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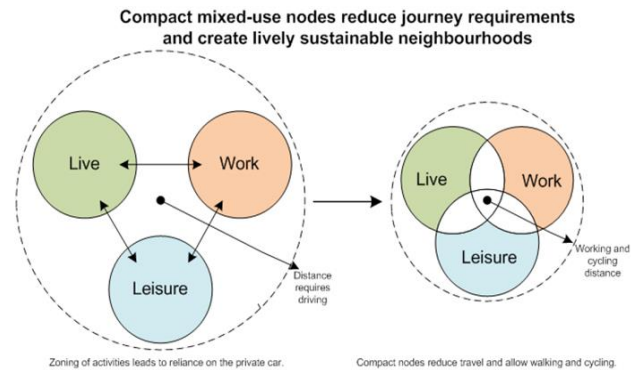
Exploring The Commercial Performance of Self Organized Mixed-use Streets in Delhi

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Introduction

Mixed-Use Development

Land use mix refers to **bringing different types of land uses** (residential, commercial, institutional, recreational, etc.) close together.



Live, work, leisure (play) concept and sustainability

Transportation	Economic	Social
• VMT reduction • Increase in use of alternative mode • Shortened Trip length for work, shop, recreation and amenities • Increase Walkability	• Increase in housing property value • Increase in commercial property value • Job population balance • Increase in employment/income • Increased Diversity of Retail/Services	• Better BMI score-based on walking • Eyes on street-women safety • Social interaction • Sense of belonging • Heritage Revitalization

Condition in India & Research Gap

In developing countries like India mixed-use manifestation such mixed-use development is often **aligned around the traffic corridor or a street** and is supported by **local demand of commercial activities**.



Research Gap: To understand the **factors which contribute** to the development of self organized mixed-use development and **to understand the effect size** of these factors on commercial performance.

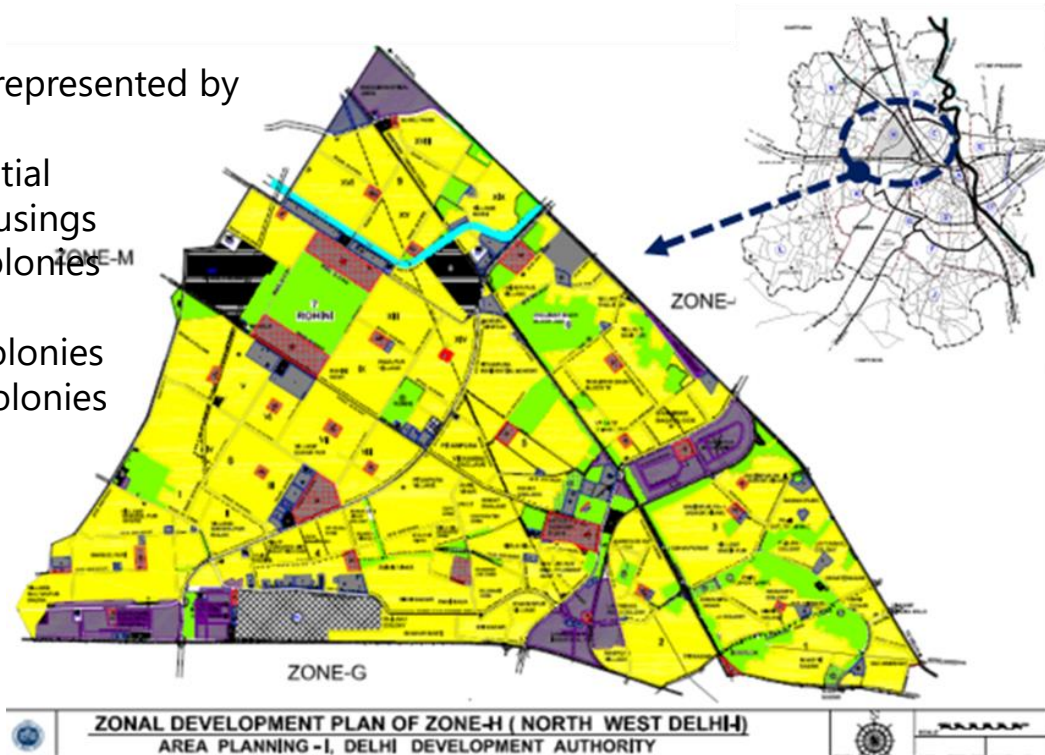
Site Selection

Delhi has more than 6000 declared mixed-use streets. It is split into 15 planning zones. Zone 'H', also known as Northwest Delhi-I is chosen

Overall, the area is represented by

- Planned residential
- Cooperative housings
- Resettlement colonies
- Pre-1962 rehabilitation colonies
- Unauthorized colonies
- Urban villages

Total 240 samples were used from 8 streets with different ROWs.



Indicators

Commercial Attractiveness Indicator

- Average number of customers visiting the store on a weekday

Retail typology-based indicators

- Average Sale on a Weekday
- Size of the Store
- Number of Hours Operating
- Number of Years functioning
- Owned or Rented
- Type of Activity

Retail clustering-based indicators

- Are Other shops selling related items
- Distance to the nearest shop selling same product
- Is Informal Activity Linked to the Store



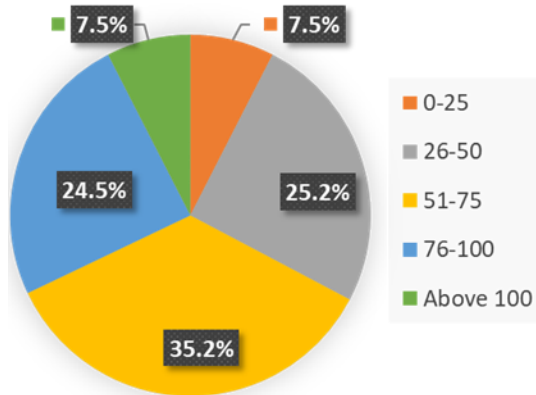
Mixedness-based indicators

- Distance to shop Owners Residence
- Percentage of Local Customers

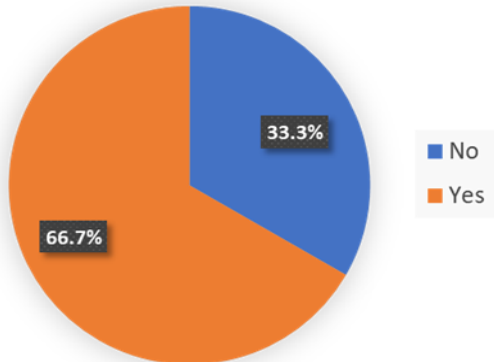
Network Connectivity-based indicator

- Link to Node Ratio

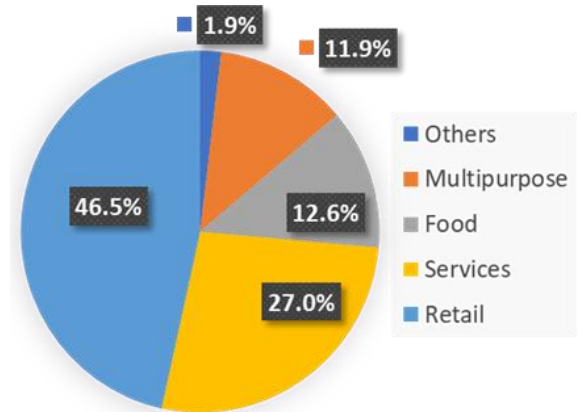
Survey Results



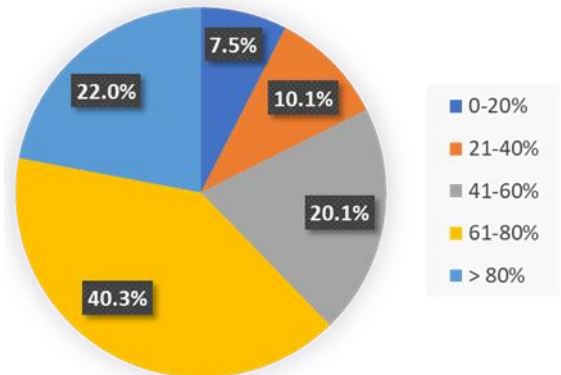
Customers visiting on a weekday



Informal activity is linked



Activity Type



Percentage of Local Customer

Data Analysis

Parameter Estimates of Ordinal Logistic Regression

Name of Variable		Estimate	Std. Error	p -value	95% Confidence Interval	
					Lower Bound	Upper Bound
Threshold	(Dependent Variable)					
	[customers visiting on a weekday = 1]	19.724	4.277	0.000**	11.342	28.106
	[customers visiting on a weekday = 2]	22.653	4.322	0.000**	14.181	31.124
	[customers visiting on a weekday = 3]	25.266	4.423	0.000**	16.597	33.934
	[customers visiting on a weekday = 4]	28.298	4.557	0.000**	19.366	37.229
	(Independent Variables)					
Sr. No.	Retail Typology Indicators					
1	Log Sale	3.974	0.888	0.000**	2.234	5.714
2	Log Size	0.299	0.759	0.694	-1.189	1.788
3	Number of Hours Operating	0.620	0.199	0.002**	0.231	1.010
4	Number of Years Functioning	-0.031	0.024	0.202	-0.078	0.016
5	[Owned or Rented= 1]	-0.503	0.663	0.448	-1.804	0.797
	[Owned or Rented= 2]	0 ^a				
6	[Activity Type (Others) = 1]	-3.025	1.415	0.033*	-5.799	-0.250
	[Activity Type (Multipurpose)= 2]	0.622	0.602	0.302	-0.559	1.803
	[Activity Type (Food) = 3]	1.188	0.638	0.063	-0.063	2.439
	[Activity Type (Services) = 4]	-0.446	0.461	0.333	-1.350	0.457
	[Activity Type (Retail) = 5]	0 ^a				

Data Analysis

Parameter Estimates of Ordinal Logistic Regression

	Name of Variable	Estimate	Std. Error	p -value	CI-95% Lower Bound	CI-95% Upper Bound
	Retail Clustering Based Indicators					
7	[Other Shops Selling Related Items (No) = 1]	-0.852	0.360	0.018*	-1.558	-0.146
	[Other Shops Selling Related Items (Yes) = 2]	0 ^a				
8	[Nearest shop selling same Product = 1]	-1.109	0.628	0.078	-2.340	0.123
	[Nearest shop selling same Product = 2]	-1.301	0.651	0.046*	-2.578	-0.024
	[Nearest shop selling same Product = 3]	-0.161	0.564	0.775	-1.267	0.944
	[Nearest shop selling same Product = 4]	0.279	0.576	0.628	-0.851	1.409
	[Nearest shop selling same Product = 5]	0 ^a				
9	[Informal Activities Linked (No) = 1]	-0.899	0.379	0.018*	-1.641	-0.157
	[Informal Activities Linked (Yes) = 2]	0 ^a				
	Mixedness Based Indicators					
10	[Shop Owner Living Within 500 Meters= 1]	0.004	0.784	0.996	-1.532	1.540
	[Shop Owner Living Within 1000 Meters= 2]	0.051	0.455	0.910	-0.841	0.944
	[Shop Owner Living Beyond 1000 Meters= 3]	0 ^a				
11	[Percentage of Local Customers (0-20%) = 1]	-2.363	0.770	0.002*	-3.873	0.853
	[Percentage of Local Customers (21-40%) = 2]	-1.134	0.684	0.097	-2.475	0.206
	[Percentage of Local Customers (41-60%) = 3]	-0.353	0.538	0.511	-1.407	0.701
	[Percentage of Local Customers (61-80%) = 4]	-0.260	0.462	0.574	-1.166	0.647
	[Percentage of Local Customers (> 80%) = 5]	0 ^a				
	Network Connectivity Based Indicator					
12	Link Node Ratio	2.267	1.080	0.036*	0.151	4.383

Results & Discussion

Retail typology-based indicators

Log Sale: Parameter estimate value of **+3.974** ($p < .001$), **one-unit increase in log sale** results in a **significant increase** in the odds of customers visiting on weekdays.

Number of Hours Operating: Parameter estimate value of **+0.620** ($p = .002$), implies that unit increase in it, **increases the odds** of customers attraction by **1.86 times**.

Activity Type: **shows varying effects** The result fulfils the theoretical assumption that mixed-use areas have **increased footfall for activities like food items and general stores** based on local consumers demands.

Retail clustering-based indicators

Other Shops Selling Related Items: Parameter estimate value of **-0.852** ($p = .018$), suggests **shops not selling similar items** have **0.43 times lesser odds**.

Nearest Shop Selling Same Product: shows a **general trend** if **distance between the shops** selling the same products **increases their odds** of receiving **more customers decreases**.

Informal Activities Linked: Its presence increases the odds by **0.4 times** based on the parameter estimated value of **-0.899** ($p = .018$)

Results & Discussion

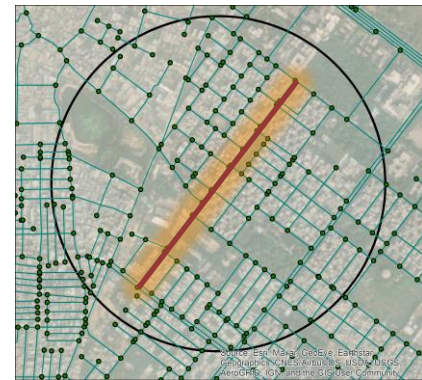
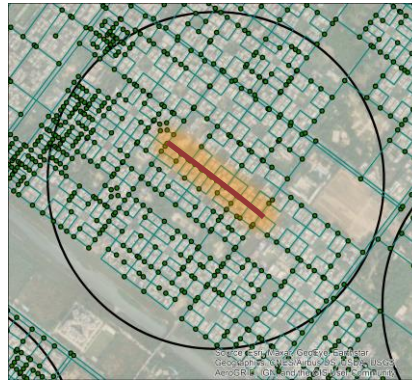
Mixedness based indicators

Shop owner's location: The distance-based measure of shopkeeper's location does not significantly impact customers' weekday visits.

Percentage of Local Customers: analysis of this parameter shows mixed results.

Network Connectivity based indicator

Link Node Ratio: parameter estimate value of +2.267 ($p = .036$) indicate the significant positive relationship. The model indicates one unit increase in the value of link node ratio increase the odds of customers weekday visits by 9.64 times.



Conclusion & Policy Implications

This study proposes a framework to assess economic performance in terms of customer attraction to the self organized mixed-use streets.

- Higher **sale** values predict high customer footfall, this can help in **prioritizing** the **infrastructure demands** (parking and pedestrian) for higher revenue generating areas.
- Introducing commercial activities which can be operated for **longer and flexible timings** should be encouraged.
- Survey results show these **streets are highly mixed** in terms of activity type and there is positive relation between customer footfall and **food, multipurpose stores**.
- Retail clustering-based indicators confirm the theoretical assumption of activities clustering together witness high number of visitors, also **informal activities increase overall footfall** to these stores.
- Road network connectivity is the **second most crucial factor** in our model, based on the high link-node ratio **increases more footfall** and should be promoted.



**Thank you
for your
attention!**