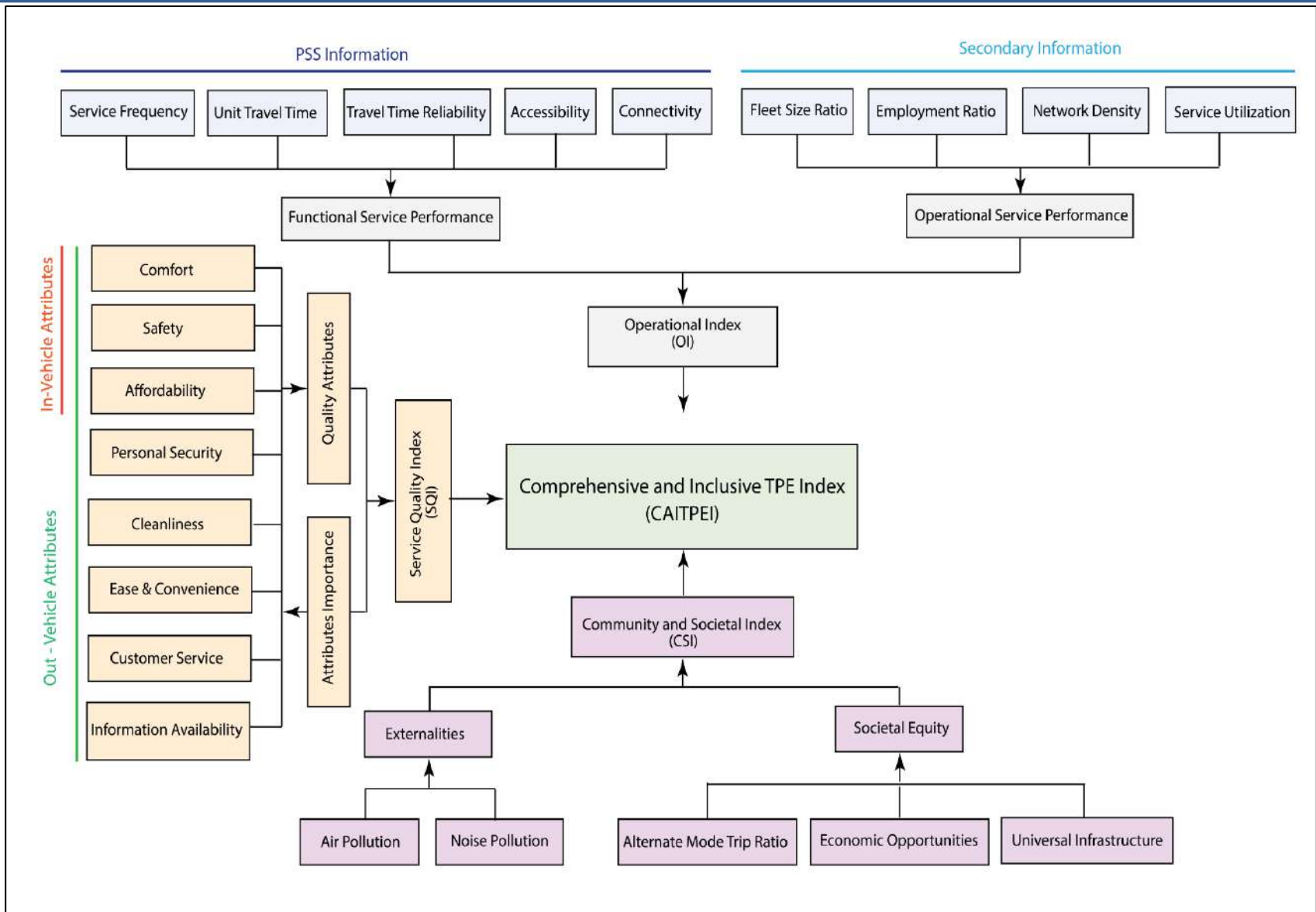
## IRC: 124 – 2017

- lists evaluation criteria specific to BRT based on operation related variables only.



## IRC SP: 131 – 2022

# Conceptual Framework



# Service Quality Index

- Service Quality Index (SQI):
  - Function of set of Service Quality Attributes (SQA)
  - Based on User Satisfaction Rating
  - Processed through Normalization and Weightage

$$SQI = \sum_{i=1}^8 [W^i_{SQA} \times \{ \mu^i_{SQA} \times S^i_{SQA} / \sum_{j=1}^8 \mu_{jSQA} \times S_{jSQA} \} ]$$

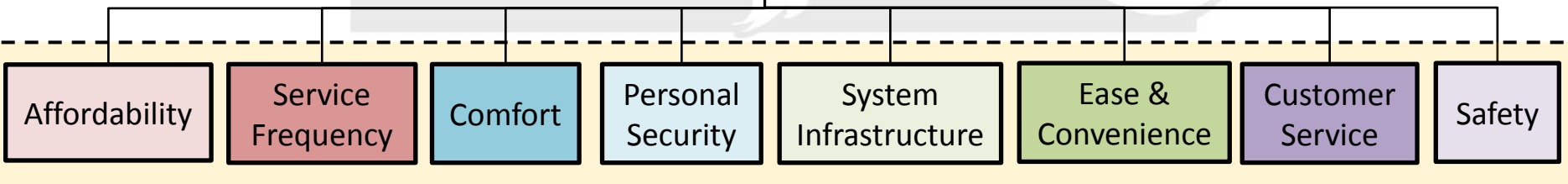
Where,

SQA = set of service quality attributes rating.

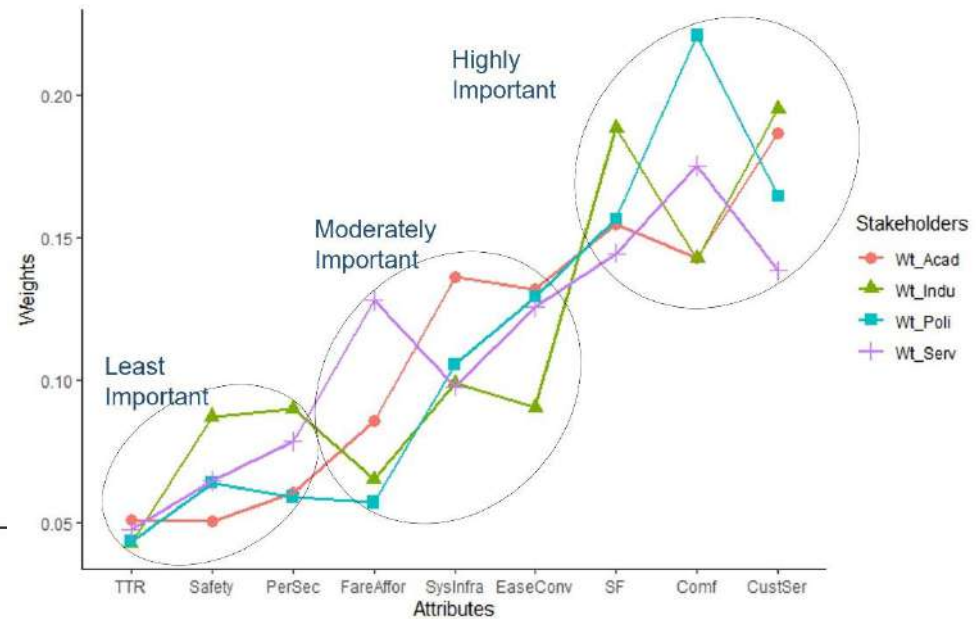
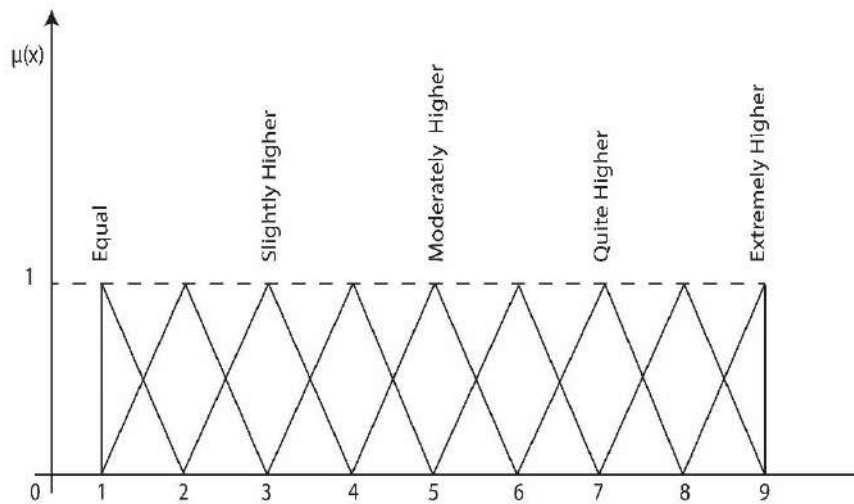
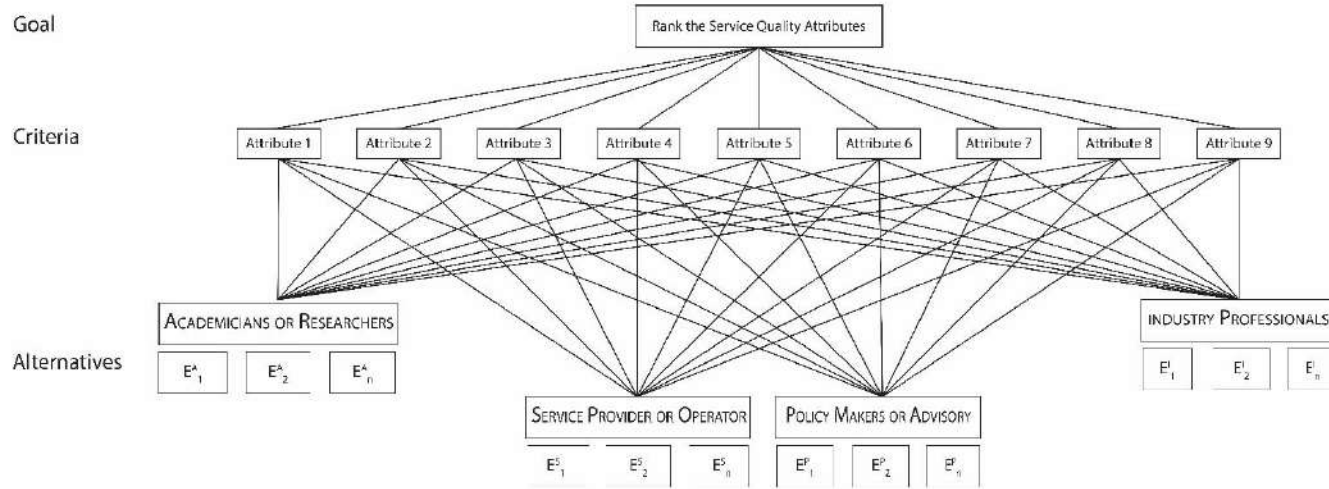
$W^i_{SQA}$  = Weights for  $i^{th}$  SQA.

$\mu^i_{SQA}$  = Mean of  $i^{th}$  SQA

$S^i_{SQA}$  = Variance of  $i^{th}$  SQA



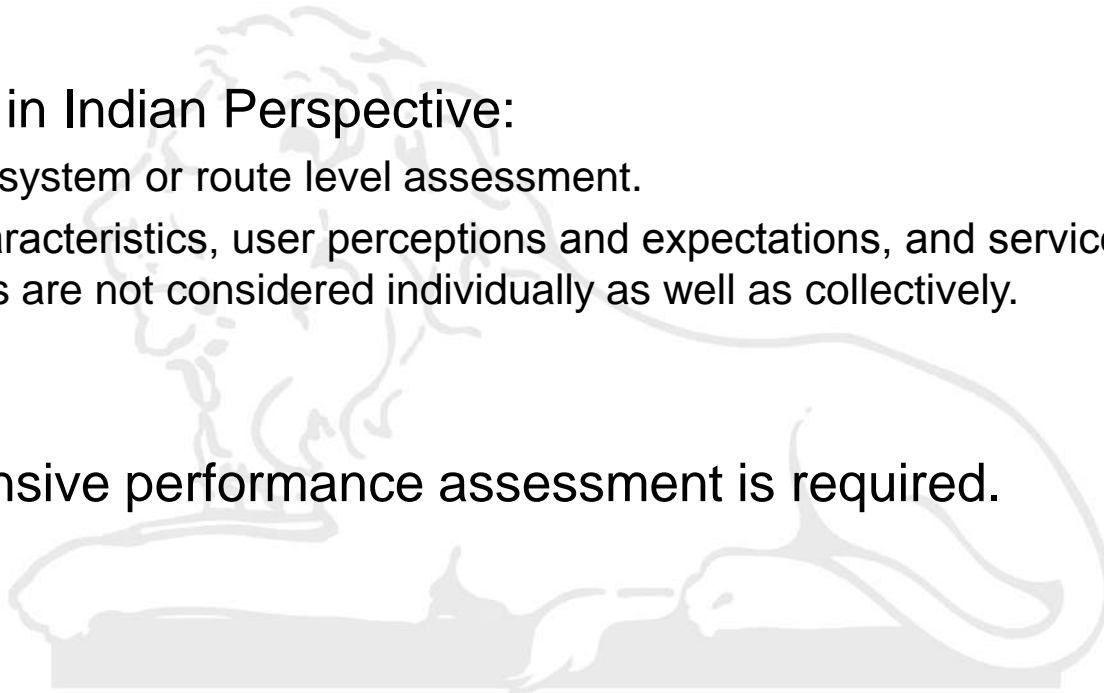
# Stakeholders' Perception



Source: Verma and Rastogi, (2022b)

# Conclusion

- All five areas of literature overlaps or ignores other perspectives
- No standard sets of performance indicators and factors exists.
- Generalized approach led to five stages of performance evaluation.
- Limitations in Indian Perspective:
  - ✓ Neglects system or route level assessment.
  - ✓ City's characteristics, user perceptions and expectations, and service providers' objectives are not considered individually as well as collectively.
- Comprehensive performance assessment is required.



# References

1. Verma, V., Rastogi, R. (2022a). An Overview of Approaches and Methods for Evaluating Public Transport Performance. In: Parida, M., Maji, A., Velmurugan, S., Das, A. (eds) Proceedings of the Fifth International Conference of Transportation Research Group of India . Lecture Notes in Civil Engineering, vol 220. Springer, Singapore. DOI: 10.1007/978-981-16-9925-2\_2
2. Verma, V., Rastogi, R. (2022b). Analysing Stakeholders' Perceived Hierarchy of Transit Service Quality Attributes' using Fuzzy-AHP. 102th Transportation Research Board Annual Meeting at Washington DC to be held during Jan 8-10, 2023.



**Thanks**

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