Paper ID: **94**

How regional rapid transit system will impact the development along Delhi-Ghaziabad-Meerut Corridor? A stakeholders' perception study

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Research Symposium 4: Land Use (LU) and Transportation Planning
28th October 2023
Delhi

Introduction

URBANISATION

REGIONAL INTEGRATION

IDENTIFY STAKEHOLDERS

STUDY STAKEHOLDERS

The study examines how stakeholders along the Delhi-Ghaziabad-Meerut corridor perceive the introduction of RRTS in the region

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Need of the Study

1. RER, Paris

2. Crossrail, London

3. KTX, South Korea

The development of RRTS will **reshape the areas** through which it runs

It will act as a catalyst for development and growth for the region, particularly **affecting the lives of the people** connected directly with the line
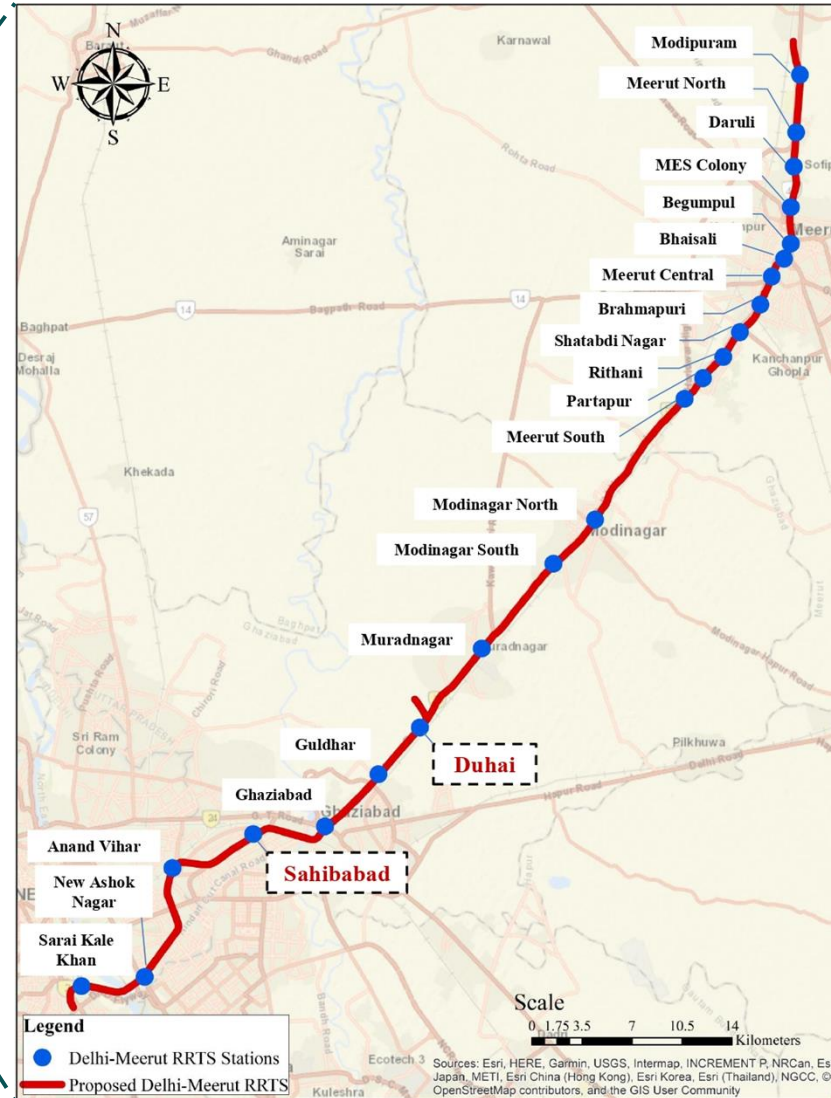
Source: https://www.ncrtc.in/rrts-background/

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Study Area

How regional rapid transit system will impact the development along Delhi-Ghaziabad-Meerut Corridor?
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Source: https://ncrtc.in/overview-project/

Corridors prioritised for implementation:
Delhi-Ghaziabad-Meerut, Delhi- Alwar and Delhi-Panipat

Length: 82 kms
Total no. of Stations: 22

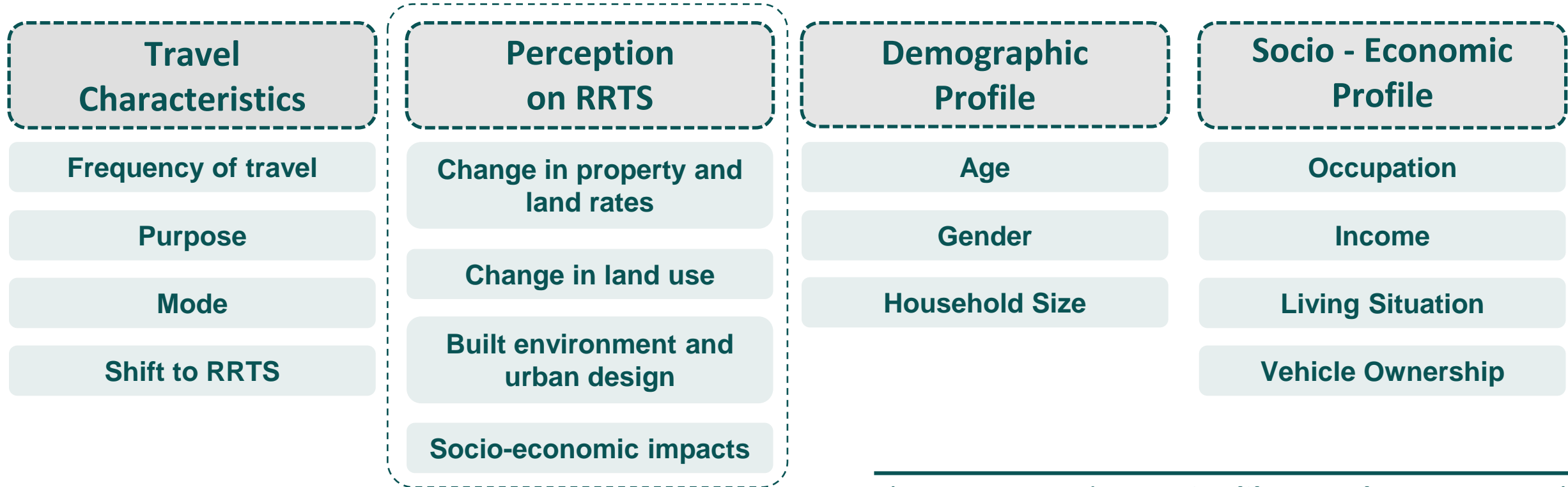**Sahibabad** and **Duhai** are part of the first 17km priority section along the corridor

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Questionnaire and Data Collection

An **offline pen-paper based stakeholder perception survey** was conducted with a sample size of **390** people in influence zones(within 1.5 sq.km. radius) of Sahibabad and Duhai RRTS stations

Travel Characteristics

- Frequency of travel
- Purpose
- Mode
- Shift to RRTS

Perception on RRTS

- Change in property and land rates
- Change in land use
- Built environment and urban design
- Socio-economic impacts

Demographic Profile

- Age
- Gender
- Household Size

Socio - Economic Profile

- Occupation
- Income
- Living Situation
- Vehicle Ownership

The survey used a **5 point likert scale** to capture the perception of the respondents

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RIDIT Analysis

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The information collected for **22 factors** was analysed using
Relative to an **I**dentified **D**istribution **I**ntegral **T**ransformation (RIDIT)

Step 1: Determine the frequency (f_j) for each response category, denoted by j (where j takes values from 2 to n)

Step 2: Calculate the accumulated midpoint frequency (F_j) for each response category

Step 3: The ridit value R_j is further calculated for each response category present in the reference dataset; N is the sum of the total responses received for each factor

$$F_1 = \frac{1}{2}f_1$$

$$F_j = \frac{1}{2}f_j + \sum_{k=1}^{j-1} f_k \quad \text{where j=2,...,n}$$

$$R_j = \frac{F_j}{N} \quad \text{where j=1,2,...,n}$$

Step 4: The ridits and mean ridits are calculated.
π_{ij} is the frequency of category j for the ith scale item

$$r_{ij} = \frac{R_j \times \pi_{ij}}{\pi_i} \quad \text{where } i = 1, ..., m$$

$$\pi_i = \sum_{k=1}^{n} \pi_{ik}$$

Step 5: Calculate the average ridit value (ρ_i) for every item on the Likert scale; Compute confidence interval for ρ_i (95% CI)

$$\rho_i = \sum_{k=1}^{n} r_{ik}$$

$$CI = \rho_i \pm \frac{1}{\sqrt{3\pi_i}}$$

Step 6: Stated hypothesis is investigated by employing Kruskal-Wallis statistics W
The value of W is governed by X² distribution with (p-1) degrees of freedom

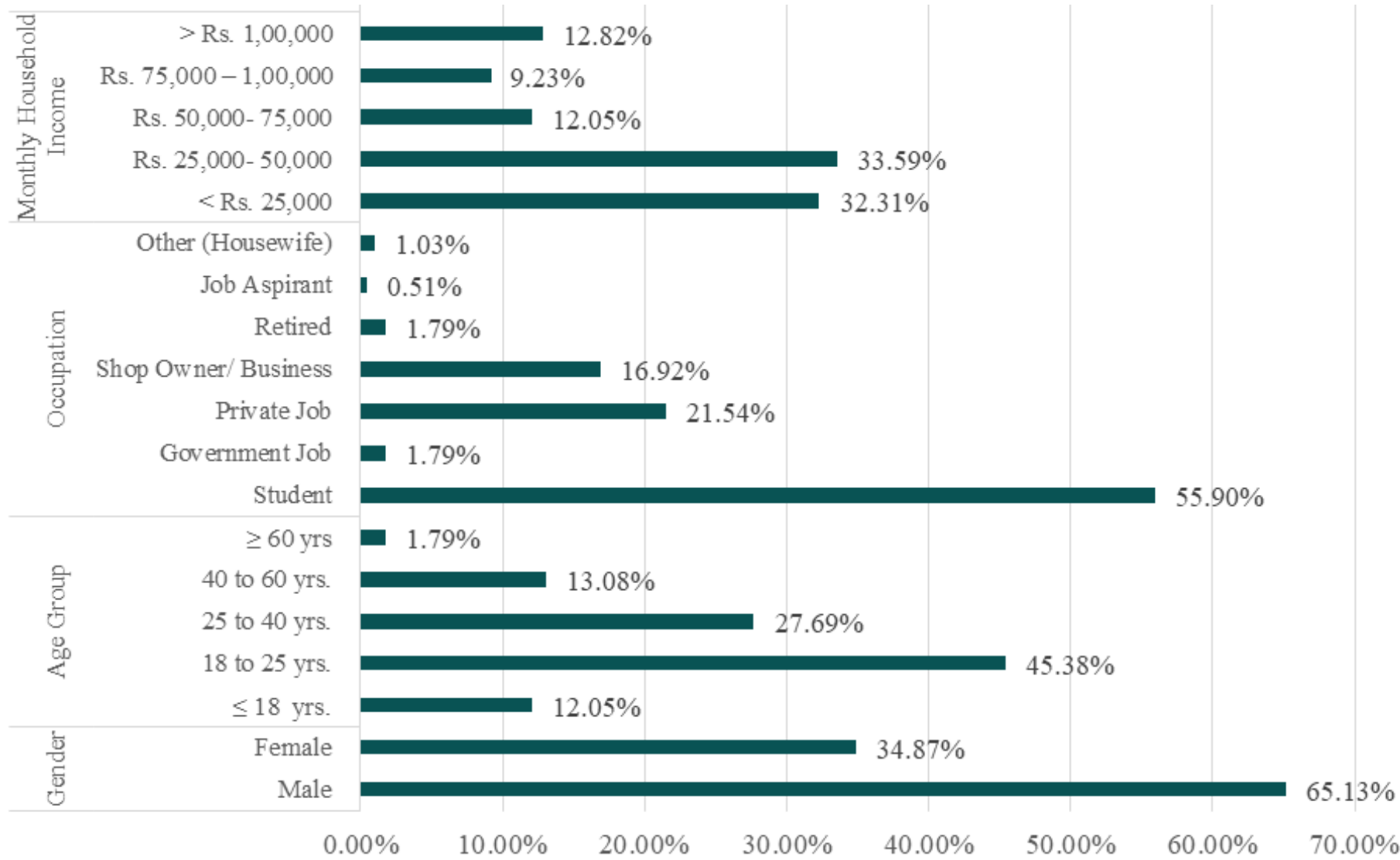$$W = 12 \sum_{i=1}^{p} \pi_i(\rho_i - 0.5)^2$$

Source: Bross, 1958; Pitale et al., 2023; Sadhukhan et al., 2018

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16th Urban Mobility India
cOnference & Expo 2023

Observations

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Monthly Household Income
- > Rs. 1,00,000: 12.82%
- Rs. 75,000 – 1,00,000: 9.23%
- Rs. 50,000- 75,000: 12.05%
- Rs. 25,000- 50,000: 33.59%
- < Rs. 25,000: 32.31%

Occupation
- Other (Housewife): 1.03%
- Job Aspirant: 0.51%
- Retired: 1.79%
- Shop Owner/ Business: 16.92%
- Private Job: 21.54%
- Government Job: 1.79%
- Student: 55.90%

Age Group
- ≥ 60 yrs: 1.79%
- 40 to 60 yrs.: 13.08%
- 25 to 40 yrs.: 27.69%
- 18 to 25 yrs.: 45.38%
- ≤ 18 yrs.: 12.05%

Gender
- Female: 34.87%
- Male: 65.13%

Land Use in Sahibabad primarily consists of **commercial**, **industrial**, and **residential** establishments
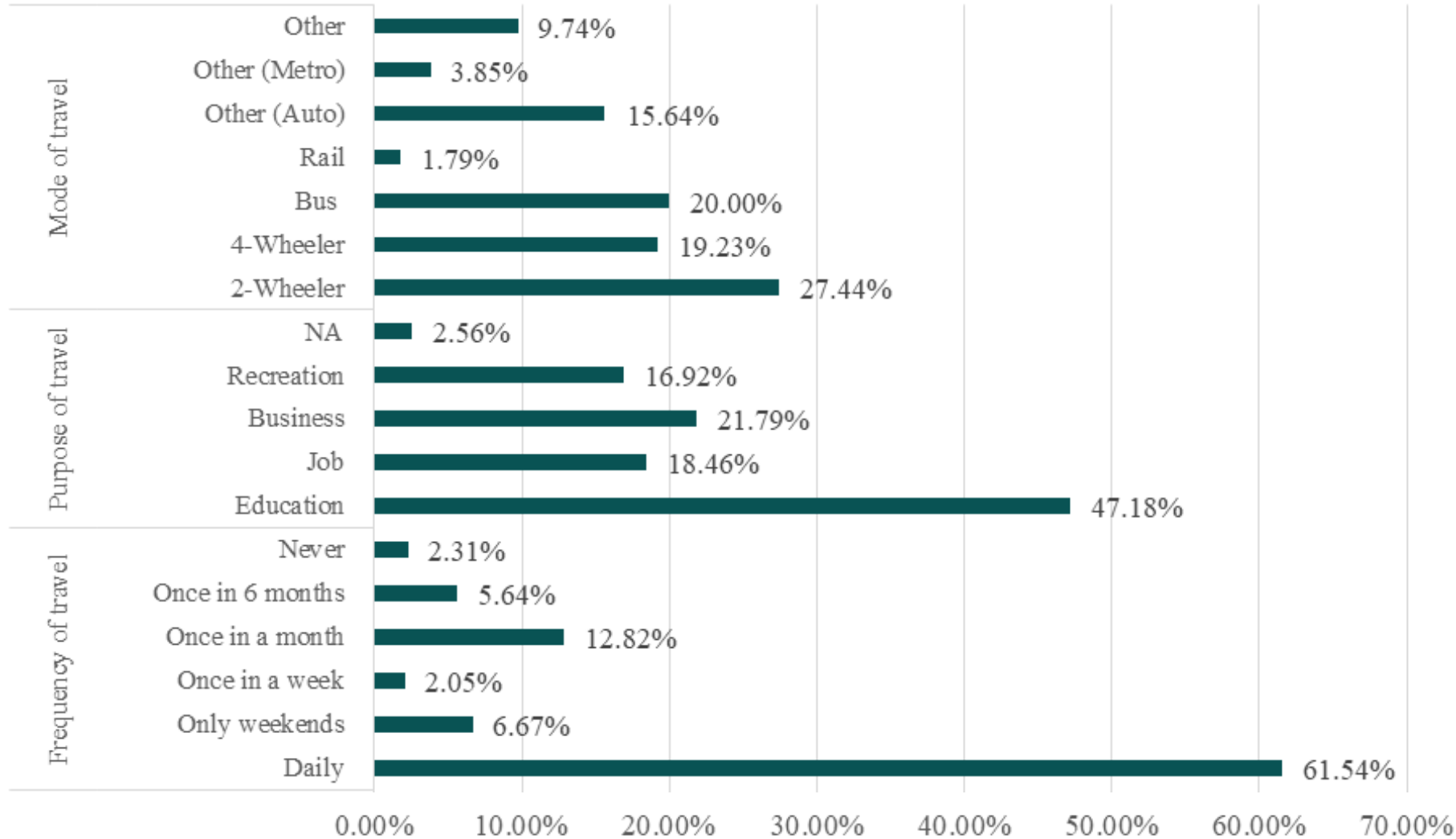
Near Duhai RRTS station, the land is predominantly used for **institutional** purposes

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Observations

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Mode of travel
- Other — 9.74%
- Other (Metro) — 3.85%
- Other (Auto) — 15.64%
- Rail — 1.79%
- Bus — 20.00%
- 4-Wheeler — 19.23%
- 2-Wheeler — 27.44%

Purpose of travel
- NA — 2.56%
- Recreation — 16.92%
- Business — 21.79%
- Job — 18.46%
- Education — 47.18%

Frequency of travel
- Never — 2.31%
- Once in 6 months — 5.64%
- Once in a month — 12.82%
- Once in a week — 2.05%
- Only weekends — 6.67%
- Daily — 61.54%

Privately owned vehicles i.e. **2-wheeleers** and **4-wheelers** are largely used to commute along the corridor

A significant majority of respondents use the route for **daily travel**, indicating its popularity

Results and Discussion

Factor	Notation	RIDIT Values					RIDIT Score (ρ_i)	Rank
		1	2	3	4	5		
Property Value increase	F1	0.001	0.004	0.011	0.286	0.325	0.626	2
Area has become more **appealing to invest**	F2	0.000	0.004	0.026	0.342	0.188	0.560	7
RRTS major reason for rise in value	F3	0.000	0.007	0.024	0.309	0.224	0.564	5
Ruined the **aesthetics**	F4	0.003	0.049	0.030	0.078	0.073	0.233	22
Increased demand for **housing**	F5	0.000	0.007	0.022	0.323	0.199	0.551	10
Property developers **accumulating more land**	F6	0.001	0.022	0.066	0.173	0.140	0.401	19
People want to **buy property** near station	F7	0.001	0.010	0.029	0.284	0.201	0.524	13
Increase in **commercial & residential** developments	F8	0.000	0.004	0.025	0.340	0.194	0.563	6
Rise in **buying & selling** of land	F9	0.001	0.018	0.051	0.201	0.188	0.458	15
Increased property **rents**	F10	0.000	0.005	0.020	0.313	0.242	0.581	4
Most **growth near RRTS** station (within a 500m radius)	F11	0.001	0.025	0.036	0.214	0.153	0.428	17
Will reduce **migration**	F12	0.001	0.007	0.032	0.274	0.236	0.549	11
Reduction in **travel time**	F13	0.000	0.003	0.018	0.239	0.396	0.656	1
Land & property will be **more valuable**	F14	0.000	0.004	0.015	0.285	0.318	0.623	3
Location of station is **suitable**	F15	0.000	0.007	0.019	0.338	0.188	0.552	9
Increased the **traffic**	F16	0.001	0.027	0.055	0.154	0.142	0.379	20
There was **urgent need** of RRTS	F17	0.000	0.006	0.036	0.277	0.236	0.555	8
Job opportunities have **increased**	F18	0.001	0.015	0.045	0.259	0.126	0.445	16
People are **moving in** the area	F19	0.001	0.014	0.060	0.247	0.105	0.427	18
≥1.5 km area also equally developed	F20	0.000	0.008	0.034	0.335	0.119	0.497	14
Will **boost economy**	F21	0.001	0.005	0.023	0.345	0.174	0.547	12
Has **disturbed privacy**	F22	0.001	0.041	0.050	0.119	0.071	0.282	21

1= Strongly Disagree, 2=Disagree, 3 =Neither Agree nor Disagree, 4=Agree, 5= Strongly Agree

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Results and Discussion

Stakeholders highly appreciate the **time-saving benefits** that RRTS offers

It is perceived that RRTS has **positively impacted property values** in the area

Less consensus among respondents that RRTS has **negatively affected** the **aesthetics**

There seems to be **no significant disturbance** to the **privacy** of the surrounding areas

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Conclusion

The primary focus of the stakeholder perception survey was to **identify crucial factors** that **matter most to the stakeholders**

New infrastructure projects **boost the value of connected areas pre-operation**, as validated by the survey's findings on increased land and property value

These findings have the potential to **support policymakers** and **researchers** in crafting targeted solutions for future corridors of RRTS in the National Capital Region

Insights gained from this study can be valuable for **planning regional transport networks in other areas of the country** with comparable characteristics

Thank You

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