**Measuring Transit Commuters’ Perception about Transit Service Quality – How to collect required data?**

**Vishwajeet Kishore Verma**

Transportation Engineering Group, Department of Civil Engineering,

Indian Institute of Technology Roorkee, Uttrakhand, India. Pincode - 247667

Email: [vverma@ce.iitr.ac.in](mailto:vverma@ce.iitr.ac.in)

ORCID: 0000-0002-4552-5025

**Dr. Rajat Rastogi**

Professor, Transportation Engineering Group, Dept. of Civil Engineering,

Indian Institute of Technology Roorkee, Uttrakhand, India. Pincode – 247667

Email: [rajat.rastogi@ce.iitr.ac.in](mailto:rajat.rastogi@ce.iitr.ac.in)

ORCID: 0000-0001-9220-4470

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**ABSTRACT**

Survey design and data collection methodology has profound impact on response based study especially if transit commuter’s satisfaction and importance ratings are to be collected. This paper discusses the outcomes of floating three questionnaire formats under two modes of survey (conventional and online). Effectiveness is examined in terms of response rate, completion rate, cost of survey, influence of scale’s description and presentation. The experiences gained are shared in the form of challenges, observances, and adopted improvement measures. The survey at the pre-test level is conducted on bus and metro routes in two different Indian cities.

**Keywords:** Transit; Performance Evaluation, Questionnaire design, Pilot Survey

**INTRODUCTION**

Survey methodology design significantly impacts the results of any response based study. Devising a type of response form or an instrument (questionnaire) that may effectively collect replies on questions raised with how, what, where, when, why and what-if is one of its major elements. Despite the availability and use of ultra-modern or futuristic tools and techniques to collect data, the meagre design of any element of the survey can mislead the outcome of the study (*1*, *2*).

Specifically talking for transit commuter surveys, literature, in the form of books (*2*–*4*), manuals and guidelines (*1*, *5*), is available. These documents discuss in detail about the effective questionnaire design and its testing, methods of data collection, response rate and quality improvisation, survey administration, etc. Selection of words and question framing, instruction and presentation, and order and placement of questions have significant role in an effective questionnaire design (*6*). An effective questionnaire reduces the errors of variability and biases in data while collecting respondents’ behaviour (*2*, *7*). Rastogi and Rao (*8*) observed that the questionnaire formats, layouts, and methods of data collections have influence over survey completion and participation rate. The survey participation rate is influenced by many factors. Incentives, length of the questionnaire, survey location and surroundings, contact timing and the contacted person, surveyor, topic, and survey method are such factors (*7*, *9*–*11*). Memarian et al. (*12*) found that the short questionnaire possesses significantly high response rate than the long questionnaire which contradicts the early findings (*13*, *14*) that the length of questionnaire and response rate are unrelated. Providing incentive to respondents enhances response rate either. They further concluded that the commuter’s income, demographic characteristics, language diversities influence the response rate and unit cost of the on-board survey. Besides these, mode of survey is also found to be a prominent parameter in engaging the respondent interest to the survey (*15*), and in maintaining the quality and standards of the survey. Present survey era shows, conventional survey methods appear to suffer from lower response rate, require higher unit cost and labour hours’ consumption. On contrary, recent emerging technology enabled mode of surveys (Computer Administered Web Interview (CAWI), Computer Administered Telehonic Interview (CATI), Computer Administered Personal Interview (CAPI)) have profound opportunities to curb those challenges. In general, though most surveys are done online in developed nations, but intercept surveys are still important for transit commuters in the developing as well as developed nations. Agrawal et al. (*16*) examined the quality of data measured by using overall response rate and completion rate for paper based, tablet based and online modes of surveys. They observed that the online survey suffers severely in survey participation rate and response rate but performed superior in completion rate. Cummins et al. (*17*) found that the online survey can replace the on-board survey provided the user's email address are available. Nevertheless, invalid, outdated, and inaccurate respondents’ contact database yields huge survey distribution, coverage, as well as survey participation losses in case of transit commuter related survey. Many asserts that a mix of conventional survey with latest mode of survey can promisingly yield higher survey quality (*9*, *10*, *17*–*19*).

Documents, in particular to the effective survey design and collection of transit commuter’s satisfaction and importance, are rare. However, a large section of research (*20*–*25*) is ongoing in this field based on transit Commuter’s Satisfaction and Importance Survey (CSIS). Here, the commuters (users) are considered as the sole evaluators of the service quality. Literature indicates, a generalised multi-items tool named SERVQUAL was devised by (*26*) to measure consumer perceptions about service quality of management and production services after shortlisting 22 quality parameters spread under 5 quality dimensions. Moreover, as per authors’ knowledge it is only a study which has shown questionnaire standardization that too in production and management area. Danaher and Haddrell (*27*) had compared three different scale types to measure customer satisfaction on multi-items quality parameters of downtown hotel. Interestingly, studies had revealed that irrespective of the types of the products and services, customer’s satisfaction rating plots are majorly negatively skewed (*28*, *29*). This is because larger proportion of the satisfied respondents falls on upper side of the axis. The satisfied customers are not provided with enough variance in respondent’s satisfaction scale to distinguish their perception. Thus, it is imperative to fill this gap by exploring the challenges, and process associated with survey instrument design, execuation and administration pertaining to CSIS.

Continuing with the above discussion, this paper presents the outcomes of two pilot surveys which were conducted *to examine and standardise* the CSIS based questionnaire that aimed to assess the performance of transit systems, as well as, *to arrive at a suitable data collection methodology*. The experience gained from designing the questionnaire, execution of different methods of data collection and effectiveness of the questionnaire are presented in the form of challenges, observances, and adopted improvement measures after administrating and executing the survey at the pre-test level. Influence of satisfaction and importance scale description in the questionnaire and presentation to respondents on perception ratings is also examined. Three variants of questionnaire formats and two modes of data collection are examined and discussed in this paper. It is believed that the study findings shall benefit to transit professionals, researchers, and operators from developing and developed nations who would conduct CSIS to evaluate transit performance.

The paper is oriented in the following way. First a brief account of the study area(s) is given. Then the questionnaire objective, details, and design are discussed. Next the execution of the survey is discussed, which is followed by presenting the characteristics of transit commuters contacted. Assessment of the performance of questionnaire design and data collection methods is then presented. Towards the end the challenges faced, and improvements done in the methodology are discussed.

**STUDY CITIES AND THEIR PUBLIC TRANSPORTATION**

Two cities, New Delhi and Jaipur, were selected for the conduct of first-stage survey (i.e. pilot survey). New Delhi is the capital city of India and Jaipur is the capital city of adjoining state Rajasthan. New Delhi has a well-established network and operation of city bus system (operated by DTC) and metro train system (operated by DMRC). City bus system (operated by JCTSL) in Jaipur is reasonably established and metro rail system (operated by JMRC) is in its initial stages. Only one corridor of metro rail is operative currently in Jaipur city. As can be seen in **Figure 1,** the city and public transport characteristics of the two cities are quite different. Delhi metro has a network of around 373 km as compared to Jaipur metro which has a length of 9.63 km. Similarly, against 453 bus routes in Delhi, there are 26 bus routes in Jaipur.

Diagram, map

Description automatically generated with medium confidence

**FIGURE 1 Public Transportation Services of New Delhi and Jaipur cities**

**QUESTIONNAIRE DESIGN AND EXECUTION**

The questionnaire intends to measure transit service quality from its commutesrs. To do so, the measurement variables were identified. Transit service quality is directly defined and measured by the operational, functional, and infrastructural attributes. The present context of the study identifies 9 prime service quality attribute categories under which 31 sub-level attributes were finalized for the CSIS. The service quality of any transit systems can be defined and measured by these gneralised attributes. Further, to segment commuters’ (captive or choice vis-à-vis regular or irregular) based on their satisfaction and importance level their travel habbits and socioeconomic information are required. Thus, with these objectives in plan, the questionnaire was designed condidring four sections, namely *travel information, satisfaction-perception information, attribute’s importance information,* and *personal information*. While designing the questionnaire following were given due consideration:

1. Question type and response effort – closed form, minimal writing, field coded, choices-binary.
2. Order and grouping - question order, choice order, information order, grouping by possible intent.
3. Scale effect - mixed use of nominal and ordinal scale, scale representation.

The intent was that above measures should develop respondent’s interest in the survey, improve response quality and questionnaire completion rate and reduce respondent’s fatigue (*2*, *9*). Choices were presented as classification data. 10-point Likert scale is used for satisfaction level and importance ratings, and Gravity, Urgency and Trend (*30*, *31*) matrix scale was used for the importance ratings by experts.

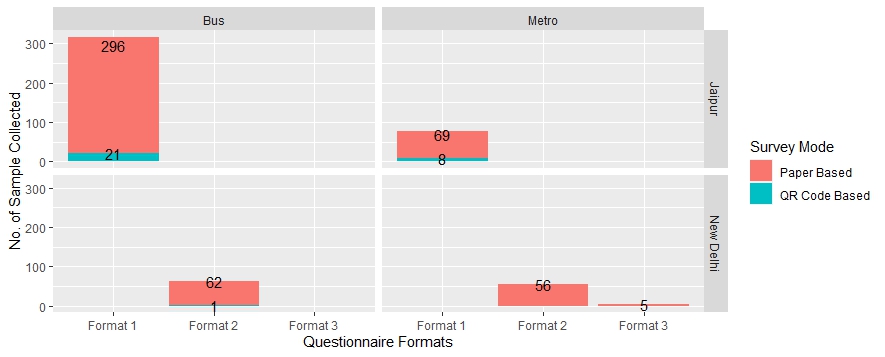
Regarding data collection, two survey methods, namely paper-based questionnaire and QR code generated web questionnaire were considered. While on-board transit, the paper-based questionnaire was used to record responses during the commuter’s journey itself, whereas, the QR code of survey was provided to respondents who were making short time trip or were unwilling to provide information on-board. Information on questionnaire formats is given in **Table 1**.

A female master student with transportation engineering background alongwith two hired enumerators did pilot testing of F1 format. In case of F2 and F3 formats, author alongwith two hired enumerators conducted the survey. All of them were trained, and sample trails were observed before initiating the survey. Passengers were intercepted onboard and on-station premises abiding random sampling strategy. Survey was conducted on weekdays as well as on weekends from 0900 Hr to 1800 Hr. The F1 format was tested during mid October in 2019. Format F2 and F3 were tested during mid November 2019 and January 2020. Format F1 and F2, required around 10-12 minutes of respondents to provide one complete sample response, whereas format F3 require 18-20 minutes to fill a complete response. Both Hindi as well as English language were used throughout the survey according to the commuter’s preference. Four bus routes were selected in Jaipur. These included non-air-conditioned and air-conditioned bus service types, and varied in distance from 24 to 47 km. Single metro route in Jaipur is 9.63 km long. Two bus routes were selected in New Delhi, varying in length between 8 and 13 km. Both, air-conditioned and non-air-conditioned bus service types were operated on both the routes. Similarly, two metro routes, both around 6 km long, one on violet line and other on yellow line were selected in New Delhi for survey.

At first, Format F1 was tested (influence of scale description in importance related attributes) in public transport of Jaipur city. On contrarily, bi-level pilot survey was conducted only in New Delhi. In the first level at New Delhi, F2 and F3 formats were tested (scale related to satisfaction and importance level of attributes). The response rate (overall/ head wise/item wise), identification of deficient/redundant/missing/useful but computable data item, and time required to complete the questionnaire were examined. Deficiencies observed were addressed and the revised questionnaire format F2 was again examined in the second level at New Delhi. Data collection methods were examined at both the levels with some modifications. **Figure 2** shows the information about number of pilot sample conducted with respect to questionnaire formats. Questionnaire format F1 was used at first and the survey team manage to note down major observations by collecting large samples. Thereafter format F2 and F3 were used together, wherein reluctancy to adopt format F3 among respondents were observed due to longer survey length (both satisfaction and importance related questions) and hence format F2 were picked by respondents mostly.

**TABLE 1 Designed Questionnaire Formats for Pilot Testing**

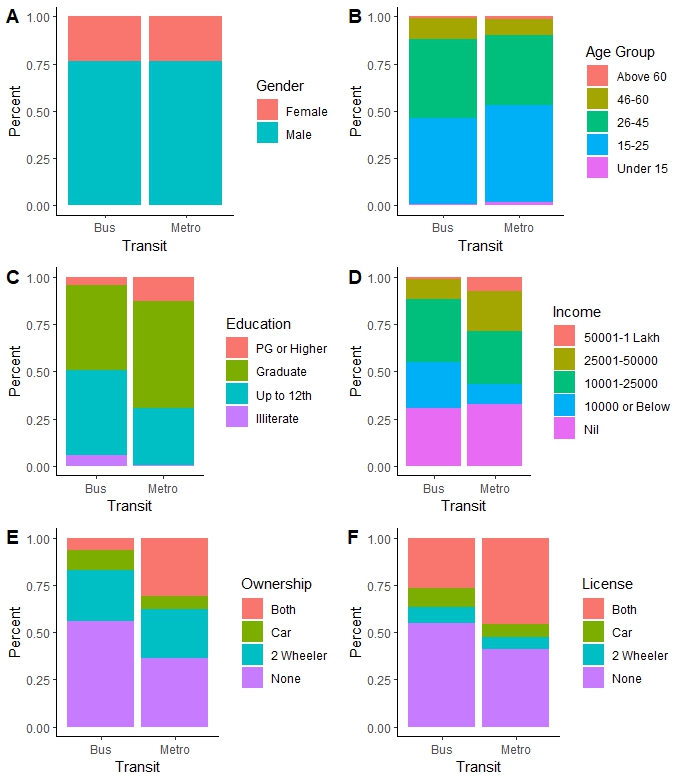
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No** | **Format** | **Mode of Survey** | **Section considered\*** | **Scale** |
| 1 | F1 | Paper & QR Code | Importance | Discrete Value - Likert (1 to 10)  (levels 1, 3, 5, 7 & 10 are defined) |
| 2 | F2 | Paper & QR Code | Satisfaction# | Discrete Value - Likert (0 to 10)  (Extreme and Middle Value Defined) |
| 3 | F3 | Paper | Satisfaction;  Importance | Fractional Value - Likert (0 to 10)  Gravity, Urgency and Trend basis |
| Note: \*Travel and Personal sections were common in all formats; #revised and tested again as second level pilot survey. | | | | |



**Figure 2 Information on No. of Pilot Samples Collected with respect to the Format F1, F2, and F3**

**CHARACTERISTICS OF PUBLIC TRANSPORT COMMUTERS**

Socioeconomic characteristics of commuting respondents are presented in **Figure 3**. Around 85% commuters in both systems were observed in the age group of 15-45 years, which is prime earning age. 75% commuters were male. Metro commuters were majorly graduate (70%), whereas almost 50% bus commuters did schooling. Income status of around half of bus commuters was low (less than USD134 per month), whereas 67% metro commuters earned more than that. Effect of income reflected in vehicle ownership. One-half of the bus commuters do not own a motorised vehicle, whereas around one-third of the metro commuters owned at least one motorised vehicle.

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**Figure 3 Characteristics of Public Transport Commuters observed in Pilot Survey**

**ASSESSMENT OF QUESTIONNAIRE DESIGN AND SURVEY METHODS**

The quality of the survey is assessed through four measures namely survey participation rate, response and completion rate, economic aspect, and population representativeness (*12*, *16*, *32*, *33*). First three are used for the assessment of the questionnaire in the pilot stage. Influence of description and presentation of satisfaction scale on the respondents’ rating behavior is also tested.

**Survey Participation Rate**

Schaller (*5*) defined the survey participation rate as percent ratio. Numerator is considered as number of respondents who participated in the survey, whereas, the denominator varies. Two response rate definition exists for on-board transit survey. In one case the denominator is considered as the number of targeted commuters being approached for the survey and in other the number of commuters who were approached for the survey. The first definition in the context of present survey. **Equation 1** is used to arrive at the survey participation rate for the *i*th survey method.

Participation Ratei (%) = {P*i* / D*i*} x 100 (1)

Where,

P*i* = Total number of questionnaires collected from respondents when participated for ith survey method.

D*i*= Total number of contacted or distributed questionnaire to targeted commuters for ith survey method.

Distribution and response track records of QR code-based web questionnaire slips was noted down at Jaipur and New Delhi survey location, however in case of paper-based questionnaire track records of respondents contacted and responded was done only at New Delhi location. **Table 2** shows the comparative assessment of two survey methods. It can be seen that paper based survey resulted in a much higher participation rate as compare to the QR Code based web survey. This is found in agreement with other studies (*16*, *34*). Agrawal et al. (*16*) reported very low participation rate for online survey as compared to paper or tablet-based survey conducted in San Francisco, California. Similarly, Monzon et al. (*34*) found survey participation rates varying from 13 to 21% for various European transportation projects at Madrid, London, Helsinki and Victoria.

**TABLE 2 Survey Participation Rates of Different Survey Data Collection Mode**

|  |  |  |
| --- | --- | --- |
| **Mode of Survey** | **Description** | **Nos or Rate** |
| QR Code Based Web Questionnaire | Distributed | 81 |
| Responded | 30 |
| Participation Rate (%) | 37.04 |
| Paper Based Questionnaire | Contacted | 172 |
| Responded | 123 |
| Participation Rate (%) | 71.51 |

The statistical analysis method “z-test for difference in two proportions” is hypothesized to check the participation rate similarity of the survey methods (*12*, *35*). The z-test shows whether or not the difference between two proportions is statistically significant. z-value is calculated from **Equation 2**. Null hypothesis (H0) considered is that both proportions are equal. Confidence level considered is 95% and 99%. The results are presented in **Table 3**.

Zcalc = (2)

Where,

pi = participation rate proportion of ith survey method

P = (p1 n1+ p2 n2)/(n1+n2); Q= (1-P)

ni = number of targeted respondents contacted for the ith survey method.

**TABLE 3 Results from z-Test for Difference in Two Proportions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Participation Rate Proportions** | **Participation. Rate Diff. (%)** | **zcal** | **At 95 % CI** | | **At 99 % CI** | |
| **ztab** | **Decision on H0** | **ztab** | **Decision on H0** |
| PB v/s QR | 34.47 | 5.33 | 1.65 | Rejected | 2.58 | Rejected |

It is concluded that the hypothesis is rejected i.e., the two methods differ in participation rate.

**Completion Rate, Non-Reporting, and Inaccurate Information**

The completion rate is defined differently based on the number of questions answered or in a particular set of data (*16*). Overall completion rate of both, QR based and paper-based survey are observed to be around 97%. It indicates that respondents could understand the questions with or without the assistance of the interviewer.

Further, non-reporting and inaccurate reporting are the usual errors that exist in the questionnaire survey. These errors arise either due to the faulty design, enumerator or respondents’ fault, etc. which can be eliminated. But the non-response due to non-willingness of the respondent or memory lapses or reporting of inaccurate information can be partly or fully rectified by applying logical consistency checks (*36*) and through editing, deleting, and imputing (*37*) to the dataset. Post these exercise, the obtained dataset is pruned and usable data is considered for further analysis. After applying logical consistency check and imputing the dataset, the overall usable percent of response for different parts of the questionnaire are presented in **Table 4**. The overall usable responses of personal information part and importance of attributes related sections have been found to be quite high. As such non-usable response to other sections has been either quite low or negligible. But there have been data items to which the usable response has been low and that resulted in higher partially usable responses to some of the information sections. Satisfaction related responses and travel information are such parts which have high percent of partially usable responses.

**TABLE 4 Overall Usable Responses for Different Parts of Questionnaire**

|  |  |  |  |
| --- | --- | --- | --- |
| **Questionnaire’s Part** | **Complete (%)** | **Partial (%)** | **None (%)** |
| Personal Information | 95.16 | 3.09 | 1.74 |
| Satisfaction Rating | 25.24 | 71.84 | 2.91 |
| Importance Rating | 98.48 | 1.52 | 0.00 |
| Travel Information | 83.37 | 15.47 | 1.16 |

Satisfaction and travel related information were further analyzed to identify the specific data items which caused higher percent of partial usable responses. **Table 5** shows such data items. In the satisfaction rating section, the issue was with route information and attributes not experienced by the respondents. Parking and complaints redressal related attributes caused issues to respondents who were not accessing stop/station by own vehicle. In case of travel related information, distance based data items suffered non-response. Respondents could reply to travel time and cost in a better manner.

**TABLE 5 Data Items identified with High Non-Response**

|  |  |  |  |
| --- | --- | --- | --- |
| **Questionnaire’s Part** | **Related Question** | **Metro (%)** | **Bus (%)** |
| Satisfaction Rating | Time-Table Awareness | 53.57 | 38.39 |
| Complaints Redressal | 16.67 | 5.36 |
| Parking Infrastructure | 19.84 | --- |
| Travel Routes and Real-Time Information | 14.29 | 6.25 |
| Travel Information | Access to Stop: Distance | 10.53 | 9.84 |
| Stop to Stop Distance | 28.07 | 1.64 |
| Egress from Stop: Distance | 5.26 | 18.03 |
| Fare Information | 12.28 | 15.57 |

Nonetheless, few missing data items were identified in the questionnaire. Format F1 had data items missing like commuter’s occupation level, ‘dependent’ in income classification. These were important for segregation of commuters and behavioural analysis. These missing items were duly addressed in formats F2 and F3. Further it was observed that retired/pensioner category was missing and supporting staff and lower level employee category caused confusion. In format F2, lower level employee category was merged in supporting staff, and retired/pensioner category was added to occupation level. Thus, revised format F2 was standardized through second level pilot survey.

Another issue observed was with travel cost. The commuters carrying bus pass or metro card found it difficult to answer trip cost. In format F2, a conditional question ‘ticket holder or pass/card holder’ was inserted. The ticket holder had to reply the ticket fare, however pass holder was required to tell pass validity period. The travel cost was computed later in the office according to the fare model available from the respective transit operator.

**Cost Analysis**

The unit cost of a survey is the cost incurred to collect one response. This can be calculated using **Equation 3**. **Table 6** provides the comparative assessment of unit cost of response per method. The QR code based web survey seems to be cheaper compared to paper-based survey mode. Remarkably, around 87% of the total expenses in paper based survey goes to manpower hiring.

Cm = ; *A (e, p, t)* (3)

Where,

Cm = Unit cost incurred for mth survey method

Cj = Unit cost calculated from jth expenses; *j*

A = Set containing different expenses in unit per questionnaire form, *A (e, p, t)*

e = Enumerator expenses per questionnaire,

*p =* Printing cost per questionnaire,

*t* = Bus passes, metro tickets incurred to collect ‘y’ questionnaire

**TABLE 6 Unit Cost per Response for Different Survey Methods**

|  |  |  |
| --- | --- | --- |
| **Expenditures (INR) / Questionnaire** | **Paper Based** | **QR Code Based** |
| Enumerators Payment | 35.00 | 08.75 |
| Questionnaire Printing | 01.50 | 00.33 |
| Bus Passes, Metro tickets | 03.78 | 01.30 |
| Total Unit Cost | 40.28 | 10.38 |

Considering the above cost analysis, incentivizing techniques can be planned to improve the response rate of QR based web survey (*11*) as it has profound effect on the respondents in participating and completing the survey.

**Influence of Scale’s Description and Presentation**

Questionnaire format F2 and F3 were used to study the effect of scale presentation and, F1 and F2 were used to study the effect of scale description. Questionnaire formats F2 and F3 comprised of satisfaction scale variants, namely discrete and fractional scale (**Figure 4**) respectively. Both were floated through paper-based survey. The range used was 0 to 10, where 0 was defined as “not at all satisfied” and 10 as “Extremely satisfied”. In the discrete scale format, the respondent was asked to tick one of the boxes representing scale value, whereas, in fractional scale format, respondent was free to place a cross (X) either on a value or in between the consecutive values (representing fraction). The meaning and corresponding value of the score was explicitly explained to the respondents before taking response. It was observed that the respondents showed higher adoptability to the discrete scale format.

In format F1, importance ratings were defined as per 10–point Likert scale, wherein scale values were defined for periodical values like 1, 3, 5, 7 and 10. On the contrary, format F2 described only the extreme value of the scale i.e., 0 and 10. The responses of the respondents are shown in **Figure 5**. The “carryover effect” of scale description can be observed in their rating behaviour (*9*), wherein peaks occur periodically on scale values 3, 5, 7, and 10 (other values not being described). In other case where description was not made for periodical values of scale, the responses are a sort of continuous in nature. Thus, it is evident that the description of scale and rating methods biases the respondent’s rating behaviour.

A picture containing graphical user interface

Description automatically generated

**Figure 4 Variants of Satisfaction Scale Presented to Respondents**

Chart, histogram

Description automatically generated

**Figure 5 Responses to variants of scale representations**

**INSTRUMENT AMENDMENT**

In line with the objective of pilot survey, the following amendments were made to standardize the questionnaire:

1. The codes for frequency of trips (one-directional movement per week) were modified to present wider spectrum from one trip to more than 6 trips.
2. Categories of ticket holders, metro card and bus pass holders were included with information regarding duration of the card/pass. The trip cost was arrived at afterwards in office for such commuters.
3. It was observed on verifying the travel cost information provided by the respondent that they have reported the unit travel cost even if they were accompanied with one or more person. Hence, data item number of persons accompanied became redundant and removed in modified questionnaire.
4. The data items, which are answerable if experienced before, like complaints redressal, parking facilities, etc. were made conditional i.e., reply if used before. This helped in reducing non-response.
5. Few missing data categories were observed, like retired/pensioner/housewife, no income, etc. These were included in the modified questionnaire.
6. The section on assigning importance to attributes through the GUT Matrix scale was removed and used as a part of expert survey to get attribute weights. This eventually reduced the completion time of the survey, as well as the complexity associated with it.

**CRITICAL OBSERVATIONS FROM PILOT SURVEY**

This section discusses the challenges observed while administrating and executing the survey and in tackling commuter behaviour while conducting the on-board survey. These are discussed in subsequent sections.

**Administration, Planning and Execution**

1. The length or travel time on a selected corridor or section is critical for an on-board transit survey. It was one of the reasons behind partly completed responses as short distance trip maker struggled to complete. This is also pointed out by other researchers (*2*, *16*).
2. The training of enumerators has a bearing on well informed and accurate information derived from the respondents. In present survey it caused negative effect on schedule of transport service and travel time information related data items.
3. The regular commuters are the targeted population for perception based surveys. Therefore, the optimal time to conduct the on-board survey is observed as 0800–1200h and 1400–1800h on a weekday.
4. The precise and crisp description of survey objective is crucial in getting completed responses on-board transit. More time dedicated to this may cause difficult situations to find a commuter having left with sufficient time to provide responses.
5. The access/egress travel time to/from metro station, as recalled by a respondent may or may not include the time taken to get to platform and enter the train. To get higher clarity, it shall be included as station service time. But social status of commuters was not appreciative of this information.

**Commuter Response Behaviour**

1. Regular commuters (work/education trip maker) in a transit are more supportive to share information and perceptions than non-regular commuters (shopping/recreation/social trip makers).
2. Commuters with accompanying person, in general, are less willing to let their personal space and privacy compromised.
3. It becomes difficult to control time lost in narration of personal grievances which also has implication on completeness of the survey. This is especially true with respondents using bus transit system.
4. Initially inattentive respondents became interested and enthusiastic after going through initial questions. This justifies the importance regarding use of starting questions in triggering the respondent’s curiosity for the upcoming question and genuineness of the survey, as also stated by (*2*)
5. Previous experience with competitive or alternate transport modes/systems do influence the positive and high satisfaction level with the presently used transit system. This is observed to be true with metro system.
6. The non-response or partial response to certain data items like schedule, reliability, punctuality, etc. is an outcome of poor information system provided by transit operators. The gravity of situation is higher for bus transit system and needs improvement.
7. Commuters are more comfortable answering the quantifiable travel impedance related information rather indirect information like fare charge, distance, etc.
8. The perceived average waiting time was observed to be equal or greater than the operational frequency of the respective transport system. This indicates that commuters weigh waiting time quite high.

**CONCLUSIONS**

Effective questionnaire design and choice of a suitable data collection method are crucial in collecting the commuter’s satisfaction and importance information regarding the transit performance. Three questionnaire formats with paper based and QR code based web survey methods were designed and their effectiveness are assessed through pilot survey conducted on bus and metro system in two different Indian cities. The critical observations, challenges and experiences from the questionnaire design are concluded here.

* Paper based and QR code based survey methods of data collection have significantly different response rate but similar completion rate. However, QR code based survey is three-fourth times cheaper than paper based survey.
* Travel information and satisfaction parts of the questionnaire suffer highest non-usable response than personal information part. Moreover, respondents find difficulty in quantifying distance than travel time in travel information parts. In satisfaction part, question such as complaints and parking experience require respondent’s prior experience to answer these.
* Irrespective of ways of scale presentation, commuters tend to opt discrete integer rating than fractional scale. On the contrary, the description of scale values has carryover effects to the commuter’s rating behavior. They tend to get influenced by the scale description and opt the value as closely and clearly described in the questionnaire.

The analysis has helped in the finalisation of the questionnaire which is used for final data collection. The final designed and standardized questionnaire, and critical observations from Jaipur and New Delhi pilot tests were useful to conduct main CSIS. CSIS of passengers using Sub-urban commuters’ rail at Mumbai, BRTS at Ahmedabad, Conventional Bus Transit systems and MRTS at New Delhi cities were successfully conducted during October 2021 to January 2022. The analysis of this data will help in the identification of influencing attributes and development of performance evaluation indices for transit systems.

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NIL

**AUTHOR CONTRIBUTIONS**

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