

# Performance Assessment of Public and Intermediate Public Transportation from P-O-C Perception: Case Study of Udaipur City

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**Abstract:** The growth of urban areas in terms of physical size and population, causes a variety of problems and challenges in the planning of efficient transportation system, which is able to meet the requirements of travels, not only in terms of the quantity of means of transport, but also attention should pay to improve performance of public transport (PT) and intermediate public transport (IPT) services, strategies to improve the performance of both. The knowledge of the perception of passenger, operator and community (P-O-C) will provide finest results to improve the performance of PT and IPT. Generally, the P-O-C perception are different from each other due to different expectations. The objective of this research is to assess the performance of PT & IPT from P-O-C viewpoints and perceptions, so that proper response will be given to address the different public transport problems in Udaipur city. The assessment is based on the perception or opinion on performance indicators, which are different for passenger, operator and community. The analysis is done by weighted average of assigned score to indicators by passenger, operator and community. Furthermore, from the analysis, major issues and problem are determined. Also, the end of this research concludes with suggestions to improve and address the problems related to PT and IPT in case study area.

**Keywords:** Public & intermediate public transportation, performance and perception

## 1. Introduction

As cities grow in terms of population and physical size, there is an increase in pressure on the urban transportation systems. With the growth of urban areas, the demand for urban transportation has increased manifold. The need for public transport and intermediate public transport and the impact on the level of their services increases with the pace of development of cities [1]. An integrated and systematic control is required to improve the urban PT and IPT service. To improve the service quality and address the different problems of PT and IPT systems, performance assessment strategy is used. The PT & IPT service is very essential in improving the quality of care and reduce the problems of urban transport systems [2]. The ability to improve PT & IPT performance is closely tied on the ability to consider the no. of perception. Many performance measures have been established from P-O-C viewpoints so that proper response will be given to address the different public transport problems [3,4]. Performance of public transport is an operational assessment of service quality in providing satisfaction to the user and provider of PT and IPT services. The quality of service is the fulfillment of the expectations or requirements that compares the results with the expectations, the need to compare whether to accept a level of quality service [5]. The knowledge of the perception of passenger, operator and community (P-O-C) will provide finest results to improve the performance of PT and IPT. Generally, the P-O-C perception are different from each other due to different expectations. The objective of this research is to assess the performance of PT & IPT from P-O-C viewpoints and perceptions, so that proper response will be given to address the different public transport problems in case study area. The assessment is based on the perception or opinion on performance indicators, which are different for passenger, operator and community and collected in the survey questionnaire. The analysis is done by weighted

average of assigned score to indicators by passenger, operator and community. Furthermore, from the analysis, major issues and problem are determined. Also, the end of this research concludes with suggestions to improve and address the problems related to PT and IPT in case study area.

## 2. Literature Review

The perception plays a prominent role in determining whether a system is used and thus deserve careful attention while planning, designing or evaluating a public transport system from a many perspective [6]. Performance indicator can be used to control costs, maintain or improve the quality of the system, justify changes in a system like spacing between stops, peak speeds route & lane extensions, signal cycle lengths, types of vehicle etc., and report the status of the public transport system to decision makers. The precise and relevant performance indicators will give a clear overview of the public transport systems and will help to monitor the benefits of implementing efficient public transport system in a city. The approach to assess the performance of the public transport system using performance indicators is relatively easy to implement. Principally, there are three performance assessment perspectives given as following table 1: -

**Table 1:** Performance indicator in P-O-C perception [7]

Passengers	Operator	Community
Availability	Area coverage	Service quality/passenger
Frequency/headway	Reliability	System cost
Punctuality	Cycle speed	Reliability in emergencies
Travel time	Capacity	Environmental impact
Comfort	Flexibility	
Convenience	Safety	
safety	Costs	
User cost	Passenger attraction	

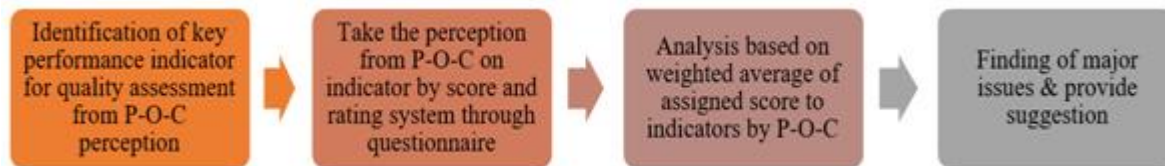
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### 3. Research Methodology

This study presents a simple and systematic methodology for assessment of performance of PT and IPT system from



**Figure1:** Performance indicator in P-O-C Perception

### 4. Research Methods

The research method for assessment of performance of PT and IPT used is quantitative method, aims to accurately describe the properties of an individual, state, or the symptoms of a particular group, or influence in public relations. The data are collected through questionnaires to the respondents. Target respondents are passenger, operator and community. Approximate 274 samples are collected from target respondents. The questionnaire is made for P-O-C perception differently. The perception survey is done by stratified random method and random method for Passenger-community and operator respectively. The passenger and community perception are collected at major interchange, intersection near and outer to core city, to get accurate information about performance, because both area has different experience to PT and IPT service. The operator perception is collected at major interchange, intersection. The experience form respondents are collected on score basis to given rating of each indicator. The analysis is based on comparison of experience and weighted average value for each performance indicators.

### 5. Data Description, Analysis and Inferences

Performance assessment of public and intermediate public transport in this case passenger, operator and community will have the perspectives and interests of different according to what is perceived, in the study of public transport users and operators to assess the indicators of public transport services, so the decision to be taken in order to improve public transport services urban is a desire or hope for all (P-O-C).

#### 5.1. Data Description

The data are obtained from the direct surveys on performance indicators about public and intermediate public transport services. The PT and IPT experience of target respondents are collected by assigned a score value to performance indicators. The collected response on performance indicator form passenger, operator and community, are shown in table 2, 3 and 4 respectively.

P-O-C perspective. The proposed methodology consists of four major stages. The major stages of proposed methodology are presented in figure 1.

**Table 2:** Passenger perception on performance of PI/IPT at interchange & intersection near (I) and outer (II) area to core city

S. No.	Indicators/ rating	Area	Score				
			5 Excellent	4 Good	3 Moderate	2 Fair	1 Poor
1.	Frequency	I	22	25	7	2	0
		II	9	20	15	3	2
2.	Cleanliness	I	8	15	27	4	2
		II	5	13	21	7	3
3.	Punctuality	I	2	3	20	27	4
		II	2	5	25	15	2
4.	Ease of Transfer	I	16	25	11	4	0
		II	1	5	23	17	3
5.	Travel Time	I	2	6	13	26	9
		II	1	5	23	15	5
6.	Safety	I	5	9	24	14	4
		II	2	9	21	12	5
7.	Comfort	I	6	8	19	14	9
		II	8	16	13	9	3
8.	Convenience	I	14	27	12	3	0
		II	5	12	17	10	5
9.	User Cost	I	11	30	11	3	1
		II	4	10	12	21	2

**Table 3:** Operator perception on performance of PI/IPT at major interchange & intersection

S.No.	Indicators/ rating	Score				
		5 Excellent	4 Good	3 Moderate	2 Fair	1 Poor
1.	Area Coverage	5	22	16	3	0
2.	Reliability	4	15	20	6	1
3.	Cycle Speed	3	13	18	9	3
4.	Capacity	6	21	17	2	0
5.	Flexibility	5	11	19	3	8
6.	Safety	7	18	19	2	0
7.	Capacity	11	24	9	2	0
8.	Passenger Attraction	2	6	20	15	3

**Table 4:** Community perception on performance of PI/IPT at interchange & intersection near (I) and outer (II) area to core city

S. No.	Indicators/ rating	Area	Score				
			5 Excellent	4 Good	3 Moderate	2 Fair	1 Poor
1.	Service Quality	I	8	16	9	2	0
		II	2	5	18	7	3
2.	Reliability in Emergency	I	6	15	12	2	0
		II	1	4	16	12	2
3.	Cost	I	8	20	5	2	0
		II	2	7	18	7	1
4.	Environment Quality	I	0	2	13	17	3
		II	0	3	12	16	4

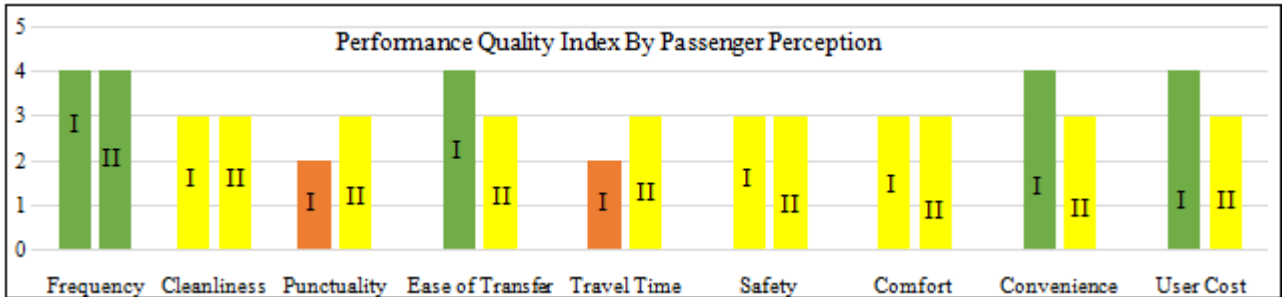
**5.2. Data Analysis and Inferences**

The data or collected score to performance indicators are analyzed by calculating the quality index from weighted average of scores given to various ratings assigned to each

performance indicator. The quality index of various performance indicators for passenger, operator and community perception, are shown in table 5, 6 and 7 respectively.

**Table 5:** Quality index on various performance measuring indicators by passenger perception

Indicators	Frequency		Cleanliness		Punctuality		Ease of Transfer		Travel Time		Safety		Comfort		Convenience		Cost	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
Quality Index	4	4	3	3	2	3	4	3	2	3	3	3	3	3	4	3	4	4



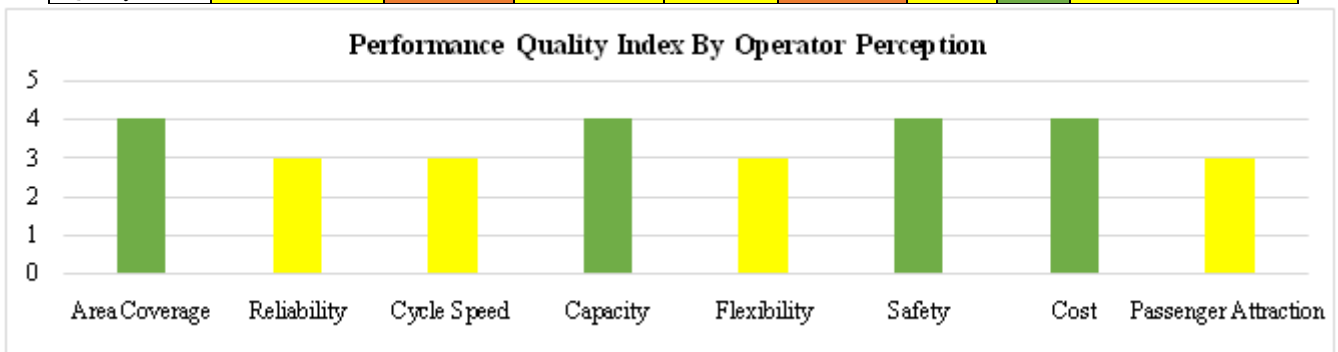
**Figure 2:** Quality index on performance indicators by passenger perception at interchanges near (I) and outer (II) to core city

From above analysis, it is clear that the punctuality, travel time, are the major issues in the area near to core city, which mainly due to oversupply of IPT modes (3-W Tempos), absence of management, schedule and local IPT governing bodies or union. Other reasons are like as improper stops,

headway, dwelling time due to feeling of competition & holding passenger as much as they can. Major issues in area outer to core city are related with ease of transfer and user cost, which mainly due to no choice of various PT and IPT routes to desired destination.

**Table 6:** Quality index on various performance measuring indicators by operator perception

Indicators	Area Coverage	Reliability	Cycle Speed	Capacity	Flexibility	Safety	Cost	Passenger Attraction
Quality Index	4	3	3	4	3	4	4	3



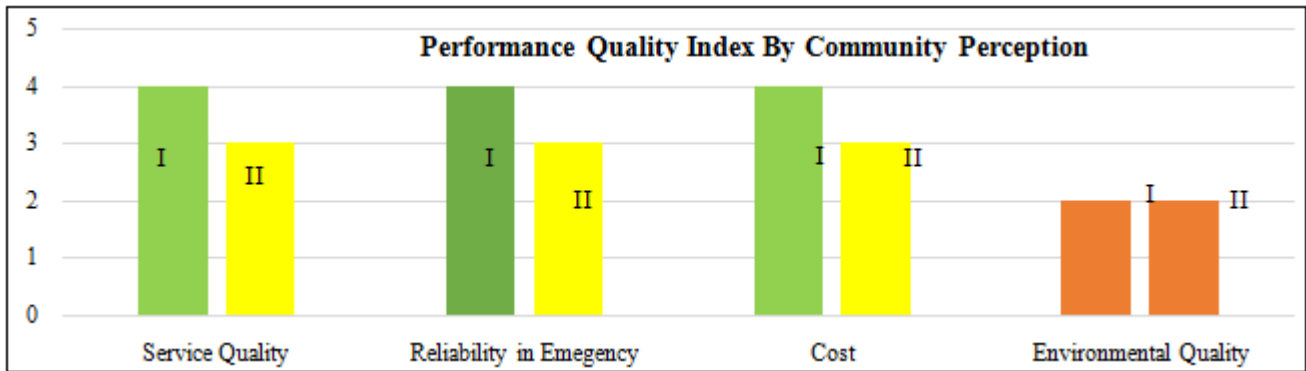
**Figure 3:** Quality index on various performance measuring indicators by operator perception

From above analysis, it is clear that the flexibility and passenger attraction are the major issues, which mainly due to versupply of IPT modes, absence of management and

schedule and no local governing bodies (tempo union), limited IPT route coverage.

**Table 7:** Quality index on various performance measuring indicators by community perception

Indicators	Service Quality		Reliability in Emergency		Cost		Environment Quality	
	I	II	I	II	I	II	I	II
Quality Index	4	3	4	3	4	3	2	2



**Figure 4:** Quality index on performance indicators by community perception at interchanges near (I) and outer (II) to core city

From above analysis, it is clear that the environment quality is the major issues in the area near to core city, which mainly due to presence of older tempos in large no. Major issues in area outer to core city are related with service quality, reliability in emergency and environment quality, which is mainly due to poor accessibility in outer areas and presence of older tempos respectively.

**Table 8:** Quality index based on Rating of scores for opinion/perception survey

S.No.	Rating of scores for opinion/perception survey					
1	Score	5	4	3	2	1
2	Rating	Excellent	Good	Moderate	Fair	Poor
3	Colour					

## 6. Result and Suggestion

From the assessment of primary data (P-O-C perception) and secondary data, it is found that case studies area don't have effective, robust PT system. The lack or absence of effective, robust mass PT system in udaipur city has given rise to a tremendous and uncontrolled increase in IPT modes. This uncontrolled supply of IPT modes, affects the various performance indicators or parameters. Also, absence of management & schedule system, no governing bodies, poor accessibility, limited PT and IPT routes coverage and presence of old PT and IPT modes, results in un satisfaction of the expectation of passenger, operator and community. To improve the overall quality of PT an IPT system in holistic way, some suggestions are given as follow:

- Restructuring of existing PT and IPT routes
- Route planning and extension of PT and IPT routes in unserved areas
- Planning for integration of PT route with IPT
- Institutional arrangement and management
- Use of smart technology in PT & IPT system

## 7. Conclusion

The growth of urban areas in terms of physical size and population, causes a variety of problems and challenges in the planning of efficient transportation system, therefore attention has pay to improve performance of public transport (PT) and intermediate public transport (IPT) services. The perception of passenger, operator and community on quality of existing PT & IPT system, helps to improve the performance of PT and IPT and increase the level of

satisfaction of them. The objective of this research is to assess the performance of PT & IPT in Udaipur city. From the assessment of primary and secondary data, it is observed both PT and IPT system has very low quality of service due inefficient PT, uncontrolled supply of IPT, absence of management & schedule system, no governing bodies, poor accessibility index, limited PT and IPT routes coverage. Hence, to improve the overall quality of PT an IPT system in holistic way, restructuring of existing PT and IPT routes, route planning and extension of PT and IPT routes in unserved areas, planning for integration of PT route with IPT, institutional arrangement and management and use of smart technology in PT & IPT system is required.

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