

Beyond Metropolitan Boundaries: A Firm Network-Based Assessment of Regional Rapid Transit Potential in India

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INTRODUCTION & AIM

Rapid transit corridors play a crucial role in improving regional integration, reducing travel costs, and supporting economic development through enhanced connectivity and investment attraction (Gain, 2023). While intra-urban rapid transit systems such as Metro Rail, BRT, and LRT have been extensively studied, research on regional-scale rapid transit systems connecting multiple urban regions remains limited, particularly in the Indian context (Kaushik, 2020). Simultaneously, increasing urbanization has led to the emergence of mega city regions and polycentric urban regions (PURs), characterized by functionally connected yet spatially distinct urban nodes linked through flows of people, information, and economic activities (Hall & Pain, 2006; Lambregts, 2006; Lambregts, 2009). Although such discussions are often centered on Tier I metropolitan regions in India, the emerging polycentric characteristics among Tier II cities remain underexplored.

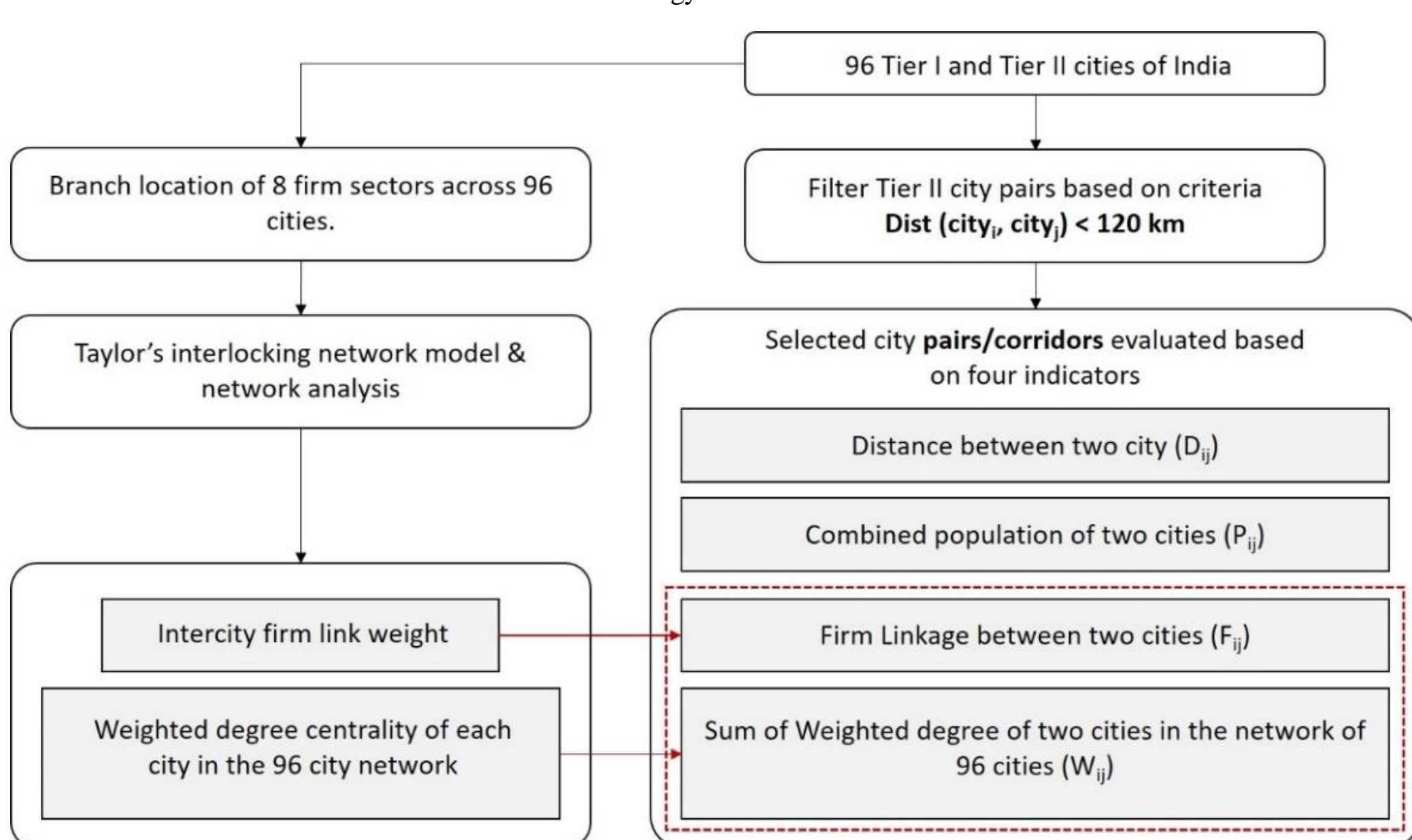
This study focuses on identifying potential PURs among Tier II cities in India and evaluating their feasibility for supporting Regional Rapid Transit Systems (RRTS). Using an Office Location Approach (OLA) derived from World City Network studies, the research examines intercity firm linkages and regional business connectivity as indicators of corridor-level economic potential (Taylor, 2001; Taylor, Catalano, & Walker, 2002; GaWC, 2024).

DATA & METHODOLOGY

Details of firms selected for the study.

S. No	Firms	Source	Numbers	Branches
1	Banks	RBI	220	59448
2	Insurance	IRDAI	67	9768
3	Accountancy	ICAI	4941	12343
4	Non-Banking Finance Companies (NBFC)	RBI, NHB	9266	13849
5	Management Consultancy	Online sources	100	906
6	Research and Development (In-house R&D units)	DSIR	1956	2625
7	Law	Online sources	132	583
8	Advertising	Online sources	59	162

Methodology flowchart.



$$RTEI_{ij} = aP_{ij} + bF_{ij} + cW_{ij} - dD_{ij}$$

Where,

$RTEI_{ij}$ = Rapid Transit Eligibility Index

P_{ij} = combined population of city pair

F_{ij} = Firm link between city i and j estimated using Taylor's interlocking model

W_{ij} = city pair's overall centrality in intercity firm network of 96 cities

D_{ij} = Intercity distance between two cities

a, b, c and d are weights such that a, b, c and $d > 0$

RESULTS & DISCUSSION

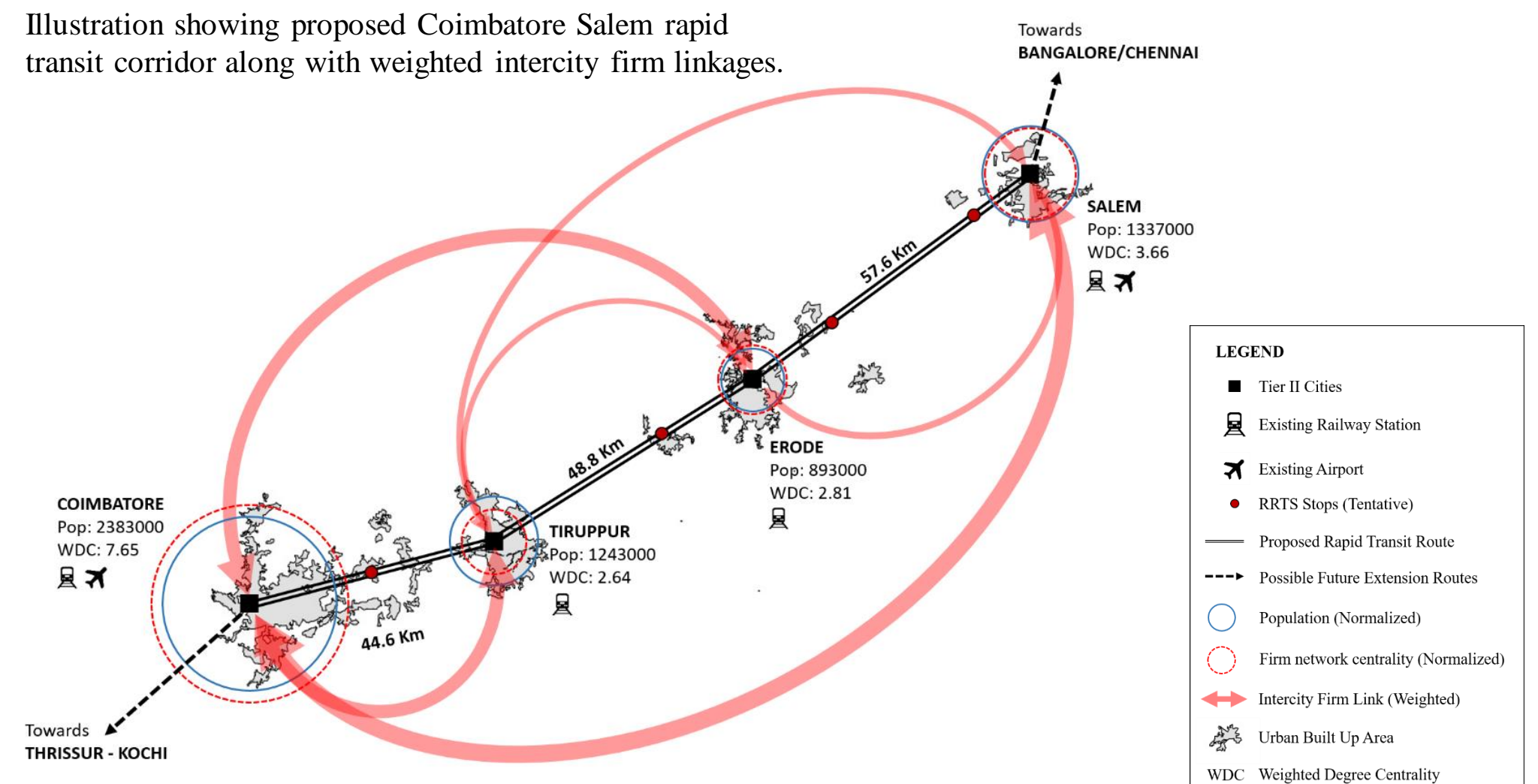
List of Indian city-pairs ranked based on RTEI scores.

Rank	City pair (i,j)	D_{ij}	P_{ij}	F_{ij}	W_{ij}	$RTEI_{ij}$
1	Lucknow-Kanpur	73.87	9382417	0.103	13.08	2.83
2	Indore-Ujjain	52.43	4059828	0.066	11.10	1.23
3	Ludhiana-Chandigarh	90.73	4682839	0.062	9.74	1.02
4	Tiruppur-Coimbatore	44.63	3625825	0.048	10.28	0.82
5	Kochi-Thrissur	65.06	6449345	0.032	7.50	0.67
6	Allahabad-Varanasi	115.95	6206732	0.033	7.99	0.48
7	Vijayawada-Guntur	29.92	2213166	0.043	8.72	0.43
8	Ludhiana-Jalandhar	52.9	3437869	0.034	7.24	0.26
9	Thiruvananthapuram-Kollam	57.9	6020681	0.018	5.24	0.20
10	DurgBhilai-Raipur	30.21	2871923	0.026	6.78	0.08
11	Kozikode-Kannur	80.66	6786000	0.015	3.78	0.05
12	Jamnagar-Rajkot	78.58	2261824	0.034	7.19	-0.04
13	Malappuram-Kozhikode	42.22	6123872	0.009	3.03	-0.06
14	Saharanpur-Dehradun	61.6	2494477	0.025	6.80	-0.12
15	Salem-Erode	57.64	2229758	0.025	6.46	-0.18
16	Agra-Firozabad	39.31	3665044	0.010	5.56	-0.22
17	Belgaum-HubliDharwad	87.55	2230819	0.024	6.41	-0.33
18	Erode-Tiruppur	48.84	2135595	0.020	5.45	-0.33
19	Bhubhaneshwar-Cuttack	23.06	1146434	0.020	5.57	-0.37
20	Kolhapur-Sangli	41.55	1581122	0.019	5.62	-0.39
21	Jalandhar-Amritsar	76.15	2496093	0.019	5.43	-0.41
22	Moradabad-Bareilly	82.8	3119825	0.014	5.11	-0.44
23	Ranchi-Jamshedpur	112.37	3776784	0.012	4.57	-0.54
24	Dhanbad-Bokaro	31.31	2882774	0.004	2.49	-0.66
25	Asansol-Dhanbad	57.13	3482181	0.003	2.40	-0.69
26	Durgapur-Asansol	36.43	2924741	0.003	2.28	-0.71
27	Ranchi-Bokaro	91.83	2682537	0.007	3.72	-0.79
28	Solapur-Gulbarga	104.15	1856665	0.009	4.25	-0.89
29	Thrissur-Malappuram	59.44	1371675	0.008	3.04	-0.91

List of transit corridors ranked based on RTEI scores.

Rank	Transit corridor	$\sum D_{ij}$	$\sum P_{ij}$	$\sum F_{ij}$	$\sum W_{ij}$	$RTEI_{ij}$
1	Coimbatore – Tiruppur – Erode – Salem	151.11	5856000	0.2301	16.75	0.36
2	Chandigarh – Ludhiana – Jalandhar – Amritsar	219.78	7179000	0.2124	15.17	0.29
3	Kochi – Thrissur – Malappuram – Kozhikode – Kannur	247.38	13236000	0.1638	11.96	0.21
4	Durgapur – Asansol – Dhanbad – Bokaro	124.87	5808000	0.0212	4.77	-1.01

Illustration showing proposed Coimbatore Salem rapid transit corridor along with weighted intercity firm linkages.



CONCLUSION

The study reveals the emergence of economically integrated Tier II urban clusters that remain largely absent from current regional transport priorities. By identifying hidden functional relationships between cities, the framework demonstrates the potential of firm-network analysis to support evidence-based infrastructure investment and balanced regional development beyond dominant metropolitan regions.

FUTURE WORK / REFERENCES

Bharule, S. (2024). Structure of A High-Speed Rail Corridor: Long-Term planning implications for sustainable regional development along High-Speed Rail Corridor. *Journal of the Eastern Asia Society for Transportation Studies*.

Taylor, P. J. (2001). Specification of the World City Network. *Geographical Analysis*.

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