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# Measuring Shoppers' Perceived Satisfaction towards Pedestrianized Urban Commercial Market Spaces in Delhi

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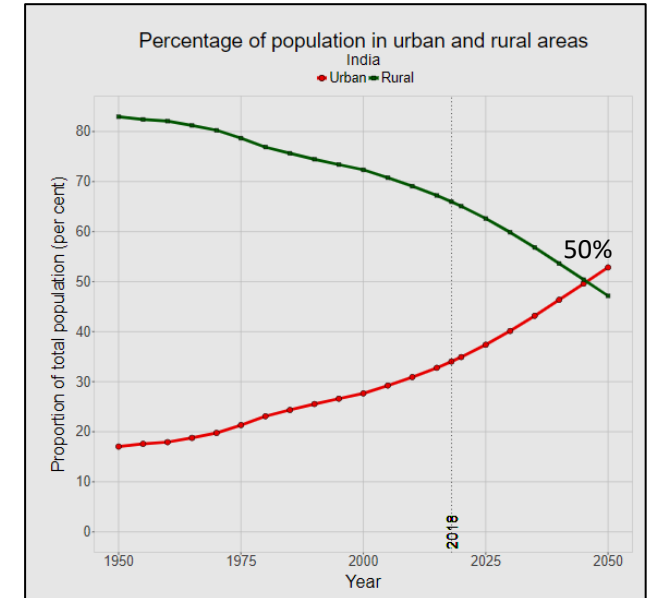
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# Introduction

India's urban population, which accounted for about 31% in the 2011 census, is projected to exceed **40%** by **2030** and **50%** by **2050** (World Urbanization Prospects, 2018)



Percentage of population in urban and rural areas, India

Source: World Urbanization Prospects, 2018

1

To derive the satisfaction **ranking** of **attributes** influencing the **accessibility** of pedestrianised commercial markets based on shoppers' **perceived satisfaction**



2

To analyze the influence of **demographic factors**, such as **age** and **gender**, on perceived satisfaction







Map showing the location of selected markets in Delhi

Source: [https://www.researchgate.net/figure/Geographical-map-of-Delhi-India\\_fig1\\_349108358](https://www.researchgate.net/figure/Geographical-map-of-Delhi-India_fig1_349108358)

- Due to time constraints, the study focused on **one city**, and **Delhi** was chosen for specific reasons.
- Delhi has a well-established **hierarchy of commercial areas**, so two markets were selected from different levels of this hierarchy.
- Delhi has a strong **public transportation network**, and the chosen markets are well-connected.
- Finding two similar pedestrianized markets with **comparable** footfall, commerce, and popularity in another city was challenging.
- Delhi's status as the **capital of India** attracts a diverse range of **visitors**, providing a unique perspective for the survey.
- The two selected markets are among the **most renowned** in Delhi.





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The selection of the attributes is done based on **frequency analysis** (frequently occurring attributes from the recent literature).

S.No.	Attribute	Description	Reference
1	<b>Safety</b>	safety of shoppers from the vehicles	(H. Singh & Singh Sohi, 2018), (Khaleghi, 2017), (Kim et al., 2021), (Krambeck & Shah, 2006)
2	<b>Security</b>	no theft, eve teasing, or any other crime	(Khaleghi, 2017), (Krambeck & Shah, 2006)
3	<b>Comfort</b>	adequate walking distance, protected from rain or sun, no crowd	(Khaleghi, 2017), (Kim et al., 2021), (Minhas & Poddar, 2017)
4	<b>Universal Accessibility</b>	facilities for differently abled, children, and elderly	(Kim et al., 2021)
5	<b>Social life</b>	a place to spend quality time with friends and family	(Sastre et al., 2013), (Kodukula, 2017)
6	<b>Lighting</b>	proper lighting during nighttime	(Roychowdhury Anumita, 2012), (H. Singh & Singh Sohi, 2018), (Malhotra, 2017)
7	<b>Cleanliness</b>	clean, and no littering	(Minhas & Poddar, 2017), (S. Singh, 2021)
8	<b>Aesthetics</b>	attractive and pleasing to the eyes	(Kim et al., 2021), (Chiquetto, 1997), (S. Singh, 2021)

# Survey and Data Collection

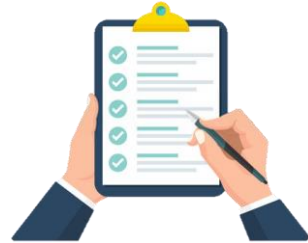
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Collected Samples = **400** (Shoppers)



Tablet based survey



Pen-paper based survey



Online Survey



Shoppers  
QR Code for Google forms

**'Cochran Formulae'** for determining sample size

Minimum Sample Size for Shopper's Survey= 384

For reliability of collected samples **'Cronbach Alpha'** was used, Cronbach Alpha=**0.784** ; this value indicates that the collected data is reliable.



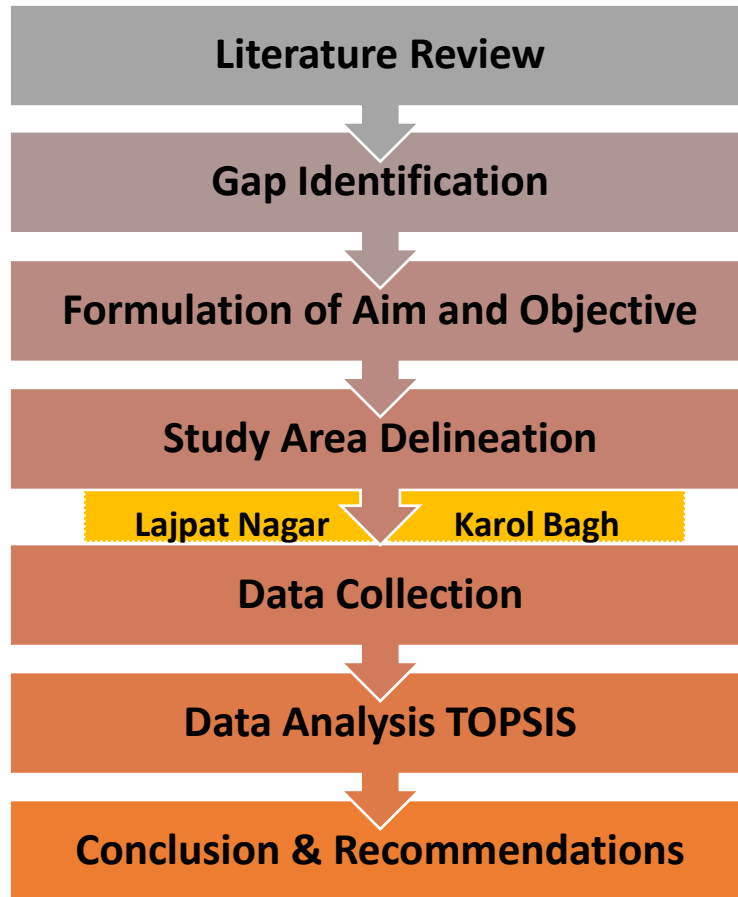
Photos of Data Collection



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## METHODOLOGY FLOW CHART



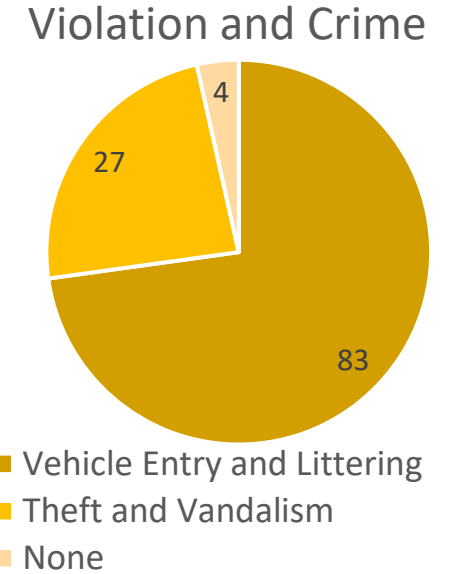
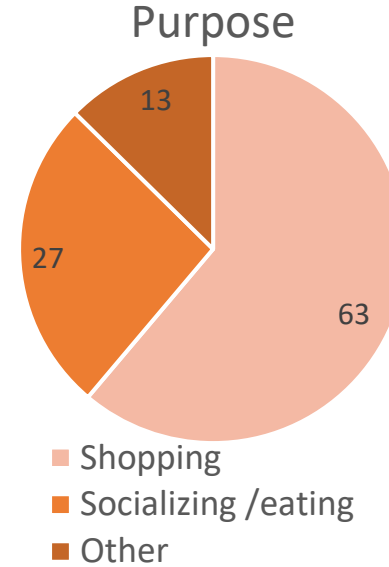
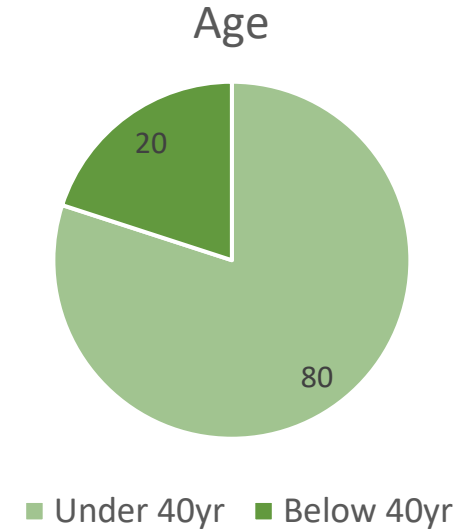
## TOPSIS Method:

- The TOPSIS method was initially formulated by **C.L. Hwang & Yoon** (1981) and subsequently enhanced by **C. L. Hwang et al.** (1993).
- TOPSIS, a well-established **MADM** method, can evaluate the **ranking of alternatives** (attributes) based on **multiple criteria** (rating scales).
- The method has been found suitable for analyzing data collected on a **Likert-type scale** (ordinal data). It involves **ranking** the alternatives based on their proximity to an **ideal solution** and their distance from the **worst solution** (Sadhukhan et al., 2015).

**Gender-Balanced Survey:** Equal representation of males and females for unbiased results.



**Diverse Visitors:** Attracts a diverse range, with 95% local visitors and 5% from different states or countries.



**Table 1: Overall Satisfaction Ranking of the Attributes**

Attributes	Distance Positive	Distance Negative	TOPSIS Score (S)	Rank
<b>Safety</b>	17.0294	28.7750	0.6282	<b>1</b>
<b>Social life</b>	17.1756	27.0000	0.6112	<b>2</b>
<b>Comfort</b>	17.8606	27.9464	0.6101	<b>3</b>
<b>Security</b>	17.9165	26.6646	0.5981	<b>4</b>
<b>Lighting</b>	19.9499	25.3772	0.5599	<b>5</b>
<b>Aesthetics</b>	21.5407	24.0416	0.5274	<b>6</b>
<b>Universal Accessibility</b>	27.9821	17.4069	0.3835	<b>7</b>
<b>Cleanliness</b>	31.8434	13.8564	0.3032	<b>8</b>



Fig. 1 Garbage Littering in Karol Bagh Market, Source: Author



Fig. 2 Lack of Universal Accessibility in Karol Bagh Market, Source: Author



Fig. 3(a)



Fig. 3(b)

Fig. 3(a) and 3(b) Garbage Littering in Lajpat Nagar Market



# Data Analysis: TOPSIS

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Table 2. Ranking of attributes from Female respondents only

Attributes	Distance Positive	Distance Negative	TOPSIS Score	Rank
Safety	11.6190	22.8692	0.6631	1
Social life	12.0830	20.8806	0.6334	2
Comfort	12.7671	21.2368	0.6245	3
Security	13.0000	20.7605	0.6149	4
Lighting	14.3527	19.4936	0.5759	5
Aesthetics	15.5242	18.8944	0.5490	6
Universal Accessibility	21.2603	12.5698	0.3716	7
Cleanliness	24.3311	9.7980	0.2871	8

Table 3. Ranking of attributes from male respondents only

Attributes	Distance Positive	Distance Negative	TOPSIS Score	Rank
Comfort	12.6886	20.6398	0.6193	1
Social life	12.5698	20.2731	0.6173	2
Safety	12.8062	20.4206	0.6146	3
Security	12.6886	19.3907	0.6045	4
Lighting	14.0712	19.2094	0.5772	5
Aesthetics	15.3623	18.3576	0.5444	6
Universal Accessibility	18.4662	15.0333	0.4488	7
Cleanliness	20.8567	13.4907	0.3928	8



Fig. 4 Benches installed, Source: Author



Fig. 5 Fewer Vehicles inside, Source: Author



Fig. 6 Manhole on the walkway, Source: Author



Fig. 7 Garbage on the walkway, Source: Author



Fig. 8 Uneven Surface, Source: Author



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Table 4. Ranking of the attributes for the age group above 40 years

Attributes	Distance Positive	Distance Negative	TOPSIS Score	Rank
Comfort	7.5498	12.5698	0.6248	1
Social life	7.4833	11.9583	0.6151	2
Security	8.1240	11.8743	0.5938	3
Safety	8.6023	12.1244	0.5850	4
Lighting	8.6023	11.3578	0.5690	5
Aesthetics	10.3441	10.2956	0.4988	6
Universal Accessibility	12.1244	8.1240	0.4012	7
Cleanliness	14.0712	6.8557	0.3276	8

Table 5. Ranking of the attributes for the age group below 40 years

Attributes	Distance Positive	Distance Negative	TOPSIS Score	Rank
Safety	15.0000	28.0891	0.6519	1
Social life	15.7480	26.4575	0.6269	2
Comfort	16.3095	26.7955	0.6216	3
Security	16.2481	25.7294	0.6129	4
Lighting	18.0555	24.8998	0.5797	5
Aesthetics	19.2354	24.1661	0.5568	6
Universal Accessibility	25.3377	17.8326	0.4131	7
Cleanliness	28.7228	15.1987	0.3460	8



Fig. 9 Broken benches Source: Author



Fig. 10 Improper Ramp Source: Author



Fig. 11 Broken Bollards Source: Author



Fig. 11 Insufficient bins



- TOPSIS, a MADM technique, is found **suitable** to determine the **satisfaction ranking** of **attributes** influencing the accessibility of pedestrianization commercial centres.
- **'Safety'** is perceived as the attribute with higher satisfaction, and **'Cleanliness'** is the attribute with lower satisfaction among the shoppers.

**Urban Development Authorities need to focus on the following attributes:**

- **Cleanliness:** Swift action is needed to address cleanliness concerns and enhance visitor satisfaction. Regular inspections and upkeep are crucial.
- **Universal Accessibility:** Implement wheelchair ramps, elevators, clear signage, and unobstructed pathways. Include rest zones, comfortable seating, accessible restrooms, stroller, and wheelchair rentals.





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***“God made us walking animals—PEDESTRIANS. As a fish needs to swim, a bird to fly, a deer to run, we need to walk, not in order to survive, but to be **HAPPY.**”***

-Jeff Speck



*Thank You*

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