ISSN (Online): 2582-7928

Indian Public Policy Review

A Journal of Economics, Politics, and Strategy

VOLUME 6 AUG 2025 ISSUE 3

ARTICLES

INDIAN PUBLIC POLICY REVIEW

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Indian Public Policy Review 2025, 6(3): 01-26
https://doi.org/10.55763/ippr.2025.06.03.001

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Tales of a few cities

Examining trends in growth of cities in India using novel high frequency data

Bibek Debroy[*] **Devi Prasad Misra**[#]

Abstract

This paper extends a previously developed model for analysing passenger movement using Indian Railways Unreserved Ticketing System (IR-UTS) data to examine urban growth in Mumbai, Chennai, Delhi, and Kolkata. The study analyses suburban travel patterns on the Indian Railways network as an indicator of spatial urban expansion. While suburban travel differs from migration, it effectively reveals urban growth patterns. The research integrates geospatial earth observation data with housing property prices to explore relationships between population dispersion and real estate values. Combining processed satellite imagery with Land Use Land Classification (LULC) data enables mapping of urban growth directions. Key findings show suburban travel rebounded post-COVID lockdowns but remains below pre-pandemic levels, potentially due to changed transport preferences or emerging counter-magnets. The analysis examines passenger arrival trends from top origin districts for each metropolitan city to understand urban growth patterns and LULC changes in suburban areas. The methodology demonstrates how high-frequency railway passenger data can effectively track urban spatial expansion when combined with geospatial and property market data. This integrated approach provides valuable insights into post-pandemic urban development patterns across India's major metropolitan centres, offering a novel framework for urban planning and policy analysis.

Keywords: Transportation Economics, Migration, Urban Economics

JEL Codes: J61; O15; R23; R30

Publication Date: 27 August 2025

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1. Introduction

Cities are engines of economic growth as they play a crucial role in concentrating human capital, innovation, infrastructure and institutions which eventually leads to a growth in productivity (Glaeser and Gottlieb 2009). By concentrating skilled workers together, cities facilitate innovation and entrepreneurship, leading to greater wage growth, which in turn attracts more human capital (Moretti 2012).

Higher concentration of markets and consumers also brings about economies of scale, and eventually leads to improvement in infrastructure (Ciccone and Hall 1996). This virtuous cycle helps cities emerge as hubs of growth by minimising transportation and logistics costs, maximising returns on investment, and by serving as focal points for trade and commerce (Krugman 1991). It is in this context that understanding the growth of cities is important not only for understanding the contours of economic growth today, but also for understanding the likely urban requirements of tomorrow.

We take forward our exploration of movement of passengers as a marker of migration, and view the dataset[1] from a different perspective to understand patterns in suburban travel and thereby trends in growth of cities.

As per Census, 2011, out of India's total population of 121.02 Crore, 37.7 Crore were in urban areas i.e. 31.6% of the total. Moreover, in the period 2001-2011, population in urban areas increased by over 9.1 Crore - a growth rate of 31.8% (Ministry of Housing and Urban Affairs 2024).

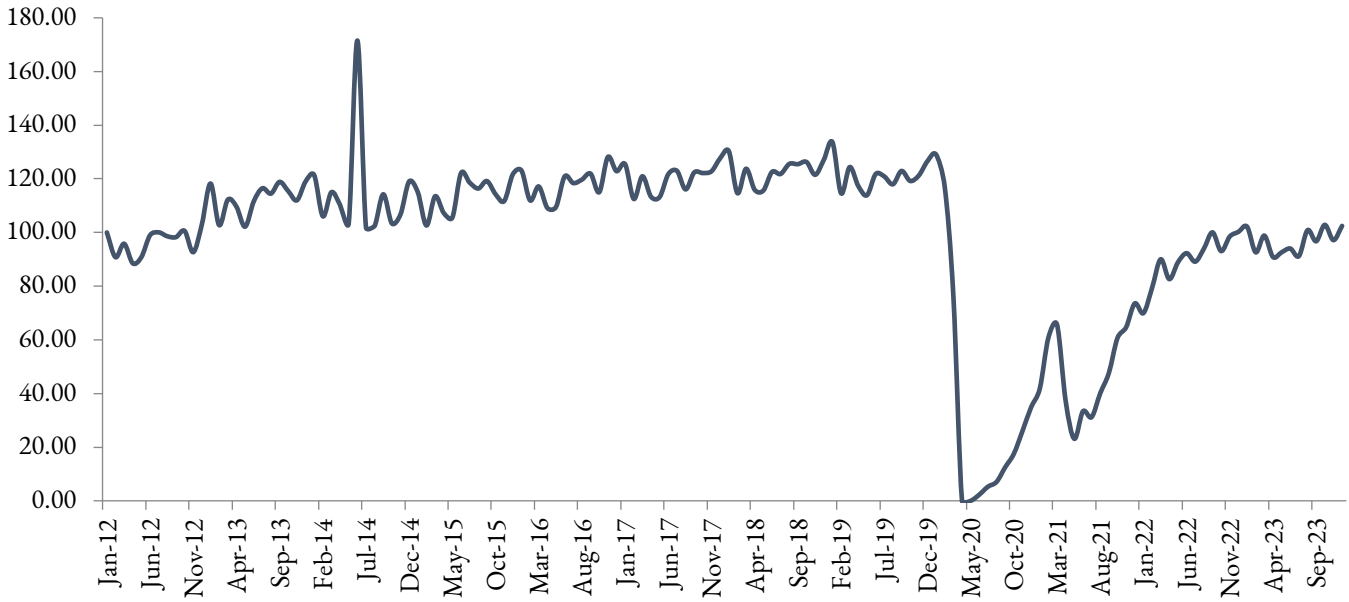
We use data from the Indian Railways Unreserved Ticket System (IR-UTS) for II Class passengers, typically the cheapest class of tickets on the IR network and is often favoured by blue collar workers. We geocode the origin/destination pairs to filter out non-suburban travel. Indian Railways defines suburban services as normally being **upto 150 Kms**. from the origin (Public Accounts Committee; Ministry of Railways 2016-17). In this paper we limit our examination to the movement of people within 150 kms from the respective city centres.

We take a look at the sources, the volume and the seasonality of movement for four cities – *Mumbai*, *Chennai*, *Kolkata* and *Delhi*. Further, using geospatial earth observation data we make an attempt to understand the spatial growth in the respective urban agglomerations.

2. Mumbai: Maximum City

We open our examination by taking a look at Mumbai. For the purposes of this section, Mumbai refers to the Mumbai City district[2]; the suburban districts (Mumbai Suburban, Thane, Palghar, Raigad) are excluded. The trends in suburban travel in Mumbai [as per Indian Railways UTS II Class tickets data] are as under. The figures are indexed, with Jan 2012 set at 100 (Figure 1).

Fig. 1: Trends in all Suburban Travel in Mumbai [Index 100 = Jan 2012, IR UTS II Class]



From the above we can see that suburban travel[3] showed a steady upward trend just prior to the pandemic related lockdowns. While sub-urban travel quickly rebounded post the lockdowns, however, we estimate that the levels have only reached the January 2012 level as by end-2023.

The caveat is that, in this period, Mumbai has also added a Metro railway network. It is possible that some passenger traffic might have shifted to the Mumbai Metro. Further, a spike in the number of travellers is noted for the month of June 2014. We are unable to explain the likely reasons for this – it appears to be a statistical anomaly.

2.1 Spatial Patterns in suburban travel

Suburban travellers into Mumbai originate from the following districts – Thane, Palghar, Raigad and Mumbai Suburban. Intra-Mumbai UTS II Class Traffic i.e. traffic originating within Mumbai was estimated to be about 65% of all UTS II Class suburban travel to Mumbai, in 2012. This percentage has since **reduced to about 58% in 2023**.

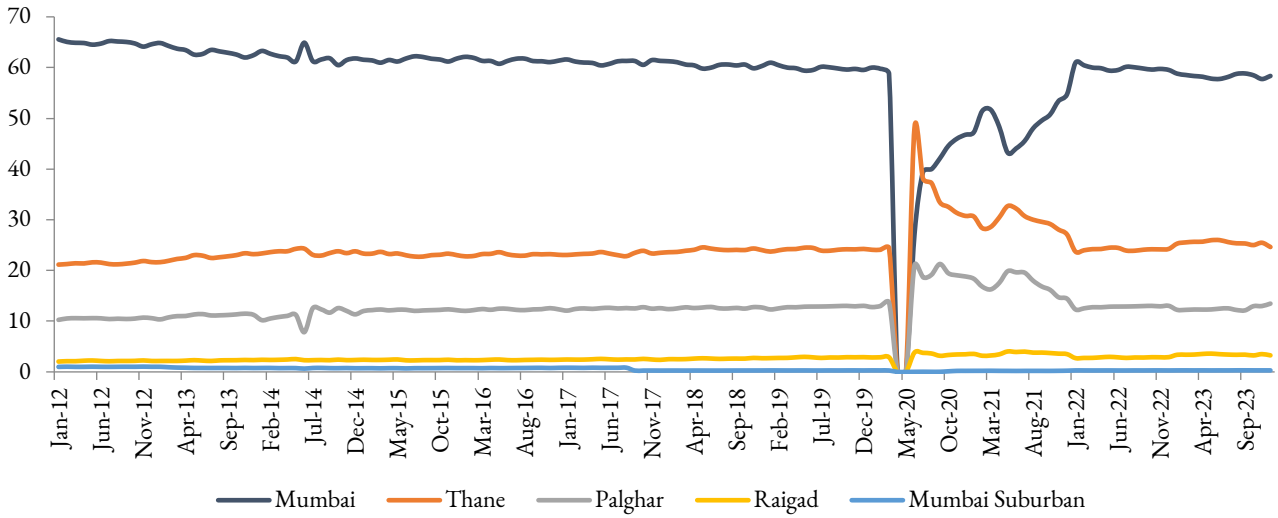
In terms of suburban travel from outside Mumbai City district, Thane continues to be the single largest originating district. In 2012, ~21% the total suburban travel destined for Mumbai originated in Thane. This number has since **increased to more than 25% in 2023**. This is an indicator of the suburban area spreading towards Thane district[4].

Palghar, Raigad and Mumbai Suburban districts make up the rest. As a percentage of total suburban travel, UTS II Class passengers originating in Palghar and destined to Mumbai, increased from ~10% in 2012 to about 13% in 2023. It may be noted that these figures are organised as per originating and destination districts. Therefore, the figures for places like Navi Mumbai (which is spread across Thane and Raigad districts[5]) would have originating passengers reflected in those districts respectively.

We visualise the month wise contribution of the districts neighbouring Mumbai city to the total suburban travel destined to Mumbai in Figure 2.

Fig. 2: Percentage composition of total suburban travellers destined to Mumbai

[2012-2023; IR UTS II Class]



Note: Apportioned as per present day district boundaries

Analysis of the data above is perhaps an indicator of the growth of the suburbs of Mumbai, especially Thane and Palghar. In order to get a better sense of this growth we make use of the Land Use Classification (LUC) Data maintained by the Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare (Directorate of Economics and Statistics n.d.).

In particular, we take a look at Land use Change under the heading, '*Area under Non-agricultural Uses*', which is defined as all land occupied by buildings, roads and railways or under water, e.g. rivers and canals, and other land put to uses other than agriculture[6]. This has been used as measure of urbanisation in a number of academic papers (Pandey and Seto 2015).

Between the years 2018-19 [first year when figures for bifurcated Thane district are available] and 2022-23, area under non-agricultural uses has grown from 59700 hectares in 2018-19 to 798300 hectares in 2022-23 a growth of over 31%! For context, in the same period the growth in area under non-agricultural uses for the entire state of Maharashtra has been about 4.48%.

For the above, it is apparent that there is growth in urbanisation in Thane district. However, at a granular level, which are the areas of most urbanisation growth and whether these areas contiguous to Mumbai urban agglomeration?

2.2 From infinity and beyond

We use Earth Observation data from *Bhuvan*, the Geo-sensing platform of the National Remote Sensing Centre (NRSC), Indian Space Research Organisation (ISRO)[7] to seek answer these questions. Night Light illumination has been found to a reliable indicator not just of urbanisation but also of population density and economic activity (Levin, Kyba and Zhang 2019).

While remote sensing and use of satellite earth observation data has been in use for some time now, however accessing high-quality satellite data, processing and analysing the images, correcting for radiometric and atmospheric effects, and extracting usable data from the images typically requires specialised skill. However, this process has been considerably smoothened by handy tools placed in public domain by the National Remote Sensing Centre (NRSC)[8] of the Indian Space Research Organisation (ISRO). For the following analysis, we use ISRO NRSC's *Bhuvan* suite of tools[9].

The Night Lights data put out by NSRC is from the Visible Infrared Imaging Radiometer Suite (VIIRS) night-time sensor (Day/Night Band) - VIIRS/DNB. The VIIRS/DNB sensor is on the Suomi National Polar-orbiting Partnership (NPP) and NOAA-20 satellites (ISRO; Dept. of Space 2022). It collects images in a 3,000 km swath at a resolution of 742 m and hosts a unique panchromatic Day/Night band (DNB), which is ultra-sensitive in low-light conditions, that allows it to observe night-time lights (NTL) with enhanced spatial and temporal resolutions[10].

ISRO's *BHUVAN* uses the *Black Marble* NTL product, derived from VIIRS/DNB at 15 arc-second spatial resolution and is available in Daily, Monthly and Annual Composite periodicities from January 2012 onwards. The imagery is processed through a chain of algorithms including Lunar *Bidirectional Reflectance Distribution Function* (BRDF), terrain and atmospheric corrections like *Atmospheric airglow contamination*, correction for stray lights, *Aurora removal*, correcting for *Aerosol Optical Depth* (AOD) effects, Cloud contamination etc. Subsequently, the datasets are processed for Geo-Tagging and extraction of administrative boundaries and calculation of statistics (ISRO; Dept. of Space 2022).

The night light radiance expressed in *nanowatts per square centimetre per steradian* ($nW/cm^2/sr$) – broadly indicating the amount of light energy detected over a specific area and angle for the district of Thane for the years 2012 and 2023 were taken from the ISRO *Bhuvan Night Time Light over India from Space* service[11] (Figure 3A/3B).

Fig. 3A: Night Light Radiance; Thane District, 2012

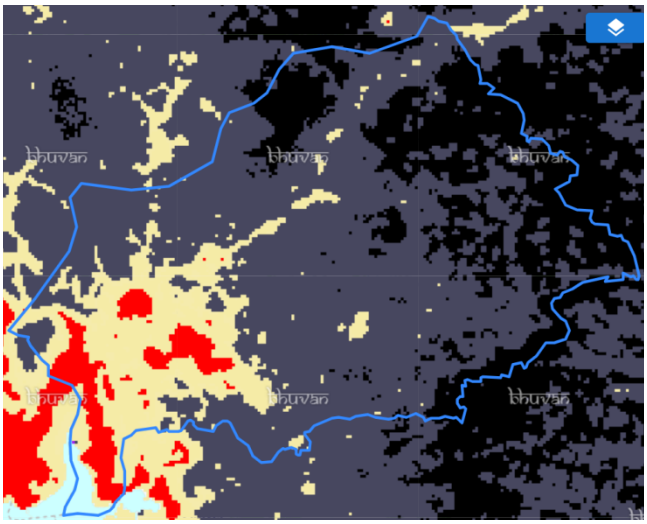
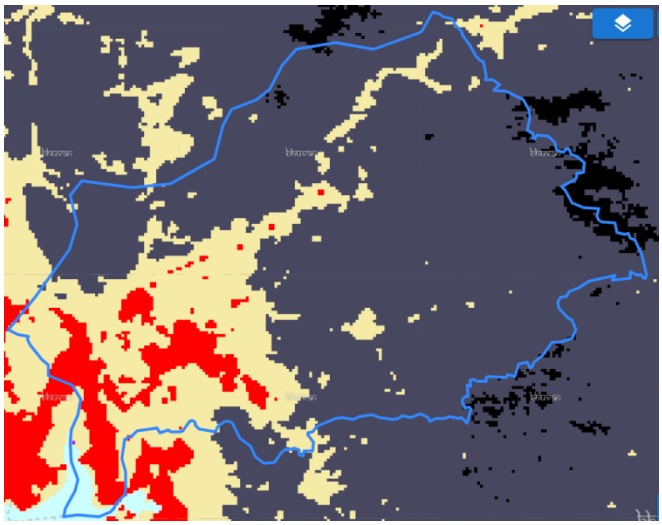


Fig. 3B: Night Light Radiance; Thane District, 2023



The colours in the above images correspond to the following Radiance scales (Table 1):

Table 1: Night Time Lights (NTL) Radiance *nanowatts per square centimetre per steradian* ($nW/cm^2/sr$)

Sl. No.	Colour	Range ($nW/cm^2/sr$)	Interpretation
1		< 5	**Very Low Radiance Band**: Indicates areas with minimal artificial lighting, often corresponding to rural/undeveloped areas, natural landscapes, forested/sparsely populated regions.
2		5 - 25	**Low Radiance Band**: Typically indicates small villages, rural settlements, sparsely populated suburban zones, or industrial areas with minimal night-time lighting.
3		26 - 200	**Moderate Radiance Band**: Typically represents semi-urban or peri-urban areas. This band might capture small towns, medium-sized cities, and industrial zones.
4		> 200	**High Radiance Band**: Usually corresponds to major urban areas, commercial districts, and densely populated areas with substantial artificial lighting - such as the central business districts etc.
5		No Data	-

Comparing Figure 3A/3B the following points emerge:

i. the *Red* Band [High Radiance Band > 200] has steadily grown between 2012 [Fig. 3A] and 2023 [Fig. 3B] this is an indicator of **growth of the urban area** as well as increasing human presence;

ii. this growth is towards the **proximity of the Mumbai Suburban area**;

iii. the *Brown* Band [Moderate Radian Band 26 - 200] has also grown which reflects the **growth in peri-urban areas**;

iv. the urban growth appears to be **along a transport corridor** going towards the North East of Thane District

While the above gives us a general idea of the trends, a more granular picture emerges when we quantify the radiance bands. We note that as of 2023, the **moderate radiance band** [*Brown*] has **increased to cover 9.87% of the area** of the district [a *45% increase* from 6.8% in 2012] and the **high radiance band** [*Red*] has **increased to cover 2.94% of the area** of the district [a *33% increase* from 2.2% in 2012].

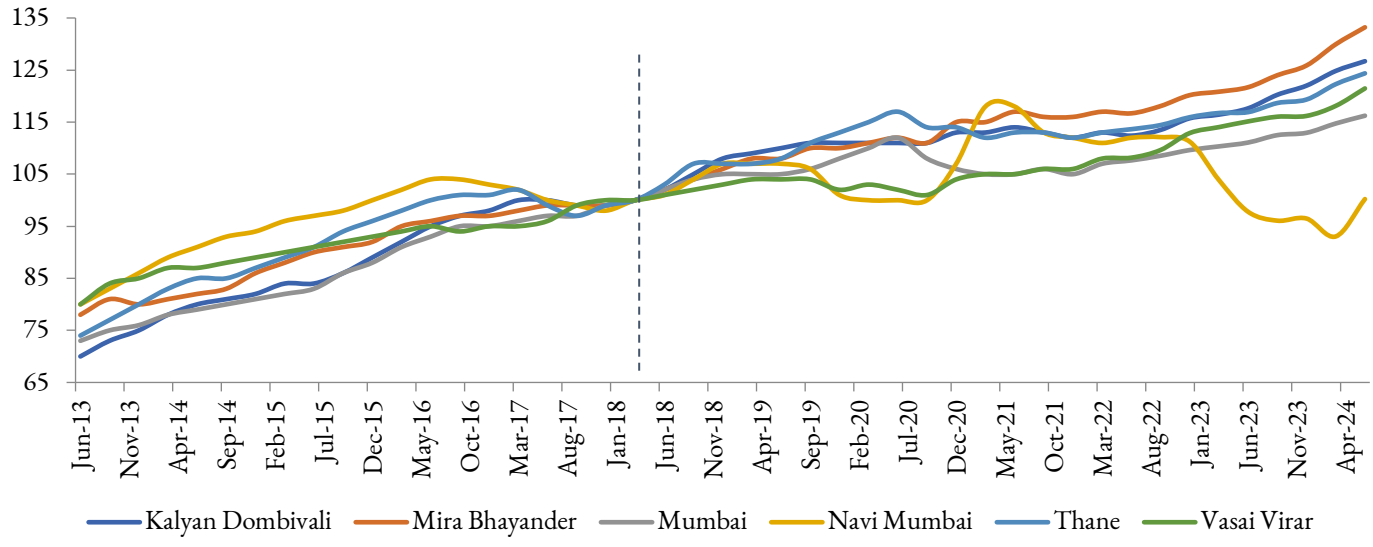
This increase in urbanisation and in population density has implications for urban governance, infrastructure planning and provision of public services etc., since enhanced population pressure on urban area has typically been linked to an increase in demand for housing (Mulder 2006).

To explore this effect, we use the National Housing Bank (NHB) Residex Housing Price Indices (HPI). The HPI covers 50 cities in India and represents price changes in residential housing properties[12]. Under HPI, the three indices viz., *HPI@Registered Prices*, *HPI@Assessment Prices* and *HPI@Market Prices* for Under Construction Properties together provide a sense of the movement in prevailing prices at the sub-city level at quarterly intervals, starting from June 2013, with year 2017-18 taken as 100 in the index.

The HPI uses data from diverse sources such as registration data collected from Sub Registrar Offices (SROs) of States/UTs; valuation data collected from Primary Lending Institutions and primary and secondary data collected through market surveys, especially for prices for Under Construction Properties.

The *Composite Housing Price Indices* are computed using population weights on city-wise indices to give a true representation of housing prices in the country. We use the NHB Residex City-wise Housing Price index to track movement in housing prices of Mumbai and some of its suburbs (Fig. 4).

Fig. 4: NHB Residex City-wise Housing Price index [Mumbai Suburbs; Jun-13 to June-24]



From the above, we can note that the prices in Mira-Bhayander, Kalyan-Dombivali, Thane and Vasai-Virar have shown a higher rate of growth as compared to the property prices in the city of Mumbai and that property prices in Navi Mumbai have dipped.

Mira-Bhayander and Kalyan-Dombivali are both parts of *Thane* district; whereas Vasai-Virar is part of the *Palghar* district. Therefore, the growth in demand for residential property in the district of Thane appears to reflect the growth of suburbanisation towards Thane.

There are multiple ways to look at the number of people living/working in a city - absolute population, population density and population living in the commuter zone of a city. However, sans the geographical context, the absolute numbers have limited meaning. For example, including the Sanjay Gandhi National Park in the area of Mumbai would drastically change the population density statistics. To visualise this more effectively, one can use gridded population maps.

Gridded population maps break up the map into a grid at 1 km^2 grids and overlay population density data over a basemap (Nolan 2024). The data is taken from the Global Human Settlement Layer (GHSL) and is based on the last Census (Copernicus 2015).

We look at the spatial extent of population in two ways – population at 1 km^2 grid level (Figure 5A) and relative population weighted densities of people living at a defined distances from the city centre (Figure 5B).

In Figure 5A, the grid squares are colour coded to indicate population density in the respective grid - squares with deeper shades of yellow show higher population density. Similarly, in Figure 5B, the coloured rings show the density of population as we go away from the city centre - here too the yellow rings reflect higher population density.

Fig. 5A: Population per 1 km^2 in Mumbai; Census 2011 Data

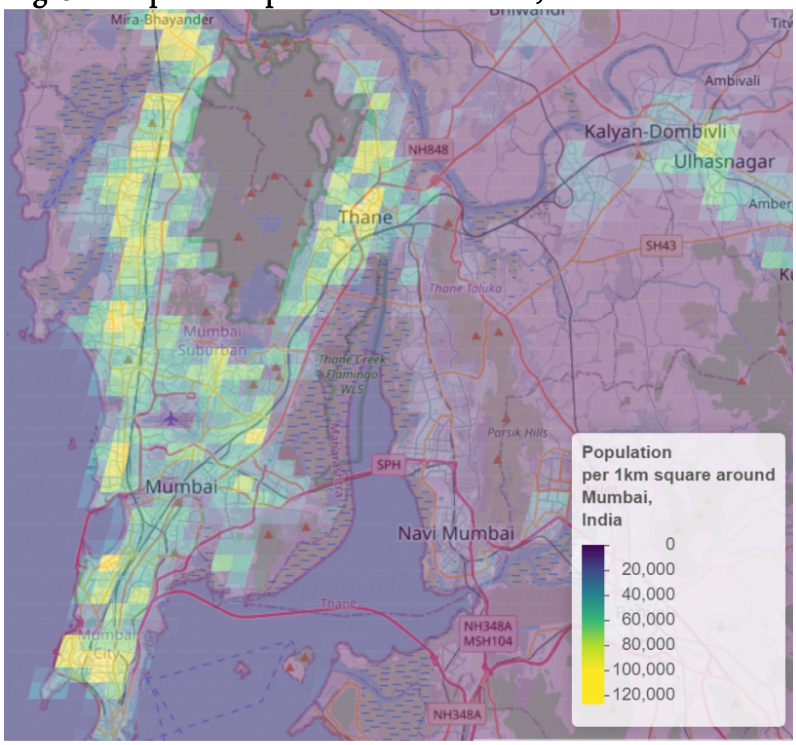
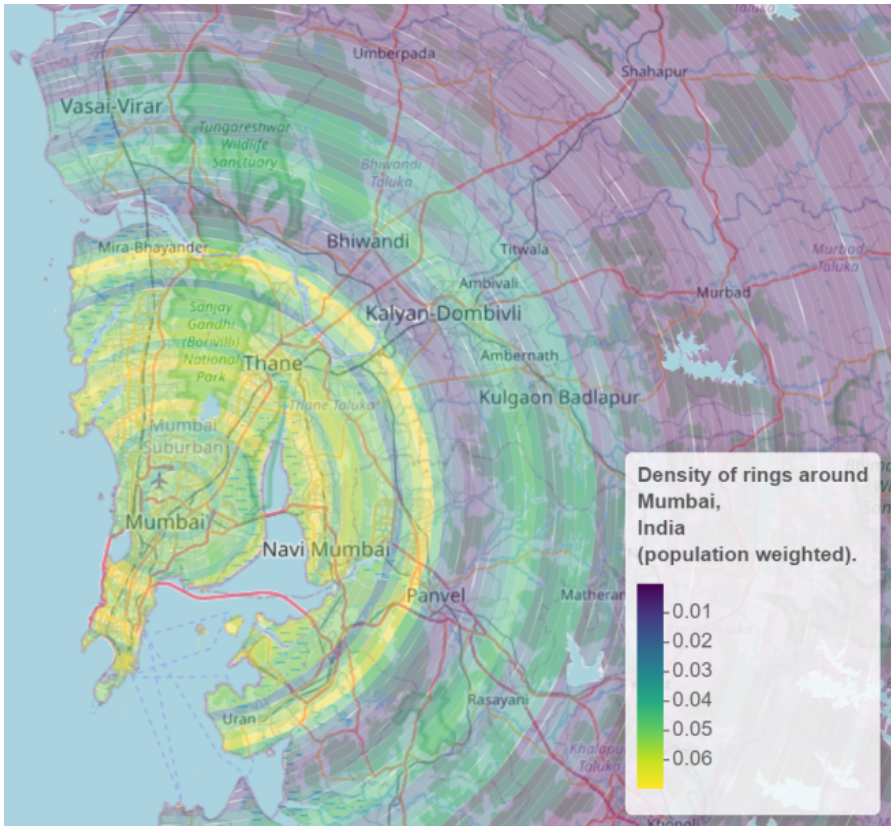


Fig. 5B: Population weighted densities at defined distances from the city centre

[Relative Measures; Population based on Census 2011 Data]

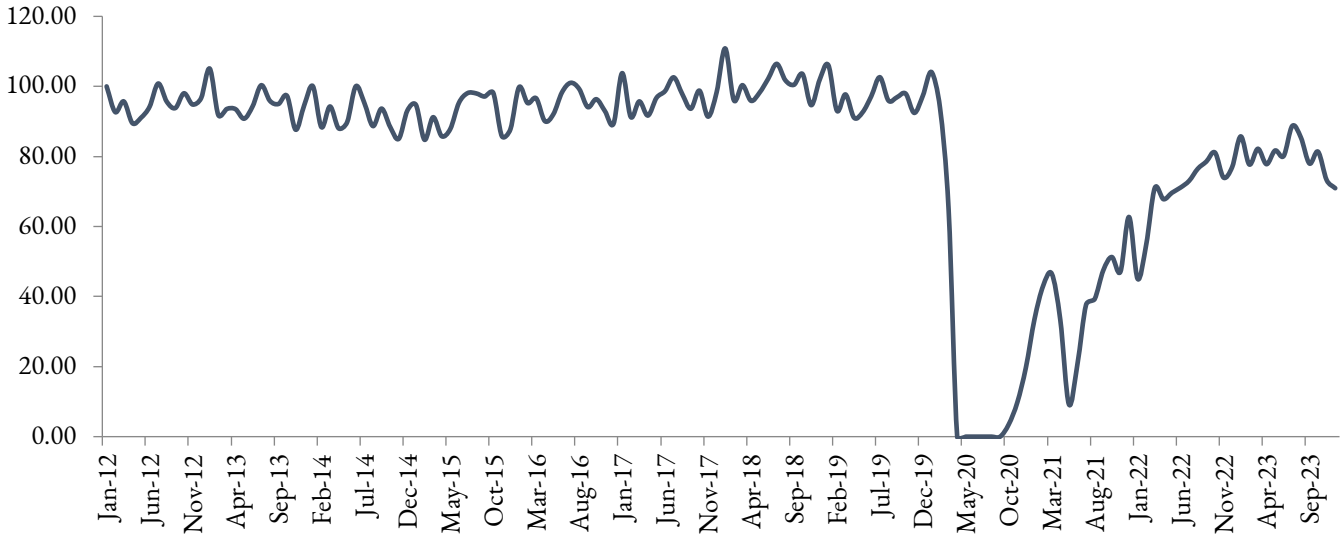


3. Chennai Express: Suburban Growth of the city of culture and tradition

From Mumbai to shift our focus southwards to the city of Chennai – a bustling metropolis with a population of 46,46,732 (Directorate of Census Operations 2011). For the purposes of this section, Chennai is taken as meaning Chennai district [as defined in the District Census Handbook]. Further, given the discussion in the previous section, in the subsequent sections the discussion on the theory will be kept to a minimum.

The trends in the suburban travel in Chennai [as per Indian Railways UTS II Class ticketing data] are as under. The figures are indexed with Jan 2012 set at 100 (Figure 6).

Fig. 6: Trends in all Suburban Travel in Chennai [Index 100 = Jan 2012, IR UTS II Class]



From the above we can see that suburban travel [defined as travel upto 150 kms from Chennai (Public Accounts Committee; Ministry of Railways 2016-17)] first dipped from Jan 2012 levels till about mid-2016, after which an upward movement is seen. Post the pandemic, while sub-urban travel did bounce back, it is estimated that the pre-pandemic levels have not yet been reached as of end-2023.

3.1 Patterns in suburban travel

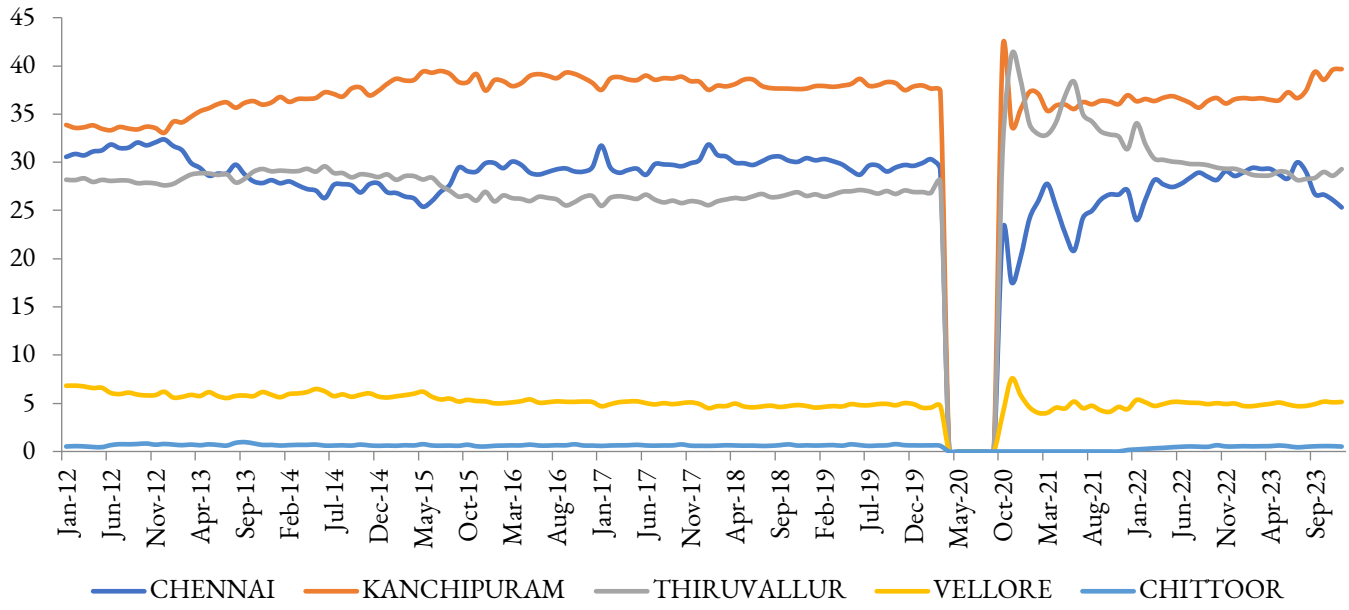
Suburban travellers into Chennai originate from Kanchipuram, Thiruvallur, Vellore, and Chittoor districts. Intra-Chennai UTS II Class Traffic i.e. traffic originating within Chennai was estimated to be about 30.56% of all UTS II Class suburban travel destined to Chennai, in 2012. This percentage has since **reduced to about 25.31% in 2023**.

For suburban travel from outside Chennai district, **Kanchipuram** continues to be the single largest originating district. In 2012, ~34% the total suburban travel destined for Chennai originated in Kanchipuram. This number **increased to more than 39% in 2023**. This is an indicator of the suburban area spreading towards Kanchipuram district.

We visualise the month-wise contribution of the districts neighbouring Chennai to the total suburban travel destined to Chennai in Figure 7.

Fig. 7: Percentage composition of total suburban travellers destined to Chennai

[2012-2023; IR UTS II Class]



We look at the spatial extent of population at 1 km^2 grid level (Figure 8A) and relative population weighted densities of people living at a defined distances from the city centre (Nolan 2024) (Figure 8B).

Fig. 8A: Population per 1 km^2 in Chennai; Census 2011 Data

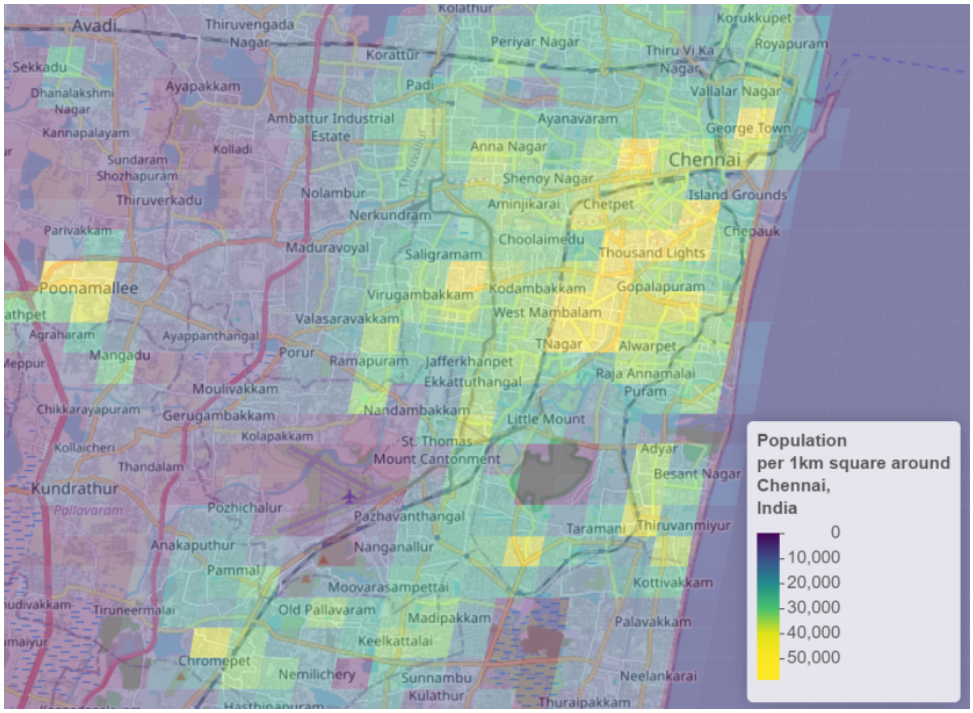


Fig. 8B: Population weighted densities at defined distances from the city centre

[Chennai, Relative Measures; Population based on Census 2011 Data]

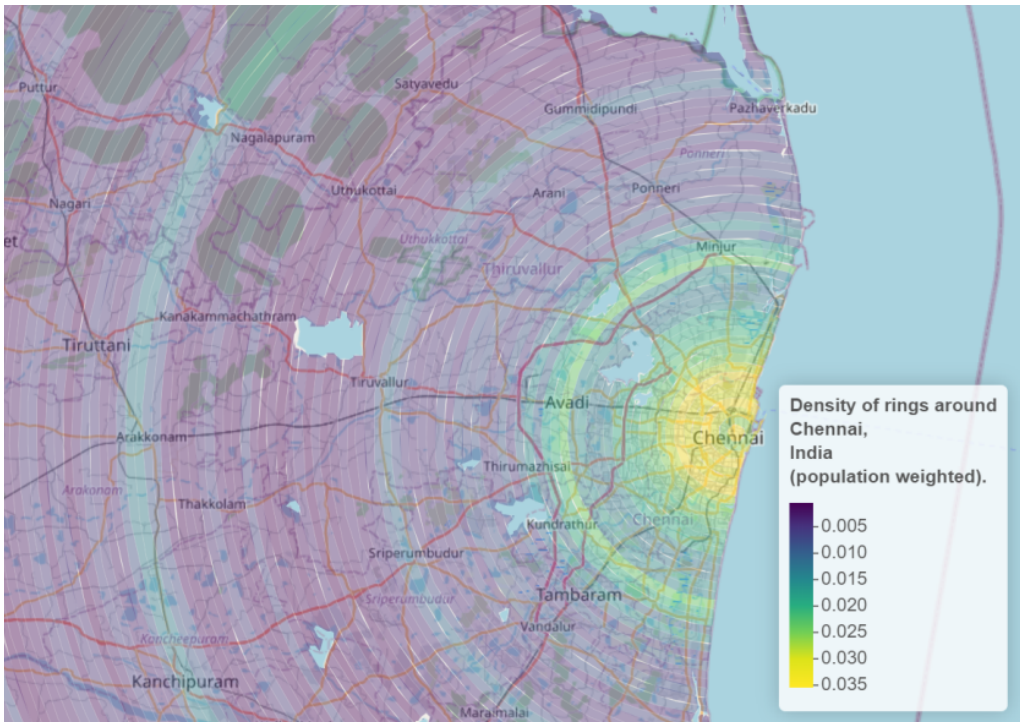


Figure 9 presents the data for night light radiance for the district of Kanchipuram for the years 2012 and 2023 [taken from the ISRO *Bhuvan Night Time Light over India from Space* service] (Figure 9A/9B). The area on the top right of the images, beyond the blue border, corresponds to Chennai District.

Fig. 9A: Night Light Radiance; Kanchipuram District, 2012

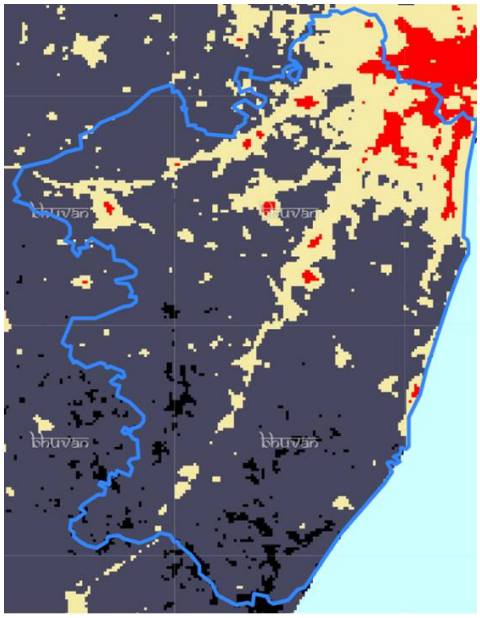
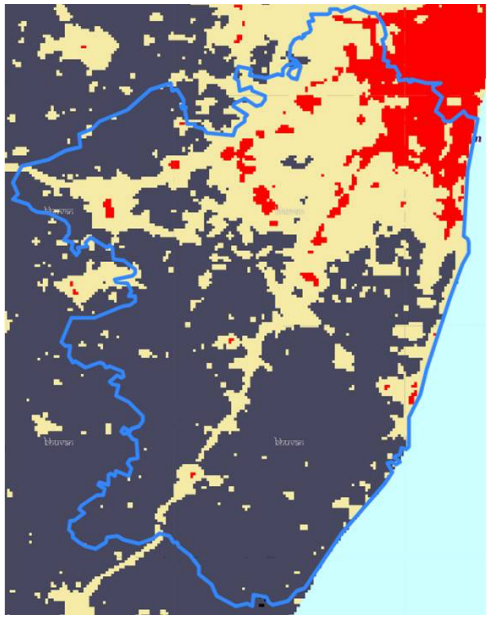


Fig. 9A: Night Light Radiance; Kanchipuram District, 2023



From the above the following points emerge:

i. the *Red* Band [High Radiance Band > 200] has steadily grown between 2012 [Fig. 8A] and 2023 [Fig. 8B]; this is an indicator of **growth of the urban area** as well as increasing human presence;

ii. this growth is greater in **proximity of the Chennai Suburban area**;

iii. the *Brown* Band [Moderate Radian Band 26 - 200] has also grown, which reflects the **growth in peri-urban areas**;

iv. the urban growth appears to be **along a transport corridor** going towards the south-west of Chennai District;

v. The high radiance band [*Red*] corresponding to **densely-populated urban/commercial areas** for **Chennai district** seems to have **increased significantly**.

The change for Kanchipuram District is tabulated here under (Table 2). It may be seen that, although on a small base, the greatest growth has come in the High Radiance Band indicating growth in densely populated urban areas.

Table 2: Quantifying Night Time Lights (NTL) Radiance for Kanchipuram District

[% change from 2012 to 2023]

Sl. No.	Colour	Range ($nW/cm^2/sr$)	Interpretation	% Change [2023 from 2012]
1		< 5	**Very Low Radiance Band**: Indicates areas with minimal artificial lighting, often corresponding to rural/undeveloped areas, natural landscapes, forested/sparsely populated regions.	-3.82
2		5 - 25	**Low Radiance Band**: Typically indicates small villages, rural settlements, sparsely populated suburban zones, or industrial areas with minimal night-time lighting.	-17.82
3		26 - 200	**Moderate Radiance Band**: Typically represents semi-urban or peri-urban areas. This band might capture small towns, medium-sized cities, and industrial zones.	54.89
4		> 200	**High Radiance Band**: Usually corresponds to major urban areas, commercial districts, and densely populated areas with substantial artificial lighting - such as the central business districts etc.	159.28

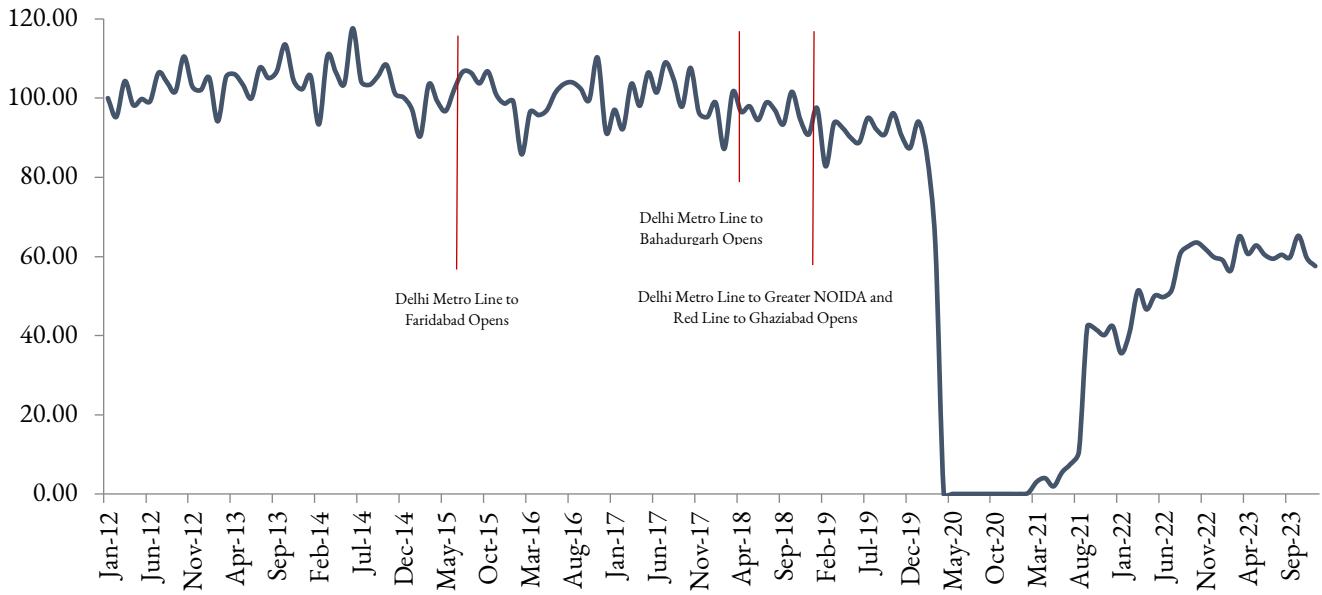
4. Delhi: The City of Djinns

We now move northwards for a quick look at the capital city of Delhi. After Mumbai, Delhi is India's second most populous city with a population of 1,10,34,555 as per Census 2011 (Directorate of Census Operations 2011). For the purposes of this section, Delhi is taken as meaning the eleven districts of Delhi [as defined in the *District Census Handbook*]. Further, as in the previous section, the discussion on the theory is kept to a minimum in this section.

It bears noting that with Delhi's extensive Metro network, there is a likelihood of shift of passenger traffic to the Metro lines, especially those connecting to suburban areas such as Gurgaon, Faridabad and NOIDA. With that caveat, the trends in the suburban travel to Delhi [as per Indian Railways UTS II Class ticketing data] are as under. The figures are indexed with Jan 2012 set at 100 (Figure 10).

Fig. 10: Trends in all Suburban Travel in Delhi

[2012-23; Index 100 = Jan 2012, IR UTS II Class]

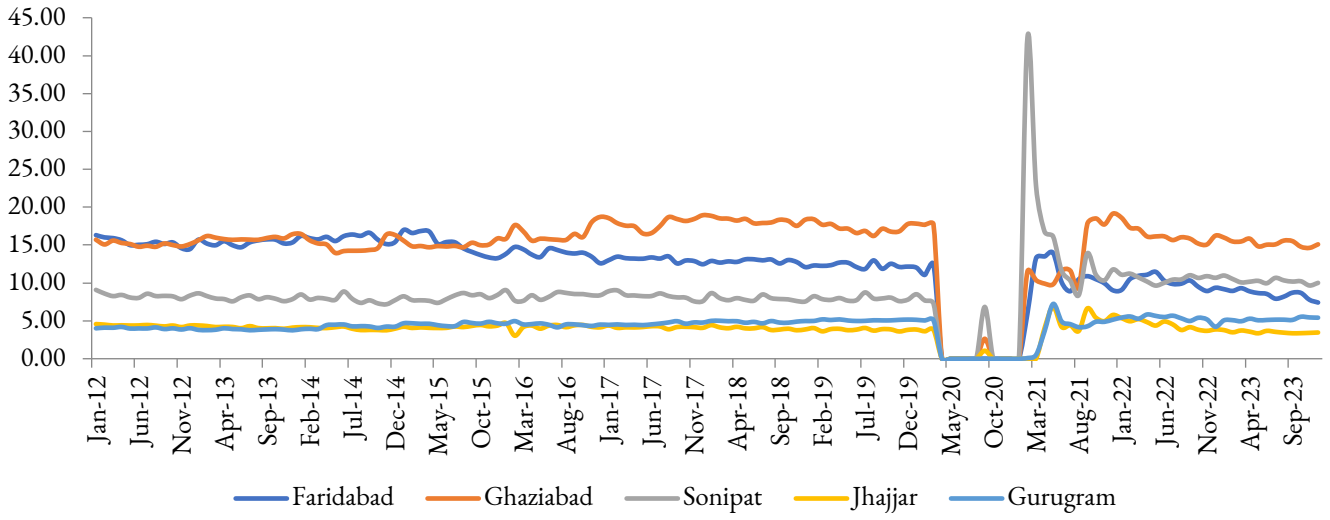


From the above it is evident that suburban travel into Delhi was on a slightly declining trend prior to the pandemic. Post the pandemic, while there has been an uptick, it is still far from the pre-pandemic levels. The opening of selected Delhi Metro connections to suburban areas is indicated in Fig. 10. Prima facie, it appears that Delhi Metro does have an impact on the use of suburban travel on the Indian Railway network. This could be on account of wider reach, better interoperability and commuter convenience.

We now visualise the month wise contribution of the districts neighbouring Delhi to the total suburban travel destined to Delhi in Figure 11.

Fig. 11: Percentage composition of total suburban travellers destined to Delhi

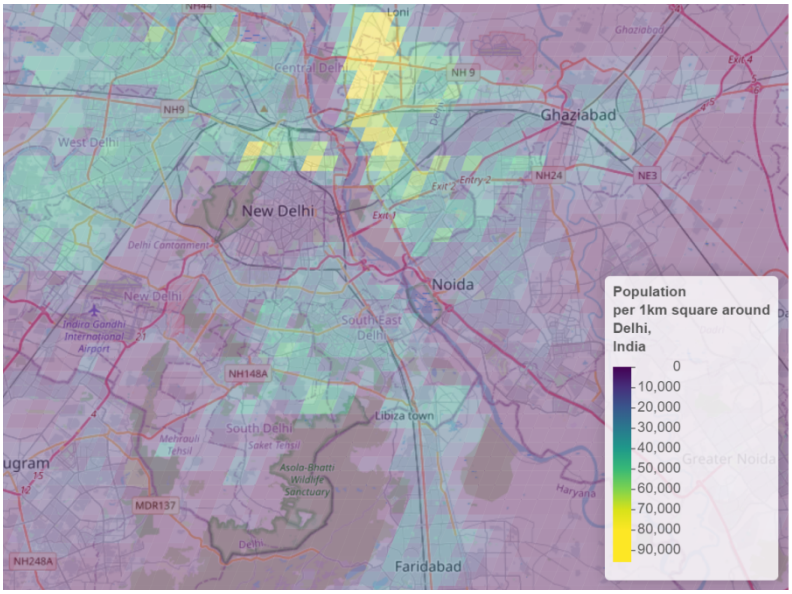
[2012-2023; IR UTS II Class]



From the above, it appears that travel from Ghaziabad district has been steadily rising, despite enhanced availability of Delhi Metro rail connectivity in Ghaziabad. Exploring Delhi Metro ridership data is likely to provide interesting insights into this.

We now look at the spatial extent of population at 1 km^2 grid level (Figure 12A) and relative population weighted densities of people living at a defined distances from the city centre (Nolan 2024) (Figure 12B).

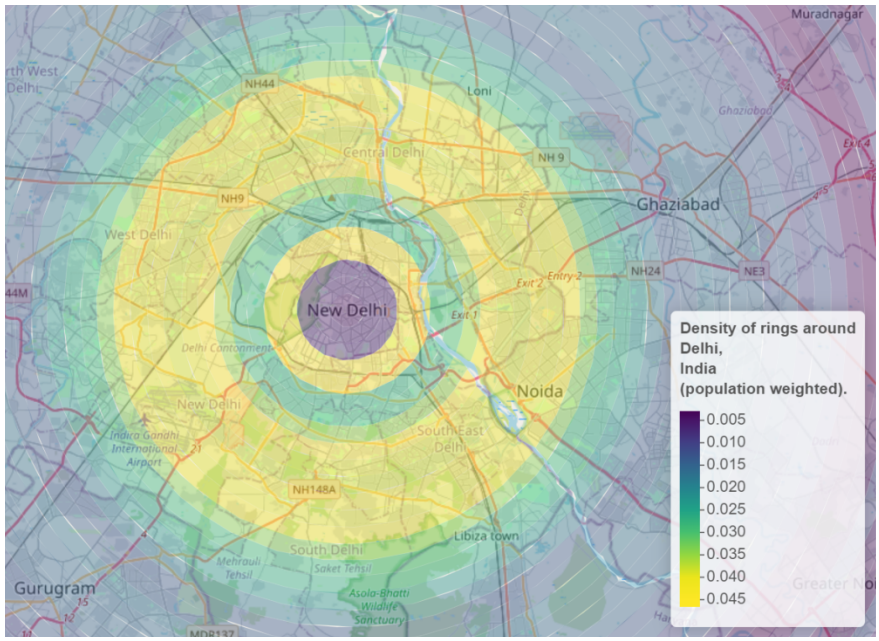
Fig. 12A: Population per 1 km^2 in Delhi; Census 2011 Data



From the above we can see a high concentration of population to the east and North East of Delhi, especially the around the *Loni* area in Ghaziabad city. Amongst the suburbs, NOIDA and Gurugram appear to be less densely populated.

Fig. 12B: Population weighted densities at defined distances from the city centre

[Delhi, Relative Measures; Population based on Census 2011 Data]



We now view the night light radiance for the district of Ghaziabad for the years 2012 and 2023 [taken from the ISRO *Bhuvan Night Time Light over India from Space* service] (Figure 13A/13B).

Fig. 13A: Night Light Radiance; Ghaziabad District, 2012

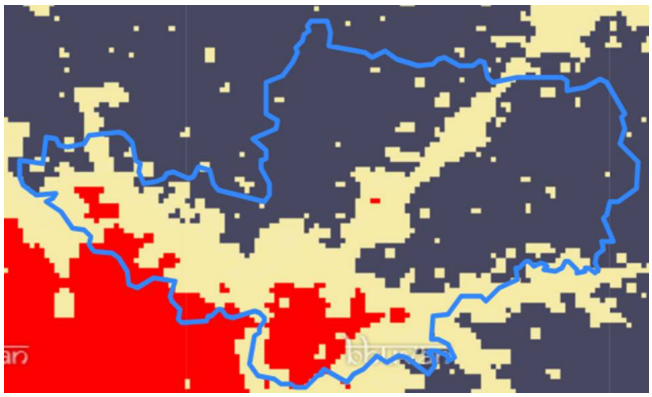
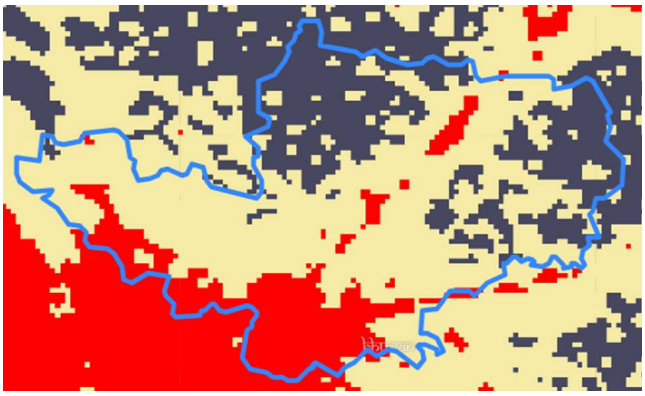


Fig. 13B: Night Light Radiance; Ghaziabad District, 2023



From the above images indicate the following:

i. the *Red* Band [High Radiance Band > 200] has grown significantly between 2012 [Fig. 8A] and 2023 [Fig. 12B] especially along transportation lines. This is an indicator of **growth of the urban area** as well as increasing population densities;

ii. this growth is practically contiguous to **Delhi**;

iii. the *Brown* Band [Moderate Radian Band 26 - 200] has also grown significantly which reflects the **growth in peri-urban areas**;

iv. the urban growth appears to be **along a transport corridor** going towards the north-east of the district;

The change for Ghaziabad District is tabulated here under (Table 3). It may be seen that, although on a small base, the greatest growth has come in the High Radiance Band indicating growth in densely populated urban areas.

Table 3: Quantifying Night Time Lights (NTL) Radiance for Ghaziabad District

[% change from 2012 to 2023]

Sl. No.	Colour	Range ($nW/cm^2/sr$)	Interpretation	% Change [2023 from 2012]
1		< 5	**Very Low Radiance Band**: Indicates areas with minimal artificial lighting, often corresponding to rural/undeveloped areas, natural landscapes, forested/sparsely populated regions.	~ 0
2		5 - 25	**Low Radiance Band**: Typically indicates small villages, rural settlements, sparsely populated suburban zones, or industrial areas with minimal night-time lighting.	- 52.28
3		26 - 200	**Moderate Radiance Band**: Typically represents semi-urban or peri-urban areas. This band might capture small towns, medium-sized cities, and industrial zones.	61.58
4		> 200	**High Radiance Band**: Usually corresponds to major urban areas, commercial districts, and densely populated areas with substantial artificial lighting - such as the central business districts etc.	74.95

We also take a quick look at the Land Use Classification (LUC) Data maintained by the Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare (Directorate of Economics and Statistics n.d.) for the district of Ghaziabad. In particular, the change in land use under the heading, '*Area under Non-agricultural Uses*'[13] has been used as measure of urbanisation in a number of academic papers (Pandey and Seto 2015).

Between the years 2012-13 and 2022-23, area under non-agricultural uses has grown from 27,478 hectares in 2012-13 to 32,627 hectares in 2022-23, a growth of over 18.73%. For context, in the same period the growth in area under non-agricultural uses for the entire state of Uttar Pradesh has been about 5.8%.

5. Kolkata: The city of joy

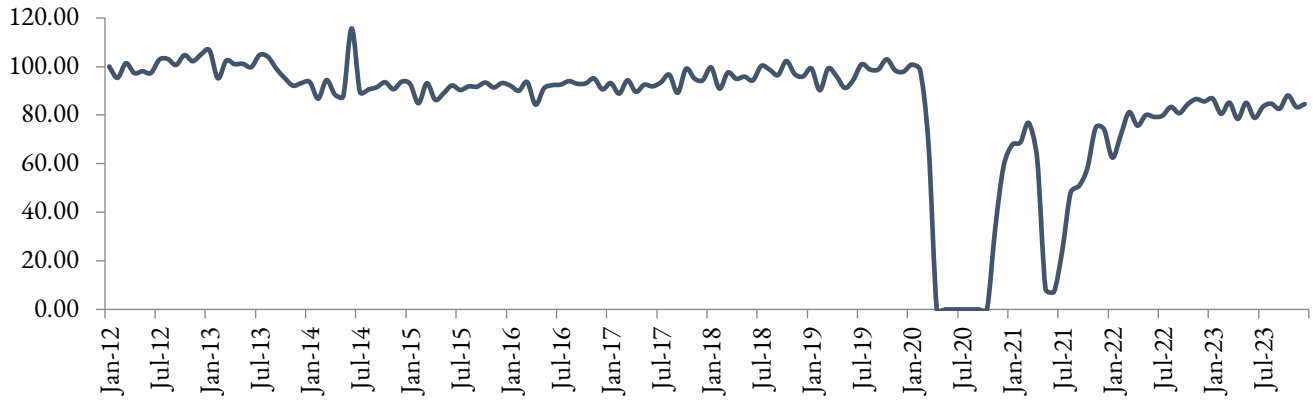
We now move northwards for a quick look at the city of Kolkata, the largest city in India's east, with a population of 44,96,694 as per Census 2011 (Directorate of Census Operations 2011). For the purposes of this section we treat the districts of Howrah and Kolkata as a conurbation (Dey 2021), and the analysis in the following section considers arrivals in Kolkata and Howrah together. The

population of Howrah district as per Census 2011 stood at 48,50,029 (Directorate of Census Operations 2011).

The trends in suburban travel to Kolkata/Howrah [as per Indian Railways UTS II Class ticketing data] are as under. The figures are indexed with Jan 2012 set at 100 (Figure 12).

Fig. 14: Trends in all Suburban Travel in Kolkata/Howrah

[2012-23; Index 100 = Jan 2012, IR UTS II Class]

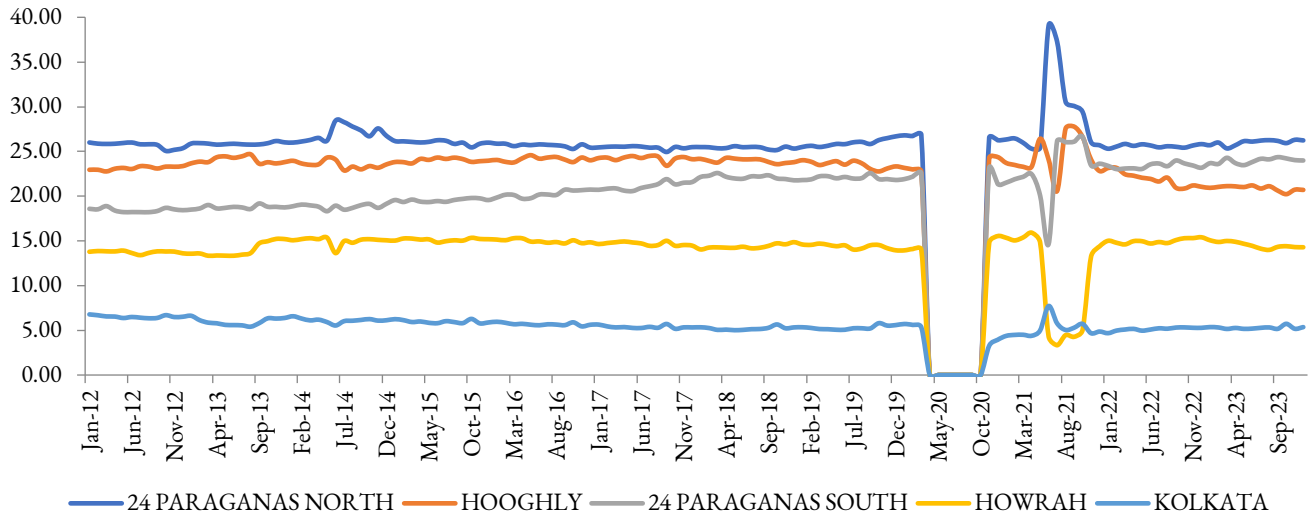


From the above, we can see that from 2015-16 to 2019-20 there is a slight increase in suburban travel to Kolkata. However, after the sharp decrease during the pandemic, the level of suburban travel continues to be about 17-20% lesser than just prior to the pandemic.

We now visualise the arrival of suburban passengers into Kolkata/Howrah from the neighbouring districts. For ease of reference, we take the top five origin districts which together represent about 90% of suburban arrivals in the Kolkata/Howrah conurbation (Figure 15).

Fig. 15: Percentage composition of total suburban travellers destined to Kolkata

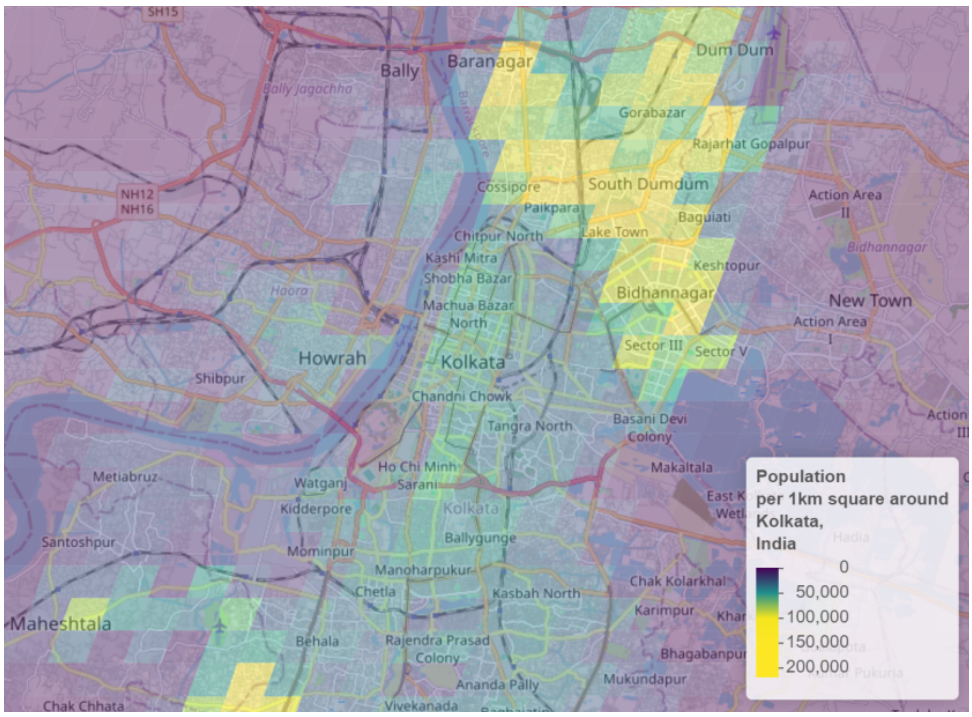
[2012-2023; IR UTS II Class]



From the above we may see that passenger arrivals from *24 Paraganas North* and *24 Paraganas South* districts shows an increasing trend; whereas passenger arrivals from *Hooghly* district appears to be slightly decreasing over time and arrivals from Howrah and Kolkata appear flat.

We now look at the spatial extent of population at 1 km^2 grid level (Figure 16A) and relative population weighted densities of people living at a defined distances from the city centre (Nolan 2024) (Figure 16B).

Fig. 16A: Population per 1 km^2 in Kolkata; Census 2011



From the above, we can see areas of high concentration of populations in the areas north east and east of the Kolkata/Howrah conurbation. These are the districts of 24 Paraganas North and 24 Paraganas South.

Looking that the night light radiance for the district of North 24 Paraganas for the years 2012 and 2023 [taken from the ISRO *Bhuvan Night Time Light over India from Space* service] (Figure 17A/17B), we see that there has been some increase in the High Radiance [*Red*] and Moderate Radiance [*Brown*] bands [Table 4].

Fig. 16B: Population weighted densities at defined distances from the city centre

[Kolkata, Relative Measures; Population based on Census 2011 Data]

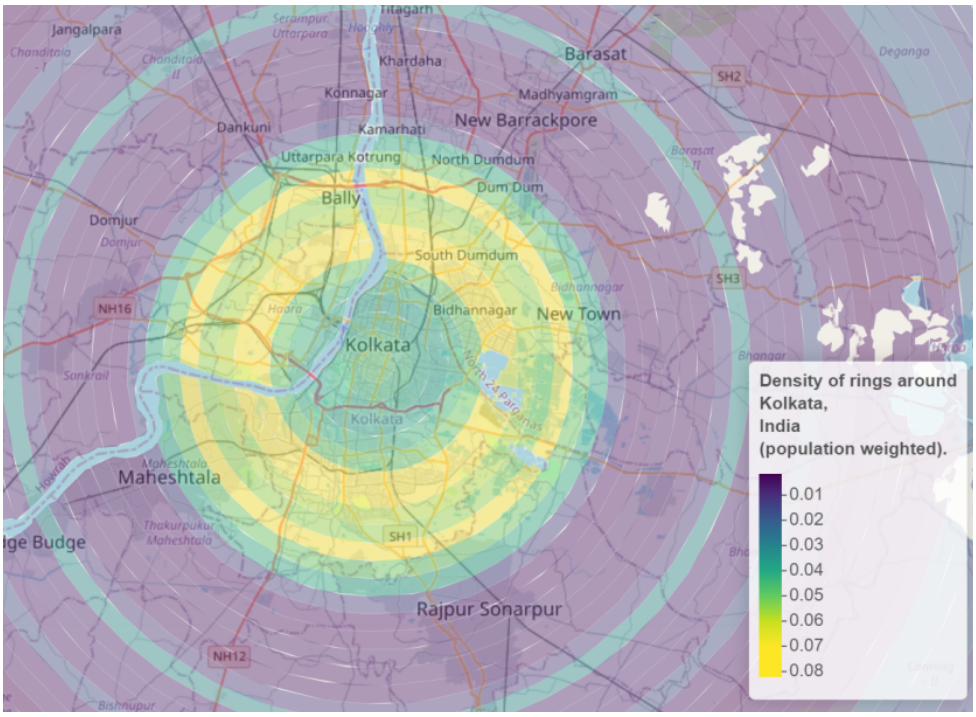


Fig. 13A: Night Light Radiance; North 24 Paraganas District, 2012

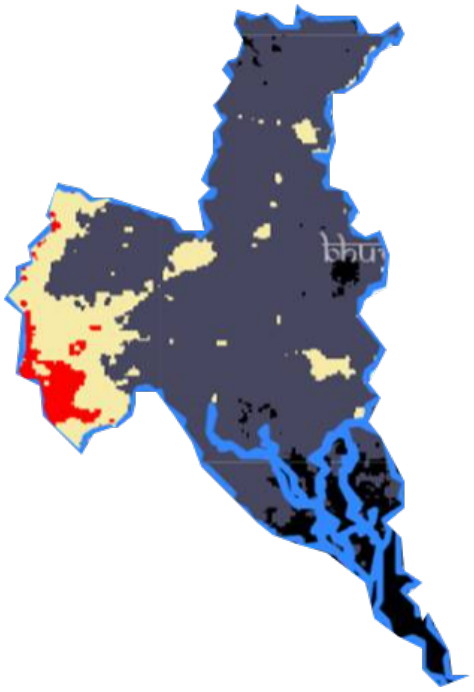


Fig. 13B: Night Light Radiance; North 24 Paraganas District, 2023

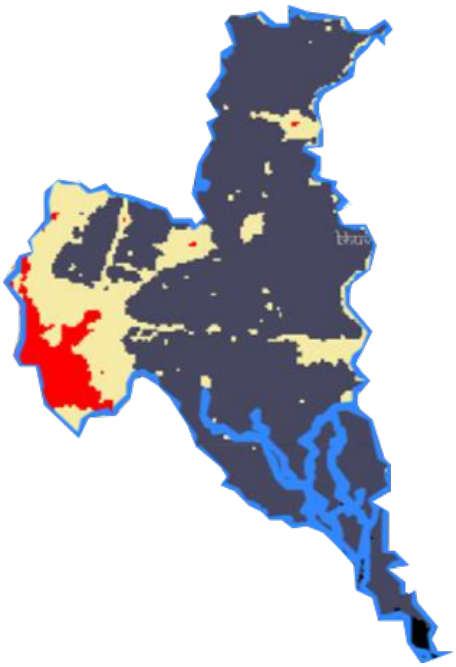


Table 4: Quantifying Night Time Lights (NTL) Radiance for North 24 Paraganas District

[% change from 2012 to 2023]

Sl. No.	Colour	Range (nW/cm²/sr)	Interpretation	% Change [2023 from 2012]
1		< 5	**Very Low Radiance Band**: Indicates areas with minimal artificial lighting, often corresponding to rural/undeveloped areas, natural landscapes, forested/sparsely populated regions.	-3.69
2		May-25	**Low Radiance Band**: Typically indicates small villages, rural settlements, sparsely populated suburban zones, or industrial areas with minimal night-time lighting.	-1.56
3		26 - 200	**Moderate Radiance Band**: Typically represents semi-urban or peri-urban areas. This band might capture small towns, medium-sized cities, and industrial zones.	32.46
4		> 200	**High Radiance Band**: Usually corresponds to major urban areas, commercial districts, and densely populated areas with substantial artificial lighting - such as the central business districts etc.	64.15
5		No Data	-	

This change is also visible in the Land Use Classification (LUC) Data maintained by the Directorate of Economics & Statistics, Ministry of Agriculture & Farmers Welfare (Directorate of Economics and Statistics n.d.) for the district of North 24 Paraganas, where we see an increase of ~8.4% in land use under the heading, '*Area under Non-agricultural Uses*'. Between the years 2012-13 and 2022-23, area under non-agricultural uses has grown from 125302 hectares in 2012-13 to 135824 hectares in 2022-23, a growth of about 8.4%. For context, in the same period the growth in area under non-agricultural uses for the entire state of West Bengal has been about 4.8%.

6. Conclusion

The above examination used passenger data from Indian Railways, coupled with earth observation and Land Use Land Classification (LULC) data to understand the relationship between four metropolitan cities and their suburbs.

Overall, we see that post the COVID-related lockdowns, while suburban travel has quickly rebounded, it still remains somewhat lower than pre-pandemic levels. There is a likelihood that this might be on account of a shift away from Railways as means of suburban transport, or on account of rise of counter magnets to cities we studied. Further, with rising income levels, there could be a shift to other modes of transport.

Subject to that caveat, we analyse this data to understand the directions of growth of the selected cities. Urban growth has been seen contiguous to the existing high density urban cores, and is typically accompanied by a reduction in agricultural area.

Our findings are summarised as under:

For Mumbai, suburban travel showed a steady upward trend just prior to the pandemic; while suburban travel quickly rebounded post the lockdowns, however, we estimate that the levels have only reached the January 2012 level as of end-2023

- Intra-Mumbai UTS II Class Traffic i.e. traffic originating within Mumbai was estimated to be about 65% of all UTS II Class suburban travel destined to Mumbai, in 2012. This percentage has since **reduced to about 58% in 2023**. This is perhaps indicative of a shift to other modes of travel.
- In terms of suburban travel from outside Mumbai City district, **Thane** continues to be the single largest originating district. In 2012, ~21% the total suburban travel destined for Mumbai originated in Thane. This number has since **increased to more than 25% in 2023**.
- Looking at LULC data, area under non-agricultural uses has grown by over 31%. For context, in the same period the growth in area under non-agricultural uses for the entire state of Maharashtra has been about 4.48%.
- Within Thane district, using geospatial earth observation data, we estimate that, between 2012 and 2023, the peri-urban area grew by 45% and high density urban area grew 33% in the same period, albeit on a small base. This is hypothesis is confirmed by housing property prices.

For Chennai - we see that suburban travel, first dipped from Jan 2012 till about mid-2016 after which an upward movement is seen. Post the pandemic, while sub-urban travel did bounce back, pre-pandemic levels had not been reached as of end-2023.

- For suburban travel from outside Chennai district, **Kanchipuram** continues to be the single largest originating district. In 2012, ~34% the total suburban travel destined for Chennai originated in Kanchipuram. This number **increased to more than 39% in 2023**. This is an indicator of the suburban area spreading towards Kanchipuram district.
- For Kanchipuram district we note that both the peri-urban and the high density urban areas contiguous to Chennai have shown significant growth in the period 2012 to 2023

For Delhi – It is seen that suburban travel into Delhi was on a slightly declining trend prior to the pandemic. This could be on account of the spread of Delhi Metro Rail network to its suburbs. Post the pandemic, while there has been an uptick, it is not yet near the pre-pandemic levels.

- **Ghaziabad** emerges as the most popular suburb of Delhi. The urban and peri-urban areas in Ghaziabad have shown significant growth along with a concomitant reduction in agricultural land use. This growth is especially concentrated in regions contiguous to Delhi and along transportation lines.

For Kolkata - we can see that from 2015-16 to 2019-20 there is a slight increase in suburban travel to Kolkata. However, after the sharp decrease during the pandemic, the level of suburban travel continues to be about 17-20% less than levels just prior to the pandemic.

- Amongst Kolkata suburbs, passenger arrivals from **24 Paraganas North** and **24 Paraganas South** districts shows an increasing trend; whereas passenger arrivals from Hooghly district appear to be slightly decreasing over time, and intra-district arrivals (from Howrah and Kolkata) appear flat.
- LULC data shows an increase of ~8.4% in land use in *24 Paraganas North* under the heading, '*Area under Non-agricultural Uses*' in the period 2012 to 2024.

Urban India is growing. At present, 35% of our population is estimated to live in urban areas (Ministry of Housing and Urban Affairs 2023); this number is likely to go up to 40% [~600 million] by 2036 and in excess of 820 million [50%] by 2047 (Jain 2011). Already urban areas contribute about 60% of India's Gross Domestic Product (GDP) (Niti Ayog, Asian Development Bank 2022). This figure is projected to rise to about 75% by 2047 (Jain 2011).

While this would certainly have an impact on existing urban centres, however it would also inevitably lead to new centres of urban growth and growing suburbanisation of present cities. It is in this context, that understanding the spatial patterns in urban growth has many significant public policy applications – urban planning, transportation, provision of services etc.

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Notes

[1] The primary data used for this analysis is of Unreserved Ticket bookings maintained by the Indian Railways Centre for Railway Information Systems (CRIS). Amongst the many systems that CRIS runs is the Unreserved Ticketing System (UTS). On an average, the system serves over 21 million passengers, issuing over 8 million tickets across 100 variations [concessional, seasonal, etc.] and involving revenue in excess of Rs. 500 Million – every day. The UTS is the backbone that serves passengers using the Unreserved or General Tickets – typically the most affordable tickets on the Indian Railways network. We analyse this large and high frequency dataset to give us interesting insights into the movement of people within the country

[2] https://mumbaicity.gov.in/

[3] See Lok Sabha PAC 69th Report (2016-17); Suburban Train Services In Indian Railways

[4] This number is likely to be an underestimation given that the erstwhile Thane district was bifurcated in 2014 into Palghar and present day Thane district *[https://palgharpolice.gov.in/History]*.

[5] Navi Mumbai Municipal Corporation; https://www.nmmc.gov.in/navimumbai/history1540201195

[6] For additional information, see Land Use Statistics Concepts & Definitions- Nine-Fold Classification; *https://desagri.gov.in/wp-content/uploads/2021/04/4-Concepts-Definitions.pdf*

[7] See https://bhuvan-app1.nrsc.gov.in/bhuvan_ntl/

[8] See https://www.nrsc.gov.in/

[9] See https://bhuvan.nrsc.gov.in/home/index.php

[10] See https://ladsweb.modaps.eosdis.nasa.gov/missions-and-measurements/viirs/

[11] See https://bhuvan-app1.nrsc.gov.in/bhuvan_ntl

[12] See https://residex.nhbonline.org.in/

[13] For additional information, see Land and Use Statistics Concepts & Definitions- Nine-Fold Classification; *https://desagri.gov.in/wp-content/uploads/2021/04/4-Concepts-Definitions.pdf*

Indian Public Policy Review 2025, 6(3): 27-84
https://doi.org/10.55763/ippr.2025.06.03.002

IPPR

Farmer Producer Organisations and Institutional Economics

Institutional Economic Thought for Strengthening Sustainable Agriculture

A M Jose **Jos Chathukulam**[*#]

Abstract

This paper develops a theoretically grounded and empirically validated framework to analyse Farmer Producer Organisations (FPOs) through the lens of institutional economics. Drawing on classical, new, and heterodox traditions—including Veblen, Polanyi, Ostrom, and Sen—it proposes a seven-cluster schema spanning transaction costs, collective governance, inclusion, ecological resilience, externalities, livelihood security, and state intermediation. FPOs are conceptualised as hybrid, socio-economic institutions embedded in evolving agrarian systems, not mere market aggregators. The framework is operationalised through mixed-methods fieldwork across 12 FPOs in Kerala, alongside national-level stakeholder validation. Using composite Enabler and Barrier Indices, the study diagnoses institutional strengths and weaknesses across clusters. Results highlight robust performance in governance and coordination, but gaps in inclusion and environmental sustainability, underscoring systemic interdependencies. The framework bridges normative institutional theory with diagnostic utility, offering actionable insights for scholars, policymakers, and practitioners. It advances context-sensitive institutional design as a critical lever for strengthening FPO ecosystems and enabling inclusive rural transformation across India and the Global South.

Keywords: Farmer Producer Organisations; Institutional Economics; Participatory Governance; Transaction Costs; Inclusive Development; Sustainable Agriculture; Collective Action; Rural Transformation; Agricultural Policy

Publication Date: 27 August 2025

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1. Introduction

Agriculture remains the backbone of India's economy, supporting 42.3% of the population and contributing 18.2% to GDP (Government of India, 2025). Yet the sector is highly vulnerable—especially for the 86.1% of farmers who are smallholders—due to limited market access, volatile prices, and severe resource constraints (Government of India, 2023). These systemic challenges underscore the need for innovative institutional solutions that empower smallholders and enhance resilience.

A key innovation in this context is the emergence of Producer Companies—hybrid entities that combine the cooperative ethos with corporate legal and financial structures. As proposed by the Alagh Committee (Government of India, 2000), Producer Companies were designed to undertake member-focused activities such as production, processing, input distribution, and technical services, to boost collective efficiency and market participation. The Radhakrishna Committee further highlighted their potential to address agrarian distress, financial exclusion, and the marginalisation of smallholders (Government of India, 2007).

The broader concept of Farmer-Producer Organisations (FPOs) gained momentum after the 2002 Companies Act amendment, spearheaded by the Small Farmers' Agribusiness Consortium (SFAC), which played a catalytic role in early FPO formation (Prasad, 2019). Over time, FPOs have evolved beyond market aggregators, becoming institutional platforms for rural transformation, enabling inclusive development and value-chain integration[1].

To formalise this vision, the Government of India introduced the Policy & Process Guidelines for FPOs, offering a comprehensive roadmap to support farmer collectives through legal, financial, and governance mechanisms (Government of India, 2013). These mechanisms enable smallholders to access investment, infrastructure, and technology via professionally-managed entities. As Pal et al. (2003) argue, post-liberalisation agrarian reforms require a rethinking of institutional arrangements at the intersection of state, market, and collective action. This forms the basis for our conceptualisation of FPOs as hybrid institutions, situated within the state–market–community nexus.

The momentum around FPOs has intensified with the release of the 2024 Draft National Policy (DNP), which reaffirms India's commitment to inclusive, enterprise-driven farming. Recognising FPOs under various legal forms—such as the Companies Act (2013) and the Cooperative Societies Act—the policy proposes a federated governance model integrating credit facilitation, digital infrastructure, and value chain ecosystems (Government of India, 2024). It envisions agriculture as a dynamic enterprise enabled by scaling strategies, collective bargaining, and risk mitigation.

These policy developments resonate with the lens of Institutional Economics adopted in this study. Unlike neoclassical models focused on rational agents and market equilibria, Institutional Economics interrogates the deeper architecture of rules, norms, and governance structures that shape economic outcomes. It critiques price-centric models for overlooking persistent inefficiencies, historical path dependencies, and the embedded nature of agrarian decision-making (Eggertsson, 1997; North,

1997). As Mäki (1993) emphasises, institutions are not peripheral—they constitute the very fabric of economic functioning.

Within this tradition, New Institutional Economics (NIE) extends neoclassical reasoning by integrating transaction costs, property rights, bounded rationality, and collective governance (Roy & Thorat, 2008; Williamson, 2000). FPOs, from this perspective, are institutional responses to market and state failures—designed to lower transaction costs, foster trust-based coordination, and enable collective action.

Following Williamson's four-level schema, FPOs operate across nested institutional layers—from informal norms and customs to formal governance structures and policy regimes (Williamson, 2000). Complementary insights by Hubbard show how contracts, conventions, and authority relations reduce uncertainty and strengthen member coordination (Hubbard, 2001).

The DNP further proposes a three-tier governance structure, reforms in credit architecture, digital CACMPs (Common Agriculture Credit Mechanism Platforms), and inclusive business models. These developments indicate that institutional economics is being increasingly internalised in India's policy discourse on FPOs. As Sidhu observed in his Presidential Address to the Indian Society of Agricultural Economics, FPOs are now recognised as central mechanisms for promoting inclusive, market-oriented, and sustainable agricultural transformation (Sidhu, 2025).

According to the Tata-Cornell Institute (TCI), India currently hosts over 45,097 registered FPOs, of which around 26,938 are active and compliant—surpassing the national target of 10,000 functional entities (TCI, 2024). FPOs are increasingly seen as institutional platforms for aggregation, bargaining power, and systemic transformation toward sustainable, inclusive agriculture.

This paper argues that the performance and sustainability of FPOs can be more effectively understood and strengthened through a structured Institutional Economics framework. Drawing from classical, new, and heterodox traditions, we develop a seven-cluster model capturing the key enablers and constraints that shape FPO effectiveness. The framework is empirically tested using a mixed-methods design: bibliometric analysis, field research across 12 FPOs in Kerala, and stakeholder validation.

Institutional thinkers such as Elinor Ostrom (governance of commons), Douglass North (institutional evolution), Mancur Olson (collective action), Amartya Sen (capabilities and inclusion), and Ronald Coase (transaction costs) have laid foundational pillars of institutional economic thought. We further draw on Thorstein Veblen (institutional evolution), Herbert Simon (bounded rationality), Geoffrey Hodgson (institutional routines), Oliver Williamson (hybrid governance), and Dani Rodrik (contextual reform). Collectively, these scholars offer a rich conceptual toolkit for analysing FPOs as hybrid, evolving institutions shaped by both formal rules and informal norms within the state–market–community interface.

The central research question is: How can institutional economics theory provide a systematic framework for understanding and enhancing FPO performance in India's diverse agrarian contexts?

We propose that India's FPOs can be systematically strengthened through a seven-cluster framework integrating transaction cost theory, collective governance, and capability-based development. These clusters—transaction costs, governance design, social capabilities, ecological resilience, externalities, market participation, and state intermediation—collectively determine institutional performance.

Our empirical fieldwork operationalises this framework, illustrating how alignment across these dimensions enhances FPO sustainability and impact. Rather than viewing FPOs merely as economic aggregators, this paper positions them as embedded institutional innovations capable of transforming smallholder agriculture.

The study contributes a diagnostic and design-oriented lens that enables policymakers and practitioners to:

a) Identify institutional strengths and bottlenecks using Enabler and Barrier Indices;

b) Tailor governance and capacity-building interventions to FPOs' unique contexts;

c) Coordinate state support, market linkages, and ecological stewardship;

d) Foster adaptive governance through multi-stakeholder feedback loops; and

e) Replicate successful institutional designs across diverse regions.

This integrative framework not only advances theoretical understanding of rules, norms, and authority structures in collective action, but also offers a practical toolkit to improve FPO governance and resilience. By bridging theory with grounded field realities, the paper contributes to global debates on institutional design and agricultural transformation.

This paper is structured into five sections. The Introduction contextualises the institutional challenges faced by smallholder agriculture in India, and outlines the rationale for adopting an institutional economics lens to study FPOs. Section 2: Methodology details the mixed-methods research design, combining bibliometric analysis, fieldwork across 12 Kerala-based FPOs, and national stakeholder validation. Section 3: Theoretical Foundations and Conceptual Framework draws on classical, new, and heterodox institutional traditions to construct a seven-cluster analytical schema for assessing FPO performance. Section 4: Empirical Validation of an Institutional Economics Lens on FPOs applies this framework using Enabler and Barrier Indices derived from field data, revealing both systemic strengths and institutional bottlenecks. Finally, Section 5: Discussion and Conclusions synthesises the empirical findings, reflects on policy implications, and outlines forward-looking strategies for institutionalising resilient and inclusive FPO ecosystems in India.

2. Methodology

This study is grounded in institutional economics, which highlights the role of institutions in shaping incentives, reducing uncertainty, and fostering long-term cooperation (Shirley, 2005).

Guided by this theoretical lens, we adopt a mixed-methods design that synthesises conceptual inquiry with empirical validation across multiple data sources.

The research design evolved through participatory dialogue at a national seminar hosted by the Centre for Rural Management (CRM), Kerala, in partnership with NABARD (Nov 1–2, 2024). Over 100 stakeholders - including farmers, FPO directors, government officials, NGO representatives, and academics - contributed insights that informed the study's core questions and policy relevance.

In order to empirically evaluate our seven-cluster institutional framework, we carried out fieldwork in three stages across twelve purposively selected FPOs in Kerala: preparatory interviews and pilot testing in July–August 2024 (to inform the NABARD National Seminar), follow-up data collection in December 2024 (immediately after the Seminar), and final validation in June–July 2025 (incorporating peer-reviewer comments)[2]. The sample reflected diversity in region (Kannur, Thrissur, Kottayam, Alappuzha, Idukki), performance maturity, and organisational structure. Selection was informed by NABARD, Palai Social Service Society, political leaders, and progressive farmers.

Primary data collection included structured surveys with 52 FPO members and 38 board directors[3]. The questionnaire was built around the seven-cluster framework and designed to capture both enabling and constraining institutional factors. To ensure the reliability and validity of our survey instrument, we conducted a pilot test with two FPOs, refining items through cognitive interviews[4]. Survey responses were anonymised, and interviewer training minimised response bias.

Enablers were rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), while Barriers were inversely scored. Based on these responses, Enabler and Barrier Indices were computed, standardised to a 0–100 scale, and integrated into a composite Thematic Index. These indices facilitated cross-cluster and cross-stakeholder comparison, revealing institutional strengths, bottlenecks, and divergent perceptions.

Three multi-stakeholder Focus Group Discussions (FGDs) were purposively conducted in selected FPOs. Each included farmers, board members, traders, local officials, and NGO representatives. These sessions unearthed tacit norms, informal practices, and local governance dynamics often missed by structured instruments.

To triangulate findings, extensive desk research was undertaken, including a bibliometric analysis of academic literature (2000–2024) and a policy review of key government reports. This layered approach - combining bibliometric mapping, conceptual synthesis, field data, and stakeholder validation - ensured both empirical rigour and theoretical depth. In line with Faghih and Samadi (2021), special attention was paid to path dependence and local institutional embeddedness.

The triangulated insights not only contextualised the field findings but also operationalised our theoretical model in a real-world setting, linking the abstract logic of institutional economics to the everyday functioning of FPOs in Kerala. While our design ensures methodological rigour, findings are context-bound to Kerala's agrarian settings, and future studies may extend this framework to other regions and seasons.

3. Theoretical Foundations and Conceptual Framework for Understanding FPOs

FPOs are complex institutional responses to agrarian transformation in the Global South. Understanding their governance and performance requires moving beyond neoclassical assumptions of rational agents and self-correcting markets. Institutional Economics offers a pluralist and dynamic lens, recognising that both formal and informal institutions shape behaviour, reduce uncertainty, and mediate development outcomes.

This section reviews key institutional traditions underpinning our framework. Each of the following seven subsections unpacks a major tradition, and maps it to specific performance dimensions of FPO governance.

(i) Classical Institutionalism: Classical Institutionalism challenged neoclassical economics by emphasising norms, culture, and social embeddedness. Veblen's concept of cumulative causation portrayed economic behaviour as historically contingent and habit-driven (Veblen, 1899). Commons defined institutions as "collective action in control of individual action," highlighting legal and normative embedment (Commons, 1934). Polanyi argued that markets are embedded in social relations; informal norms often govern rural value chains, especially in India (Polanyi, 1944). These insights position FPOs as socio-cultural institutions whose legitimacy and effectiveness depend on aligning formal mechanisms with deep-rooted social norms. This informs the Institutional Design and Collective Governance clusters.

(ii) New Institutional Economics (NIE): NIE provides analytical tools for understanding market-based institutions. Coase explained firms as responses to high transaction costs in markets (Coase, 1937). North described institutions as "rules of the game" that reduce uncertainty and support cooperation (North, 1990). Williamson classified governance into markets, hierarchies, and hybrids—shaped by bounded rationality, asset specificity, and opportunism (Williamson, 1985). Olson's logic of collective action showed how selective incentives and rules structure group behaviour (Olson, 1965). NIE positions FPOs as hybrid governance structures designed to reduce transaction costs and manage coordination—key to the Transaction Costs & Institutional Efficiency cluster.

(*iii) Contracts and Property Rights Theories*: Contract and property rights theories clarify how institutions manage incentives and control. Grossman and Hart's theory of incomplete contracts describes how firms govern under uncertainty (Grossman & Hart, 1986). Barzel differentiated between de jure and de facto rights, highlighting informal control over assets (Barzel, 1997). These ideas explain how FPOs allocate residual control rights, navigate customary claims, and distribute decision-making—informing both the Institutional Efficiency and Governance Design clusters.

(iv) Collective Action and Commons: Ostrom's research demonstrated that communities can develop self-enforcing institutions to manage common-pool resources (Ostrom, 1990). Her design principles—rules, monitoring, and graduated sanctions—show how local governance fosters durable

cooperation. These insights shape the Collective Governance and Institutional Design cluster, and also support the Sustainable Agriculture & Long-Term Resilience cluster, by embedding ecological stewardship within decentralised systems of accountability.

(v) Information Economics and Coordination Failures: Information asymmetry undermines coordination in agricultural markets. Akerlof's adverse selection, Stiglitz's moral hazard, and Arrow's theory of information as a public good explain why markets often fail in the absence of credible information (Akerlof, 1970; Arrow, 1974; Stiglitz, 1989). FPOs function as institutional correctives by aggregating information, building trust, and reducing search and monitoring costs. These roles are critical for market participation, livelihood security, and governance, while also mitigating externalities—such as underinvestment in public goods, quality standards, and rural infrastructure. This directly informs the Externalities & Institutional Failure and Income Security, Employment & Market Participation clusters.

(vi) Capabilities, Inclusion, and Livelihoods: Sen's capability approach reframes development as expanding substantive freedoms and agency, especially for marginalised groups (Sen, 1999). Acemoglu, Johnson, and Robinson argue that inclusive institutions prevent elite capture and foster downward accountability (Acemoglu et al., 2001; Acemoglu & Johnson, 2023). FPOs must embed these principles through democratic governance, quotas, and voice mechanisms. Simultaneously, NIE and information economics show how transaction cost reduction and trust-building enable market integration and secure livelihoods. FPOs enhance income security and employment through aggregation, better prices, and expanded credit access. Federated FPOs multiply employment along the value chain—from logistics and grading to processing. Together, these insights inform the Empowerment, Inclusion & Social Capabilities and Income Security, Employment & Market Participation clusters.

(vii) Institutional Dynamics and Evolution: Institutions evolve through layering, drift, and conversion. Petrović (2011) and Faghih & Samadi (2021) build on Thelen to show how FPOs blend policy incentives with community norms. Adaptive institutions also underpin resilience in the face of climatic and market shocks, aligning with the Sustainable Agriculture & Long-Term Resilience cluster. Moreover, evolving multi-level coordination with state actors strengthens state capacity, decentralisation & institutional intermediation.

While this framework is grounded in institutional economics, it integrates more theoretical traditions. Concepts from Simon (bounded rationality), North (path dependence), Ostrom (local governance), and Williamson (transaction cost logic) provide a comprehensive lens to view FPOs as hybrid, evolving, and embedded institutions. These theoretical mappings are summarised in Figure 7 and Table 1, which connect them to specific FPO governance outcomes.

3.1 Bibliometric Validation of Institutional Themes in FPO Research

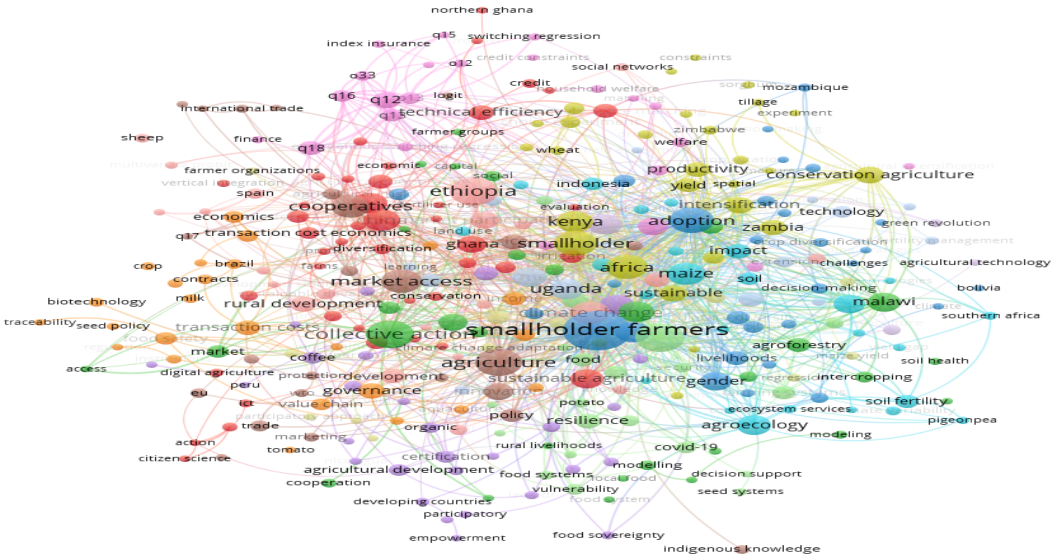
To ground the conceptual framework in contemporary academic discourse, this study employed a bibliometric and systematic literature review. Data were sourced from two major scholarly databases

- Web of Science (2,212 results) and Scopus (40 filtered results) - selected for their relevance to FPOs, institutional economics, and sustainable agriculture[5]. Using VOSviewer software, we generated keyword co-occurrence maps that revealed prominent thematic clusters, including transaction costs, collective action, governance, and market participation.

These visualisations not only validated the study's seven-cluster analytical framework but also underscored the enduring relevance of institutional economics in the FPO research landscape. The alignment between keyword clusters and theoretical domains affirms the conceptual integrity and empirical grounding of our approach.

Figure 1 presents a co-occurrence network centred on "smallholder farmers," illustrating thematic clusters across institutional and agrarian research. The blue-green cluster explores sustainable practices such as soil fertility, agroecology, and climate resilience. The red and brown clusters emphasise cooperatives, market access, and rural economics. Technical efficiency and credit form a pink cluster, while a central green cluster links governance, resilience, and collective action. Smaller clusters reflect emerging topics like indigenous knowledge, digital agriculture, and post-pandemic transformation. This thematic landscape confirms the multidimensional character of FPO research, and underscores the institutional and policy intersections that shape smallholder trajectories.

Figure 1: Overall Thematic Network of Research



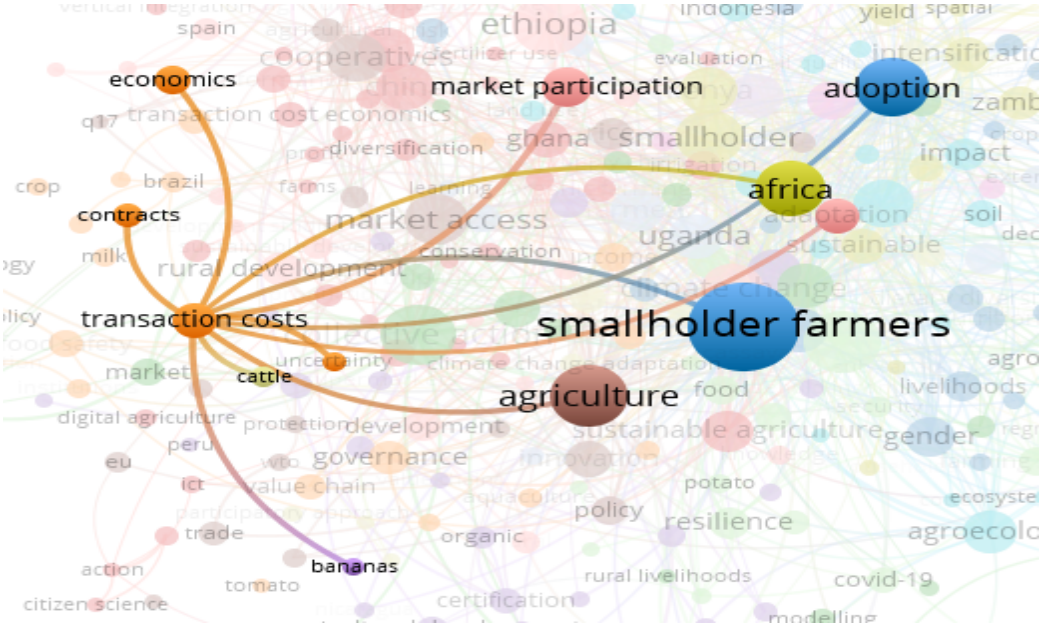
Source: Authors' visualisation using VOSviewer software based on Scopus and Web of Science data (2000–2024).

Figure 2 highlights the transaction cost thematic cluster as a central organising concept in institutional research on smallholder agriculture. "Transaction costs" appears as a prominent node, strongly linked to "contracts," "market access," "economics," and "rural development," underscoring its foundational relevance in explaining institutional inefficiencies among smallholders.

The cluster also includes regional and thematic extensions—particularly to "Africa," "adoption," and "governance"—indicating a strong empirical focus on technology adoption and institutional barriers in African contexts. The co-occurrence with terms like "resilience," "climate change," and

"agriculture" reflects the integrated concerns of sustainability, adaptive institutions, and long-term farmer welfare. This mapping directly corresponds with this paper's first thematic cluster: Transaction Costs and Institutional Efficiency, and confirms that these themes remain central to both theoretical discourse and applied empirical work in FPO research.

Figure 2: Thematic Cluster of Transaction Cost



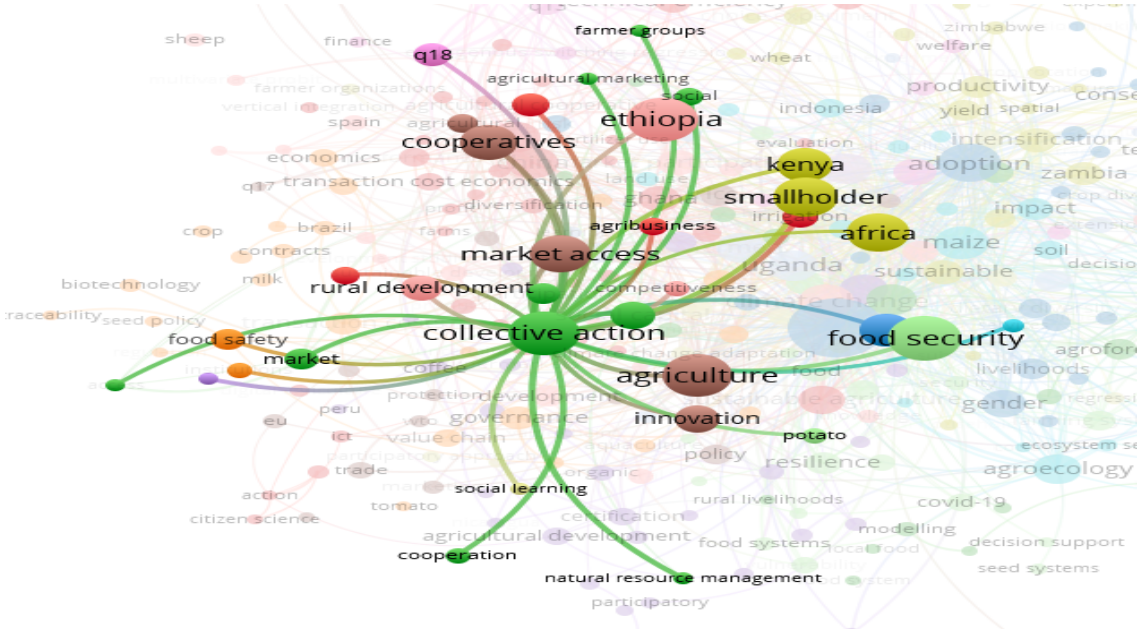
Source: Author's interpretation based on VOSviewer

Figure 3 visualises the centrality of "collective action" in the literature on smallholder agriculture and institutional development. Appearing as a dominant green node, collective action is closely linked with core concepts such as market access, cooperatives, food security, governance, agricultural innovation, and natural resource management. This indicates a widespread research consensus that collaborative approaches are crucial for empowering smallholders, improving bargaining power, and fostering inclusive growth.

Strong geographic clustering around terms like Ethiopia, Kenya, Uganda, and Africa highlights the empirical grounding of this theme in Sub-Saharan contexts, though its conceptual implications extend globally. Notably, terms such as rural development, social learning, certification, and cooperation suggest that collective action is seen as a vehicle not only for economic empowerment but also for social and ecological resilience.

This map directly validates our second thematic cluster, Collective Governance & Institutional Design, rooted in Ostrom's theory of self-organisation, Hodgson's institutional evolution, and Baviskar's emphasis on embedded rural institutions. It supports the argument that successful FPOs require not only structural efficiency but also participatory legitimacy, local knowledge, and cooperative governance mechanisms.

Figure 3: Thematic Cluster of Collective Action



Source: Author's interpretation based on VOSviewer

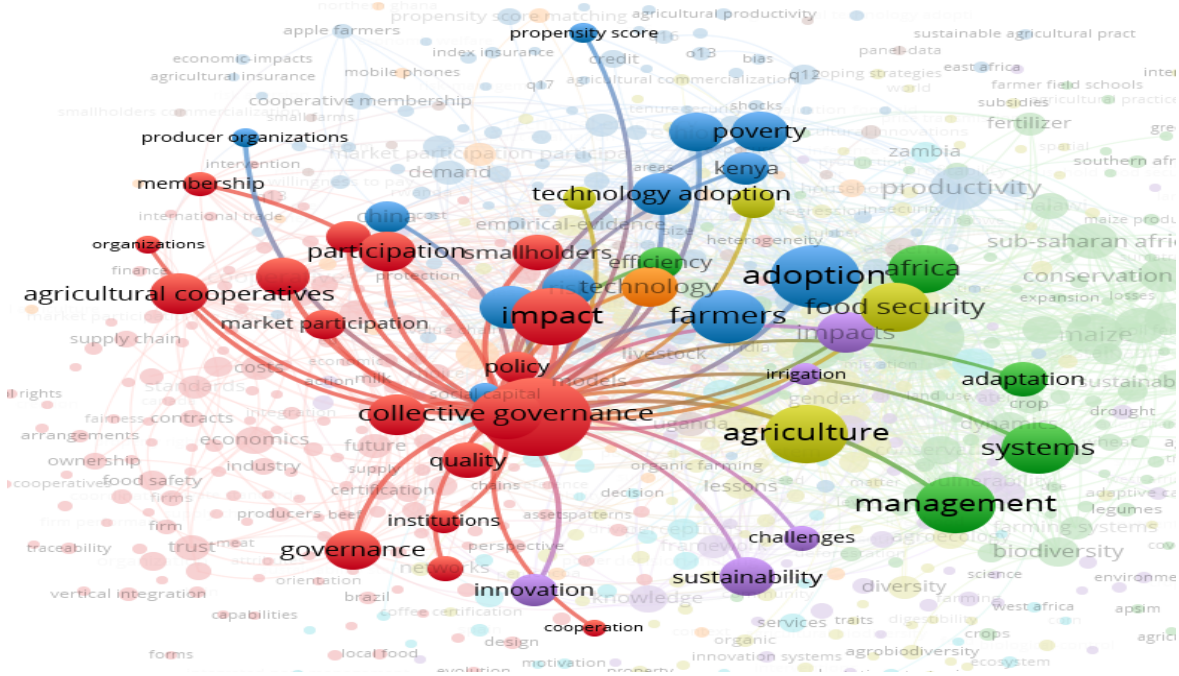
Figure 4 visualises the interconnected themes surrounding collective governance and its empirical and conceptual associations in agricultural research. The central node—collective governance—is surrounded by a dense web of related terms such as policy, impact, membership, agricultural cooperatives, and technology adoption. This cluster underscores how researchers have approached farmer institutions not merely as economic actors, but as socially embedded organisations requiring enabling governance structures.

The prominence of terms like producer organisations, standards, certification, market participation, and empirical evidence reflects a strong concern with institutional legitimacy, inclusivity, and evidence-based policy design. At the same time, the network connects to adoption, productivity, and systems, indicating a link between governance architecture and broader outcomes like sustainability, efficiency, and food security.

The appearance of country-level terms like Zambia, Kenya, and Africa affirms the empirical relevance of these themes in global South contexts - paralleling Indian realities where smallholders similarly face institutional voids and coordination challenges. The figure emphasises that for FPOs to succeed, collective governance must be embedded in supportive policy ecosystems, inclusive design norms, and cooperative legitimacy grounded in member participation and trust.

This co-occurrence cluster supports this study's thematic areas of Collective Governance & Institutional Design and Empowerment, Inclusion & Social Capabilities, reinforcing theoretical inputs from Ostrom, Birchall, Commons, and Hodgson. It also validates the need for participatory structures, policy integration, and feedback-based institutional innovation in the effective functioning of FPOs.

Figure 4: Thematic Cluster of Collective Governance



Source: Author's interpretation based on VOSviewer

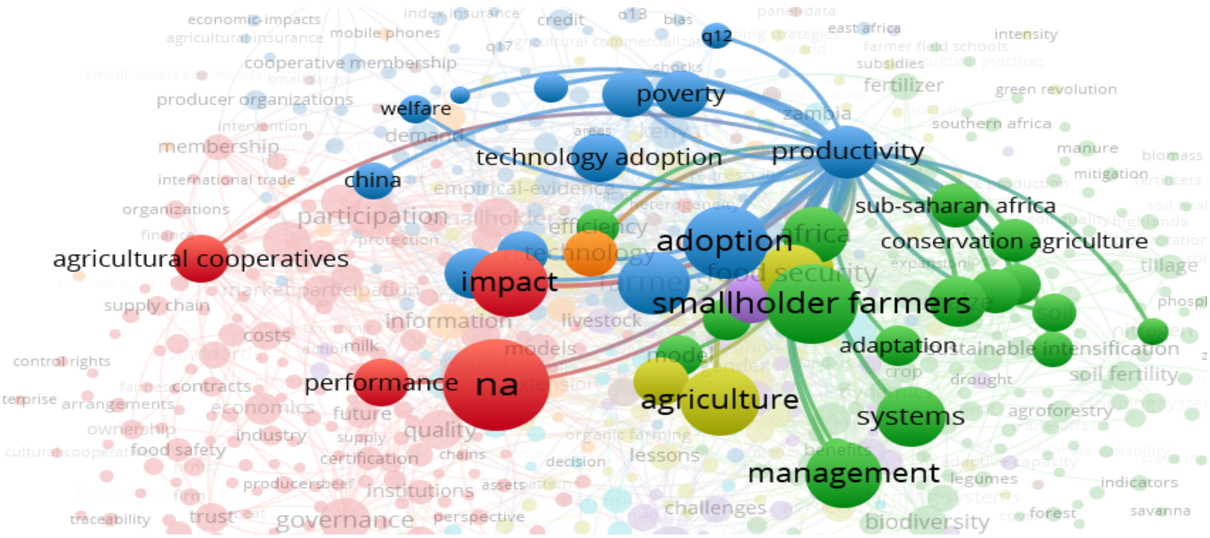
Figure 5 depicts a densely interconnected bibliometric map centering on the productivity and institutional transformation of smallholder agriculture. The green cluster reflects scholarly engagement with sustainable farming systems, including soil fertility, conservation agriculture, farm management, and adaptation strategies. These nodes underscore how environmental sustainability and resource use efficiency are core themes in smallholder literature.

A second, prominent blue cluster centres around productivity, technology adoption, and poverty reduction, indicating an evidence-backed focus on how innovation contributes to agricultural transformation. This cluster directly reinforces the logic behind our third thematic area: Empowerment, Inclusion & Social Capabilities, which views technology not merely as an input, but as an enabling tool contingent on institutional capacity and social inclusion.

The red cluster explores agricultural cooperatives, performance, governance, and quality, tying institutional structure to farm-level outcomes. This convergence affirms our clusters on Collective Governance & Institutional Design and Transaction Costs & Institutional Efficiency, as they both emphasise the role of group-based governance and institutional coordination in performance enhancement.

Overall, this visualisation strengthens the analytical coherence of the seven-cluster framework proposed in this study, by revealing how the academic literature converges around interdependent themes of institutional efficiency, empowerment, innovation, and sustainability. It validates our integrative approach that places FPOs at the intersection of these forces—grounded in Institutional Economics but responding to real-world ecological and organisational challenges.

Figure 5: Thematic Cluster of Productivity



Source: Author's interpretation based on VOSviewer

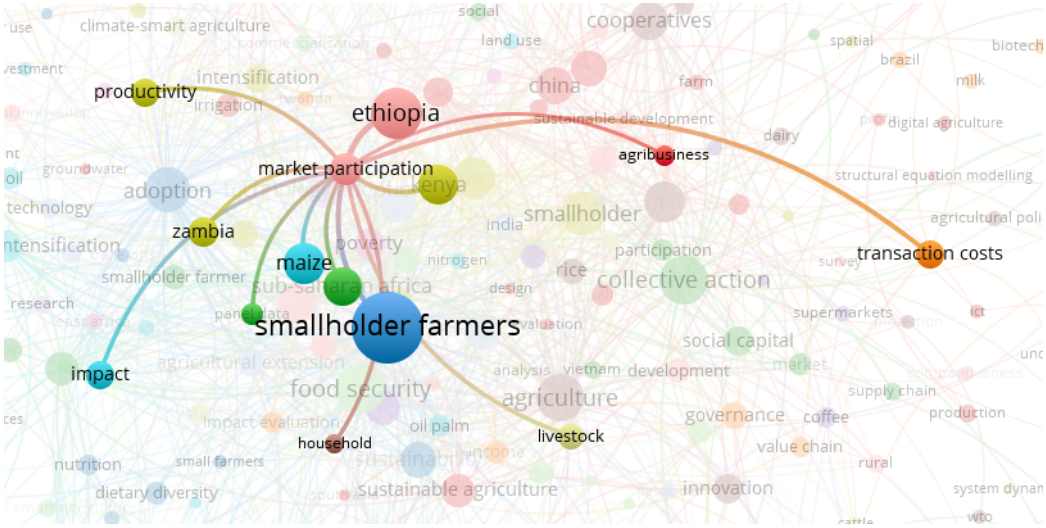
Figure 6 foregrounds market participation as a pivotal node in the bibliometric network, highlighting its centrality in research concerning smallholder transformation. Closely connected to smallholder farmers, market participation bridges institutional concerns with livelihood outcomes. Its proximity to terms like Ethiopia, Kenya, Zambia, maize, and livestock confirms a regional and commodity-specific research focus, particularly within Sub-Saharan Africa.

Importantly, the co-occurrence with transaction costs underlines a recurring institutional constraint faced by smallholders, ranging from high search and transport costs to weak bargaining power and limited access to market information. The link to agribusiness illustrates scholarly interest in value chain integration and the structural barriers small farmers face in accessing formal markets.

The thematic overlap with productivity and impact supports the thesis that market engagement is a key driver of technology uptake, resource investment, and livelihood improvements. Market participation functions as a mediating institution that links farm-level decisions with macroeconomic and policy-level determinants, thereby offering a potent lens for studying income generation, employment potential, and food system integration.

This map reinforces the inclusion of "Income Security, Employment & Market Participation" as a core thematic cluster in our study. It provides bibliometric validation for treating market access not merely as an economic output, but as an institutionally mediated outcome, shaped by governance quality, transaction efficiency, and collective agency.

Figure 6: Thematic Cluster of Market Participation



Source: Author's interpretation based on VOSviewer

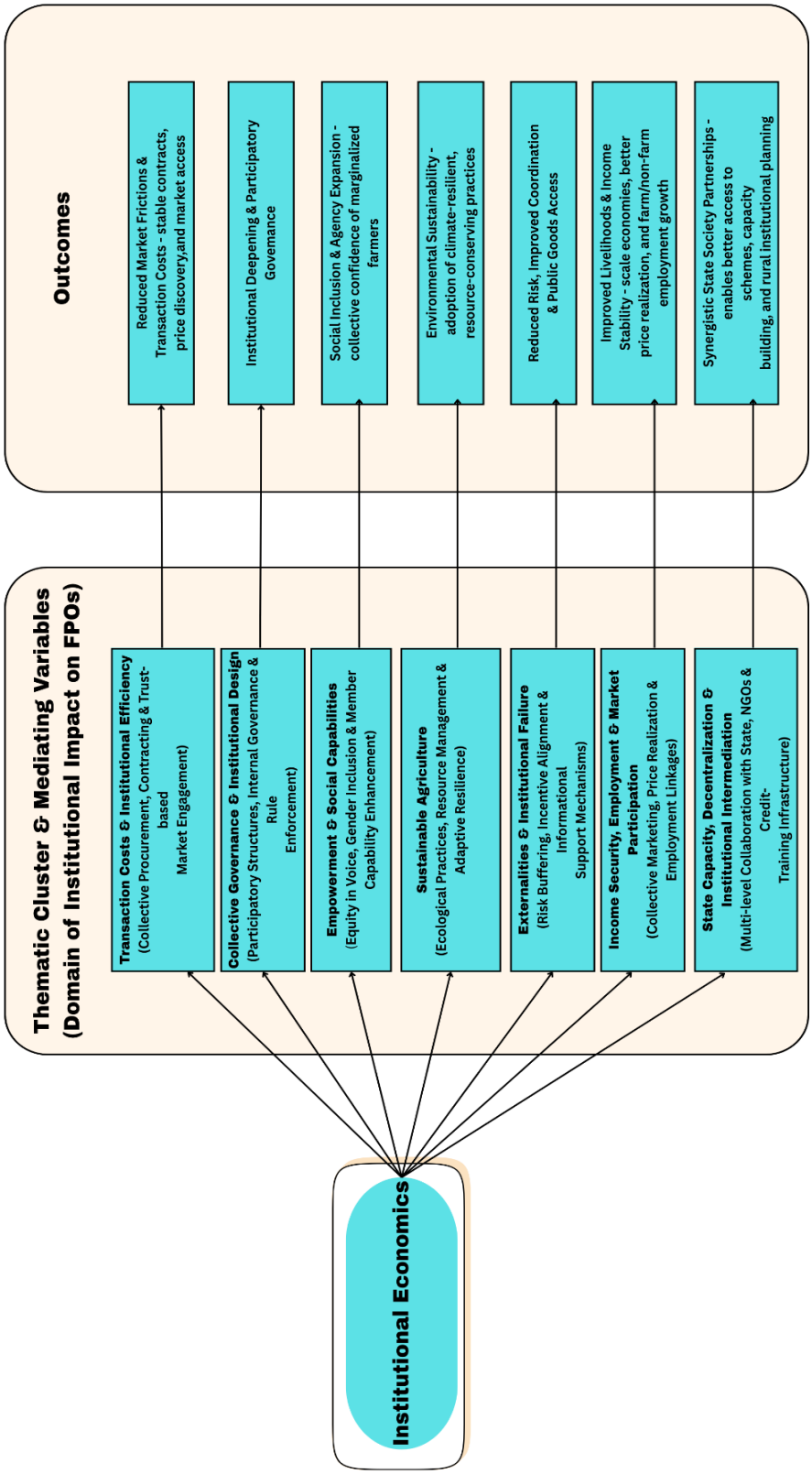
Together, these bibliometric insights validate that the seven thematic clusters developed in this paper are theoretically grounded. While the visual analysis reveals five dominant co-occurrence clusters, these align closely with the conceptual distinctions drawn from the core literature[6]. Importantly, the bibliometric patterns reinforce the multi-dimensional relevance of our analytical framework, linking institutional design, governance, transaction efficiency, sustainability, empowerment, and market integration.

Building on this dual-method validation, Section 3.2 elaborates on each of the seven thematic clusters (See Figure 7 and Table 1) through a detailed review of institutional economic thought. This structured synthesis enables us to draw actionable insights for the design and evaluation of FPOs, while anchoring our analysis in both theoretical traditions and empirical realities.

The seven clusters are not arbitrary classifications; rather, they emerge organically from the conceptual lineages and practical challenges outlined in the preceding sections. Each cluster isolates a distinct institutional function—namely, transaction costs and institutional efficiency; collective governance and institutional design; empowerment, inclusion, and social capabilities; sustainable agriculture and long-term resilience; externalities and institutional failure; income security, employment, and market participation; and state capacity, decentralization, and institutional intermediation—and aligns it with the strand of theory most relevant for its diagnosis and enhancement.

In doing so, the framework provides a coherent lens to understand FPOs as hybrid institutional forms operating at the intersection of state, market, and community in India's agrarian economy. What follows, therefore, is a detailed unpacking of these seven mutually reinforcing domains, beginning with the problem of transaction costs and institutional efficiency.

Figure 7. Conceptual Framework Linking Institutional Economics Theories to FPO Design, Performance and Legitimacy



Source: Authors' interpretation based on literature review

Table -1: Institutional Economics Foundations for FPOs – Seven Thematic Clusters, Core Thinkers, Key Insights, and Applications

Sl No	Thematic Cluster	Key Contributors |	Key Institutional Insights	Practical Application for FPOs
1	Transaction Costs & Institutional Efficiency	(Bardhan, 1989; Coase, 1937; de Vries, 2023; Magnusson & Ottosson, 2009; North, 1990; Petrović, 2011; Shirley, 2005; Singh, 2021; Uphoff, 1986; Vatiero, 2021; Wäckerle, 2014; Williamson, 1985; Akzar et al., 2024; Ciliberti et al., 2020; Do Nascimento Miguel, 2024; Duong, 2025; Lalitha et al., 2024; Liang et al., 2020; Mnisi & Alhassan, 2021; Snider et al., 2017; Tardiff, 2015; Thapa et al., 2023; Wildberg & Möhring, 2021; Williamson, 1985; Yang & Liu, 2012)	FPOs as hybrid organisations that internalise and minimise transaction costs, use both formal contracts and informal norms to coordinate exchanges and manage risk under uncertainty. Adaptive efficiency matters—early frictions are investments in specialisation and trust.	Design transparent contracts, digital platforms, shared logistics, and member incentives that channel transaction costs into organisational learning and durable market relationships. Monitor for residual frictions as indicators of institutional maturity and not just inefficiency.
2	Collective Governance & Institutional Design	(Agarwal, 2001, 2010; Baviskar, 2007; Hayek, 1945; Hodgson, 2006; Jossa, 2019; Ostrom, 1990; Parthasarathy, 2003; Shah, 1996; Tandon, 1996; Uphoff, 1986;Olson,1965; Bhanot et al., 2021; Ciliberti et al., 2020; Dary & Grashuis, 2021; Grashuis, 2018; Grashuis & Martinez-Georges, 2024; Hideto Dato et al., 2020; Hua, 2025; Jia & Huang, 2011; Liang et al., 2015, 2020; Liang & Hendrikse, 2013; Lombardi & Moschella, 2017; Ma & Zhu, 2020; Morfi et al., 2021; Y. Zhang & Hui Huang, 2014)	Collective action works when participatory rule-making, member-driven monitoring, and nested institutions align formal structures with informal norms. Avoid lock-in and elite capture through adaptive, locally grounded governance.	Institutionalise member voice: transparent board elections, inclusive by-laws, rotational leadership, active grievance systems, and capacity-building for marginalised groups. Regularly audit governance for capture or procedural drift. Foster flexibility to adapt to evolving member needs.
3	Empowerment, Inclusion & Social Capabilities	(Agarwal, 2010; Arrow, 1963; Banerjee & Duflo, 2011; Dreze & Sen, 2013; Kannan, 2011; Sen, 1999; Banerjee et al., 2001; Bhanot et al., 2021; Cavicchioli et al., 2019; Han & Liang, 2025; Merlingen et al., 2001; Musinguzi et al., 2018; Myrdal, 1970; Paul & Chakrabarti, 2011)	Institutions should expand real agency, not just procedural inclusion. Capabilities, voice, and substantive empowerment for women, youth, and marginalised groups are essential. Safeguards against tokenism and elite dominance must be proactive.	Embed gender and caste quotas, targeted skills programs, peer mentoring, and accessible communication (local language, simplified rules). Create mechanisms for feedback, rotational representation, and independent audits of participation and benefit-sharing. Recognise cultural contexts in design.
4	Sustainable Agriculture & Long-Term Resilience	(Nadkarni., 2001; Ostrom, 1990; Rodrik, 2008; Bhanot et al., 2021; Boillat et al., 2012; Duong, 2025; Krumbiegel & Tillie, 2024; Liang et al., 2020; Möhring & Finger, 2022; Paul & Chakrabarti, 2011; Widadie et al., 2021; Wildberg & Möhring, 2021)	Sustainability arises from context-specific, evolving institutions that embed ecological goals into FPO governance. Collective risk-sharing, local knowledge, and adaptive feedback are essential	Integrate ecological literacy, diversify crops, community-managed resources, and participatory adoption of climate-smart practices into FPO strategies. Use feedback loops and monitoring to continually calibrate

			for resilience against climate and market shocks.	sustainability targets. Incentivise long-term ecological stewardship.
5	Externalities & Institutional Failure	(Arrow, 1963; Lele, 1975; U. Patnaik, 2007; Raj, 1984; Simon, 1957 , Rath, 2016; Bahaj, 2020; Do Nascimento Miguel, 2024; Duncan & Nolan, 2020; Gersch, 2018; Goeyvaerts, 2023; Grashuis & Franken, 2025; Guo et al., 2024; Lence et al., 2007; Liang & Hendrikse, 2013; Lombardi & Moschella, 2017; Mérel & Sexton, 2012; Olesen, 2003; Snider et al., 2017; Y. Zhang & Hui Huang, 2014)	FPOs emerge to correct market failures: public goods deficits, information asymmetries, weak service delivery. Institutions buffer members via internal dispute resolution, pooled risk, and collective bargaining, but must guard against coordination breakdowns and dependency.	Establish robust systems for contract enforcement, price discovery, collective dispute resolution mechanisms, and partnerships for public good delivery (storage, insurance, extension). Institutionalise feedback loops to detect emerging externalities or legacy inefficiencies.
6	Income Security, Employment & Market Participation	(Bagchi, 1995; P. Patnaik, 2003; Polanyi, 1944; C. H. H. Rao, 1985; Veblen, 1899; Sen, 2016; Bahaj et al., 2022; Banerjee et al., 2001; Bhanot et al., 2021; Hansen & Sørensen, 2025; Krumbiegel & Tillie, 2024; Lence et al., 2007; Merlingen et al., 2001; Patrick, 2023; Roy & Thorat, 2008)	FPOs as anchors for rural livelihoods: income and employment stability require collective aggregation, price pooling, value-addition, and exposure to diversified markets. Democratic governance ties social inclusion directly to income security and market power.	Prioritise aggregation, risk-sharing, stable marketing contracts, value-addition infrastructure, and real-time price information. Foster inclusive employment through FPO services. Embed transparent price pooling and enable non-farm livelihood expansion for members.
7	State Capacity, Decentralisation & Institutional Intermediation	(Kannan, 2011; Bardhan, 1989; Dreze & Sen, 2013; Lele, 1975; Varshney, 2002; Banerjee et al., 2001; Bhanot et al., 2021; Callison & Levin, 2016; Ciliberti et al., 2020; Grashuis, 2020; Grashuis & Franken, 2025; Grashuis & Magnier, 2018; Hua, 2025; Jana et al., 2014; Lence et al., 2007; Liang et al., 2020; Skevas & Grashuis, 2020; Smyth et al., 2001; S. Zhang et al., 2020; Zhao et al., 2023)	FPO viability depends on a supportive, well-coordinated institutional ecosystem: enabling policies, decentralized support, state-market-civil society convergence, and adaptive learning. Avoid overregulation and dependency traps; favour embedded autonomy and nested governance.	Build multi-level alliances: seamless FPO access to credit, technical support, and infrastructure via coordinated government/NGO/local body action. Institutionalise convergence forums (e.g., regular district-level councils). Encourage diagnostic, evidence-based feedback for continual policy adjustment.

Source: Compiled by the authors based on the bibliometric analysis and a further in-depth systematic literature review

3.2 Institutional Foundations for FPO Viability: Seven Thematic Clusters

This section elaborates the seven interlinked thematic clusters outlined above. Taken together, these clusters provide a comprehensive framework to analyse the institutional architecture of FPOs, integrating concerns of efficiency, equity, resilience, and decentralised governance.

3.2.1 Transaction Costs and Institutional Efficiency

Transaction costs—the costs of negotiating, monitoring, and enforcing exchanges—are foundational to FPO viability (Coase, 1937; North, 1990). As hybrid institutions, FPOs internalise these frictions by aligning incentives and norms through governance structures that minimise market inefficiencies (Williamson, 1985).

FPOs reduce ex-ante costs via collective bargaining and templated contracts, streamlining negotiation and enforcing de facto control where formal property regimes are weak (Grossman & Hart, 1986; Hart, 1987; Barzel, 1997). They manage ex-post hazards—such as shirking or quality dilution—through relational contracts and reputational enforcement, as seen in Mahagrapes' quality-assurance protocols[7]' (Williamson, 1985; Roy & Thorat, 2008).

The 'Doubling Farmers' Income' (DFI) report highlights FPOs as a response to high transaction costs by recommending aggregation, logistical coordination, and collective access to credit and infrastructure (DFI, 2018). FPOs thus embody Coase's model of firms as cost-minimising arrangements under uncertainty. This perspective aligns with Gulati et al. (2022), who argue that FPOs offer institutional avenues to overcome market failures and high transaction costs, but their efficacy depends on coordinated policies, streamlined governance, and ecosystemic support beyond symbolic promotion.

Contemporary scholars expand this view. Wäckerle (2014) frames institutions as affective-cognitive constructs; Vatiero (2021) emphasises power asymmetries in relational contracting; and de Vries (2023) shows how localised rule interpretation shapes FPO governance. Magnusson and Ottosson (2009) warn against rigid cooperative legacies, calling for adaptive institutional design. Petrović and Krstić (2011) distinguish adaptive from evolutionary efficiency, arguing that rising complexity may indicate institutional maturation, not failure. This explains why early-stage FPOs face high coordination costs before stabilising.

Field evidence from Kerala supports these insights. Singh (2021, 2022) shows that digital procurement and shared infrastructure help reduce costs. Yet, Bardhan (1989) cautions that without political safeguards—like member-driven audits and grievance redress—decentralised entities risk elite capture. Recent policy scholarship underscores this logic.

Thus, transaction cost economisation in FPOs is not so much about eliminating frictions as about harnessing them to build trust, specialisation, and resilience. Effective FPOs blend formal rules (contracts, incentives) with informal norms (social capital, local enforcement) to navigate institutional voids and deliver sustainable value.

3.2.2 Collective Governance & Institutional Design

Participatory governance and institutional design underpin both the legitimacy and operational resilience of FPOs. Collective governance refers to how members share authority, create and revise rules, and hold leadership accountable—balancing decentralised decision-making with coherent organisational direction.

Elinor Ostrom's foundational principles—such as clearly defined boundaries, participatory rule-making, monitoring, graduated sanctions, and nested structures—offer mechanisms to sustain cooperation (Ostrom, 1990). Mancur Olson's logic of collective action warns that rational individuals may shirk responsibility in large groups unless selective incentives or sanctions are in place (Olson, 1965). These insights converge: institutional design matters because it mitigates free-rider problems and enables accountability.

In practice, this means regular General Body Meetings, inclusive voting, federated boards (e.g., by village or crop), and by-laws that codify participatory rule-making and resource use. These mechanisms institutionalise voice, embed trust, and deliver selective benefits necessary for cooperation.

Institutions are not static. Hodgson (2004) and Commons (1934) stress that institutional rules are historically embedded, path-dependent, and negotiated through collective will. Hayek's (1945) theory of dispersed knowledge supports decentralised rule-making, while Buchanan (1975) emphasises constitutional constraints and voluntary cooperation as preconditions for collective enterprise.

de Vries (2023) adds that governance requires shared interpretations and local legitimacy, while Magnusson & Ottosson (2009) caution against path-locked cooperative legacies that resist innovation. Ménard sees FPOs as hybrid institutions, balancing state regulation, market pressures, and community norms (Shirley & Ménard, 2005). O'Hara (2022) calls this a structural contradiction—FPOs must pursue efficiency while upholding democratic production relations.

Indian scholars deepen this view. Uphoff (1986) and Baviskar (2007) show that grassroots governance depends on intermediary institutions, local trust, and civic norms. Deshpande & Reddy (1990) reveal how caste hierarchies and elite capture can distort formal cooperativism, while Agarwal (2001, 2010) shows that gender equity requires explicit quotas and women's leadership development.

Recent livestock studies reinforce this: adoption of artificial insemination correlates with trust in intermediaries and reliability of delivery systems (Seth et al., 2025). The DFI Committee differentiates FPOs from cooperatives by emphasising entrepreneurial flexibility under company law—but warns of mission drift if profit motives overtake member interest (DFI, 2018).

Kannan (1998) and Parthasarathy (2003) highlight how high-trust environments like Kerala allow embedded governance that blends democratic process with social protection. Sutradhar (2024) finds that, in Assam, community memory and cultural legitimacy shape FPO endurance. Jossa (2019) champions socialist cooperativism, where decentralised ownership and democratic surplus-sharing improve efficiency and equity. Shah (1996) warns that participatory ideals collapse without operational clarity and managerial skill. Nair (1987) shows that local institutions often prioritise social cohesion over legal compliance, highlighting the importance of cultural intelligibility.

In summary, robust FPO governance requires:

a) Transparent and inclusive decision-making through elections, by-laws, and federated structures;

b) Cultural legitimacy embedded in norms and leadership customs;

c) Balancing equity and efficiency via hybrid governance models;

d) Adaptive architecture that resists lock-in and responds to evolving needs;

e) Safeguards against exclusion, including quotas, grievance mechanisms, and support for marginalised groups.

Together, these design principles and governance practices produce democratically resilient and operationally effective FPOs—capable of sustaining cooperation amid structural constraints and market volatility.

3.2.3 Empowerment, Inclusion & Social Capabilities

This cluster frames FPOs not just as economic entities but as vehicles for inclusive agency and social transformation. Drawing on Sen's capability approach, development entails expanding substantive freedoms for historically excluded groups—women, landless labourers, and lower castes—through institutionalised participation (Sen, 1999; Dreze & Sen, 2013).

Arrow's social choice theory warns of elite dominance and preference cycling in collective decision-making (Arrow, 1951, 1963), while Simon's bounded rationality (1957) stresses the need for simple, accessible rules. Together, they justify mechanisms like rotational leadership, participatory by-laws, and inclusive voting protocols to democratise governance.

Acemoglu and Robinson caution that unchecked power leads to extractive structures; downward accountability tools—like member audits and grievance redressals—are essential to prevent elite capture (Acemoglu & Johnson, 2023; Acemoglu et al., 2001). Birchall (2001) supports member-centric mutualism, arguing that equity ownership can embed empowerment in institutional design.

Bergstrom et al. (1986) show that interdependent preferences and altruism lower coordination costs and foster inclusive cooperation. Ayres and Veblen warn against symbolic inclusion that lacks genuine agency (University of California, 1963; Veblen, 1899). FPOs must, therefore, embed empowerment not only in governance architecture but in everyday practice.

Gandhi's Gram Swaraj, Kumarappa's economy of permanence, Upadhyaya's Antyodaya and Ray's new organizing principles of the economy and society offer ethical imperatives for decentralised, moral economies (Gandhi, 1947; Kumarappa, 1948; Upadhyaya, 1965; Ray, 2024).

Empirical studies confirm these foundations. Deshpande and Reddy (1990) and Agarwal (2001, 2010, 2018, 2020) show that caste and gender distort participation unless corrected by quotas, leadership training, and land rights. Banerjee and Duflo (2011) emphasise contextual institutional nudges. Schmid (1978) argues for assessing institutional outcomes by distributional fairness.

Structural inequalities persist. Drèze & Sen (2002), Ramachandran (2000), and Nair (1987) emphasise cultural legitimacy and local resonance over formal compliance. Global studies by Gijselinckx (2014), Ostrom (1990), North (1990), and Coase (1937) underline that inclusive governance fosters trust, adaptability, and durability.

In sum, empowerment and inclusion are constitutive of FPO governance. They must be embedded not as procedural formality but as lived, evolving institutional ethos.

3.2.4 Sustainable Agriculture & Long-Term Resilience

This cluster explores how FPOs act as institutional vehicles for sustainable agriculture and resilience, particularly among smallholders in fragile agroecological zones. Drawing from Ostrom's principles for governing commons—defined boundaries, collective choice, monitoring, and nested enterprises—FPOs enable participatory irrigation schemes, agroecological practices, and community-run seed and compost banks (Ostrom, 1990).

However, sustainability demands ongoing adaptability. Deshpande and Reddy's study of *Pani Panchayats* (local self-governance institutions for water resources) reveals how success can falter when participation weakens and feedback loops fail (Deshpande & Reddy, 1990). This supports O'Hara's argument that ecological concerns must be embedded in institutional DNA, not added as afterthoughts (O'Hara, 2022). Similarly, Ménard and Shirley highlight the role of nested institutions and feedback systems in sustaining performance (Shirley & Ménard, 2005).

Rodrik (2008) critiques standardised templates, urging context-sensitive models aligned with local agroecologies. FPOs embody this by tailoring sustainability strategies—crop diversification, soil health, and water management—to regional realities. Myrdal's theory of circular causation underscores that ecological deficits often co-occur with social and institutional vulnerabilities, requiring integrated solutions (Myrdal, 1970).

Polanyi (1944) and Whalen (2021) argue that markets must be socially embedded; FPOs anchored in local ethics and collective accountability counter unsustainable commodification. Veblen and Commons likewise stress that institutions evolve through social learning and shared norms, not just formal mandates (University of California, 1963).

Indian thinkers reinforce these views. Nadkarni (2001) calls for internalising environmental costs via land-use and pricing reforms. Shah (1996) and Rao et al. (2016) emphasise decentralised monitoring, ecological literacy, and inclusive safeguards. Banerjee and Duflo (2011) offer empirical backing for adaptive, feedback-driven institutional designs.

Environmental justice literature deepens this by stressing equity. Boyce and James (2002) warns of elite-driven ecological decisions that exclude poor communities. Pimbert (2009) and Pretty (2008) advocate for deliberative, community-led models, while Patel (2012) frames FPOs as platforms for resisting extractive agri-food systems. Empirical evidence from Shah and Rao et al. confirms that hybrid FPOs—combining ecological mandates with local legitimacy—are more resilient. Sustainability thus requires embedding environmental stewardship into norms, leadership, and incentives.

By integrating Ostromian self-governance, Rodrikian contextuality, Myrdalian coordination, and Indian ecological thought, this cluster positions FPOs as adaptive institutions of resilience, rooted in community, ecology, and justice.

3.2.5 Externalities & Institutional Failure

This thematic cluster examines how FPOs, as hybrid institutions, address systemic market failures—such as public-goods deficits, negative externalities, information asymmetries, and coordination breakdowns—that disproportionately affect rural agricultural economies.

Arrow's impossibility theorem highlights the challenge of aggregating individual preferences into collective decisions that satisfy fairness, rationality, and non-dictatorship simultaneously (Arrow, 1963). FPOs must navigate this institutional dilemma by designing governance mechanisms that reflect diverse member interests without sacrificing organisational coherence.

Arrow's broader work on uncertainty and public goods further explains how unregulated markets fail to provide essential services—such as price discovery, risk-pooling, and infrastructure—especially where benefits are non-excludable or coordination-intensive (Arrow, 1963, 1974). In contexts of environmental risk and shared resource dependence, FPOs consolidate dispersed knowledge, facilitate credible market signals, and foster cooperative risk-sharing frameworks.

Akerlof's "market for lemons" and Stiglitz's theory of moral hazard expose how thin rural markets suffer from adverse selection and opportunistic behaviour (Akerlof, 1970; Stiglitz, 1989). FPOs counteract these failures by developing reputation-based enforcement, peer monitoring, and quality standardisation, thereby lowering transaction costs and re-establishing trust-based exchanges.

In addition, Simon's bounded rationality highlights the cognitive and informational limits that restrict smallholders' market participation (Simon, 1957). FPOs alleviate these burdens by offering advisory services, mobile-based market information, and structured peer learning, enabling more informed and equitable participation.

Ménard and Shirley emphasise nested institutions in correcting coordination failures (Shirley & Ménard, 2005). FPOs fulfil this role by aggregating procurement, input distribution, and storage—functions that neither state nor market actors perform efficiently. These polycentric governance mechanisms support contractual enforcement and decentralised oversight.

In India's rural economy, Mellor argues that FPOs are crucial intermediaries for linking smallholders to growth processes through economies of scale and service delivery (Mellor, 2017). Raj similarly notes that decentralised planning alone cannot overcome spatial and social heterogeneity, calling for institutional sensitivity to local agrarian diversity (Raj, 1984; Jacob, 2024).

Patnaik warns that, in the absence of institutional buffers, smallholders face acute vulnerability to price shocks, indebtedness, and resource depletion (Patnaik, 2007). FPOs act as redistributive platforms—strengthening bargaining power, stabilising income through pooled pricing, and advocating for support schemes like MSP.

Thomas argues for expanding the reach and scope of cooperative credit societies to service the rural economy (Bagchi, 2022; Thomas, 1930). Rath traces the decline of India's cooperative credit system to political interference, regulatory rigidity, and member alienation, stressing the importance of autonomy and participatory governance in new-generation FPOs (Rath, 2016). Likewise, de Vries's

situational logic reveals that legacy inefficiencies persist unless institutions formalise adaptive learning via feedback loops (de Vries, 2023).

Comparative lessons from Earl's analysis of Canada's United Grain Growers show that cooperatives must continuously evolve to withstand deregulation and external shocks, warning against institutional stasis and misaligned policy regimes (Earl, 2019).

Together, these insights affirm that FPOs function as institutional correctives to market failure—provisioning public goods, facilitating collective action, and redistributing access to essential services. Robust FPO design demands trust-building norms, inclusive governance, learning systems, and context-specific public goods delivery. In doing so, FPOs reinforce both economic efficiency and distributive justice within agrarian institutional ecosystems.

3.2.6 Income Security, Employment & Market Participation

This cluster explores how FPOs enhance rural income stability, employment, and durable market participation—especially for smallholders vulnerable to systemic shocks. FPOs are conceptualised not merely as intermediaries, but as embedded socio-economic institutions.

Karl Polanyi's critique of disembedded markets warns that markets divorced from social safeguards generate precarity (Polanyi, 1944). In India's liberalised regime, deregulation and subsidy withdrawal have eroded smallholder protections. FPOs counteract this by re-embedding market exchange within norms of reciprocity and collective action. Veblen's analysis of elite domination further affirms that participatory governance is key to preventing capture and ensuring fair distribution (Veblen, 1899).

Hanumantha Rao's vision of decentralised, employment-focused development resonates in FPOs that link members to local value chains (Rao, 1985). Banerjee and Duflo show that simple, context-sensitive nudges—like reducing complexity—can reshape livelihood behaviours (Banerjee & Duflo, 2011), reinforcing the value of institutional design.

Sen's emphasis on institutional stabilisers—MSPs, cooperative credit, and decentralised procurement—is reflected in FPO functions like pooled marketing and collective storage. Patnaik contends that FPOs mitigate rural distress by restoring access to bargaining power and essential services amid policy retreat (Patnaik, 2003). Bagchi critiques capital–labour asymmetries, which democratic FPOs address through inclusive governance and equitable access (Bagchi, 1995).

Chand, as also Kannan and Raveendran, underscore that employment-led rural transformation requires decentralised institutions to counter India's jobless industrial growth (Chand et al., 2022; Chand, 2023; Kannan & Raveendran, 2009). FPOs serve as anchors for non-farm diversification, value addition, and local labour mobilisation.

Post-Keynesian Institutional Economics views FPOs as regional stabilisers during macroeconomic shocks, buffering employment and consumption cycles (Whalen, 2022). Hodgson's path-dependence theory affirms the payoff of early investments in governance, trust, and feedback (Hodgson, 2006), seen in FPOs' rotating leadership and capacity-building. India's DNP 2024 reinforces this

trajectory—mandating price transparency, minimum price guarantees, and value-addition grants — enhancing FPOs' economic role.

In sum, FPOs operate as engines of inclusive transformation, stabilising livelihoods by institutionalising decentralised governance, value-linked employment, and reciprocal exchange (Polanyi, 1944; Veblen, 1899; Whalen, 2022).

3.2.7 State Capacity, Decentralisation & Institutional Intermediation

This cluster examines how FPOs' performance and sustainability depend on the institutional ecosystem—state capacity, civil society, and intermediary actors. FPOs are not self-contained market units but embedded organisations shaped by multi-level governance, policy environments, and support systems.

Bardhan (2002) warns that decentralisation without accountability can enable elite capture. However, when designed effectively, it fosters participatory development by embedding decision-making in local norms. For FPOs, panchayats, SHGs, and cooperatives act as platforms for mobilisation, governance, and dispute resolution (Singh, 2021).

Drèze and Sen (2013) argue democratic outcomes stem not only from state action but civic engagement. FPOs thus require participatory membership to shape leadership and strategies. Birchall's theory of member-centric mutualism demands that FPOs align economic goals with democratic inclusion (Birchall, 2001, 2002). Singh (2022) critiques top-down FPO regimes for alienating members and stifling innovation, whereas decentralised tools—like digital platforms and federated credit—have enabled scale without eroding accountability.

The DFI Report (2018) reframes the state as an orchestrator of decentralised institutional scaffolding through instruments like credit guarantees, equity infusion, CACMP hubs, and capacity-building. This aligns with Ménard and Shirley's concept of nested institutional arrangements (Shirley & Ménard, 2005), where state infrastructure interacts with local norms.

Institutional design must also ensure political credibility. Börner et al. (2004) define adaptive state capacity not just in terms of resources, but responsiveness and credible long-term investment. Kannan advocates for state–community compacts centred on inclusive development and institutional learning (Kannan & Raveendran, 2009).

Varshney (2002) shows that civil society networks amplify FPOs' bargaining power and visibility. Similarly, Lele, Rao, and Deshpande & Reddy advocate for meso-level coherence between grassroots bodies and formal policy (Lele, 1975; Rao, 2007; Deshpande & Reddy, 1990). Radhakrishna (2020) cautions that liberalisation without safeguards marginalises smallholders. FPOs must act as institutional buffers—embedding market action in collective accountability (Patnaik, 2007).

Faghih and Samadi (2021) offer a lens of institutional evolution—layering, drift, and conversion—to explain how FPOs reconcile policy incentives, norms, and constraints. This calls for iterative recalibration of governance and member relations. These dynamics are captured in the Theory of

Member-Centric Mutualism, integrating Coase's institutional logic, Williamson's hybrid governance, Ostrom's polycentricity, and Sen's capability approach (Coase, 1937; Ostrom, 1990; Sen, 1999; Williamson, 1985). Whalen's systems thinking and Raina's institutional learning models affirm FPOs as platforms for context-driven adaptation (Whalen, 2022; Pal, 2003).

Hollingsworth & Boyer (1997) and Picciotto (1995) argue that neither markets nor states alone can overcome coordination failures at scale. FPOs, if supported by enabling ecosystems, mediate this gap by fostering autonomy, accountability, and adaptive governance.

In conclusion, the state's role is not dominance but orchestration—facilitating decentralised, capacitated, accountable structures. The viability of Indian FPOs rests on a dual imperative: robust institutional scaffolding and vibrant member-driven governance.

3.3 Toward an Integrated Governance Framework for FPOs

This section integrates the seven thematic clusters into a conceptual governance framework that links institutional theory with policy relevance. It enables scholars and practitioners to assess FPO performance across domains of design, function, and context. The framework draws from institutional pluralism—from Veblen and Commons to Ostrom and Sen—and is empirically grounded in the Kerala case.

3.3.1 Mapping Clusters to Performance Domains: Each thematic cluster aligns with a core performance domain crucial to FPO effectiveness. These mappings clarify how institutional logics shape governance outcomes (Table 2).

Table 2: Mapping Thematic Clusters to FPO Performance Domains

Sl No.	Thematic Cluster	Mapped Performance Domain	Analytical Focus
1	Transaction Costs & Institutional Efficiency	Institutional efficiency	Reduction of market frictions and enhancement of stable exchange
2	Collective Governance & Institutional Design	Participatory governance	Internal accountability and inclusive rule-making
3	Empowerment, Inclusion & Social Capabilities	Social inclusion and agency	Enhancement of member voice and representation
4	Sustainable Agriculture & Long-Term Resilience	Ecological sustainability	Resilience through environmental stewardship
5	Externalities & Institutional Failure	Collective coordination and public goods access	Shared risk management and provisioning of public goods
6	Income Security, Employment & Market Participation	Livelihood security and economic integration	Enhanced bargaining and value realisation
7	State Capacity, Decentralisation & Institutional Intermediation	Institutional embeddedness and state synergy	Multilevel support and systemic coherence

Source: Authors' synthesis based on institutional economic frameworks and empirical fieldwork

These mappings offer diagnostic value and serve as foundations for measurable indicators and policy levers.

3.3.2 Synergies and Systemic Interlinkages: Though distinct, clusters interact systemically. Reducing transaction costs enhances participatory governance and skill development. Inclusive design improves environmental compliance. Effective state intermediation builds institutional trust and buffers external shocks. These interdependencies demand a holistic lens, recognising FPOs as adaptive responses to agrarian complexity, not static market actors. This perspective aligns with institutional pluralism, where hybrid forms evolve via layering, drift, and conversion (Samadi & Faghih, 2021), stressing contextual fit over formal optimality.

3.3.3 A Nested Conceptual Schema for FPO Governance: Drawing on Williamson's four-level institutional schema (Williamson, 1996), FPOs are seen as hybrid, polycentric entities operating across three nested levels:

a) *Micro-Incentive Layer (Firm-Level Governance):* Informed by incomplete contract theory and property rights, this layer includes incentive-compatible designs like equity shares, patronage bonuses, and redistribution mechanisms (Barzel, 1997; Grossman & Hart, 1986; Hart, 1987). The aim is alignment between member behaviour and collective goals, incorporating trust and local norms.

b) *Meso-Governance Layer (Organisational Design):* Here, Ostrom's design principles, Sen's capability approach, and Birchall's mutualism model inform democratic decision-making, transparency, and social legitimacy (Birchall, 2002; Ostrom, 1990; Sen, 1999). Hodgson's path-dependence lens underscores governance as iterative and shaped by learning (Hodgson, 2006).

c) *Macro-Institutional Layer (Political Economy Interface):* This includes the legal-policy infrastructure and broader civic environment. Bardhan, Acemoglu, and Sen emphasise decentralised accountability, inclusive institutions, and public action (Acemoglu & Johnson, 2023; Bardhan, 2002; Dreze & Sen, 2013). Tools such as e-NAM, digital payments, infrastructure, and regulatory compliance shape FPO trajectories.

This schema identifies leverage points—contracts, governance, or public policy—that enhance sustainability. Ramachandran and Patnaik remind us that institutional design must resist commodification without social safeguards (Ramachandran, 2000; Patnaik, 2003).

3.3.4 Empirical Operationalisation: Kerala Case: Kerala serves as a testbed for the seven-cluster framework. Qualitative insights and structured surveys translated each cluster into measurable indicators. These were compiled into composite indices, enabling cross-sectional benchmarking and longitudinal tracking (Appendix Tables 2 & 3).

Our findings show that Kerala FPOs excel in participatory governance and coordination (Clusters 2 & 5) but lag in empowerment and sustainability (Clusters 3 & 4). This underscores systemic interdependencies. The results support Petrović and Krstić's theory of adaptive efficiency:

institutional frictions are not inefficiencies but investments in trust and routine (Petrović & Krstić, 2011).

Kerala's success reflects its civic capital. Local panchayats, cooperative traditions, and digital platforms facilitated governance innovation and market access (Kannan, 2011). This affirms Varshney's argument that institutional capacity is rooted in associational strength, not merely formal policy (Varshney, 2002).

4. Empirical Validation of an Institutional Economics Lens on FPOs

Unlike prior evaluations that focus narrowly on financial or operational metrics, our approach captures the institutional complexity of FPO functioning—linking enablers and barriers to transaction costs, governance, social capability, ecological resilience, externalities, market participation, and state intermediation. The findings validate three key propositions:

(a) Institutional ambidexterity defines FPOs—they serve as sites of both empowerment and constraint.

(b) Layered governance is critical—FPOs navigate intersecting state, market, and community systems.

(c) Embedded reform is vital—sustainable performance requires deep social anchoring beyond formal compliance (Polanyi; Ostrom).

This multidimensional model offers a scalable tool for assessing FPO performance across diverse institutional landscapes.

Appendix Table 1 profiles 12 sample FPOs in Kerala across 59 variables, mapped to seven thematic clusters. A key finding is Kerala's strong path dependency, illustrating how FPOs often evolve from older cooperatives and benefit from civil society networks, responsive local governments, and departmental convergence.

The FPOs in our study generally exhibit high institutional maturity—profitability, digital integration, and supply chain participation. Yet challenges persist – minimal youth involvement, fragmented landholdings, and aging leadership ("tired horses"). Despite this, Kerala's grassroots ecosystem reflects resilience rooted in social capital and decentralised capacity.

4.1 Interpretation of Thematic Institutional Clusters Based on Composite Indexes

Table 3 synthesizes the Kerala findings by cluster, using Enabler, Barrier, and Aggregate indices across Members (n=52) and BoDs (n=38).

Table 3 Comparative Index Summary of Thematic Institutional Clusters Influencing FPO Performance - Perspectives from Members and Board of Directors

Sl No.	Thematic Cluster	Member (Index)			Board of Directors (Index)		
		Enabler	Barrier	Aggregate	Enabler	Barrier	Aggregate
1	Transaction Costs & Institutional Efficiency	75	57	66	83	69	76
2	Collective Governance & Institutional Design	86	93	89	85	81	83
3	Empowerment, Inclusion & Social Capabilities	78	61	70	69	56	53
4	Sustainable Agriculture & Long-Term Resilience	97	75	86	85	38	61
5	Externalities & Institutional Failure	94	82	88	90	81	86
6	Income Security, Employment & Market Participation	86	80	83	95	69	82
7	State Capacity, Decentralisation & Institutional Intermediation	86	65	76	90	56	73

Source: Field survey conducted by the authors among 52 Members and 38 Board of Directors of FPOs in Kerala in June-July 2025[8]

i. *Transaction Costs & Institutional Efficiency:* Members report moderate gains (66) via collective input and marketing, but face credit frictions, price volatility, and weak logistics. BoDs (76) highlight digital tools and coordination gains. These patterns confirm Coase's and Williamson's views on hybrid institutions reducing transaction costs, albeit incompletely (Coase, 1937; Williamson, 1985).

ii. *Collective Governance & Institutional Design ;* High member scores (89) reflect transparent elections, public disclosures, and leadership accountability. BoDs (83) note SOPs and training but cite elite dominance and irregular meetings. Ostrom's and Commons' theories affirm this layered maturity within Kerala's democratic culture (Ostrom, 1990; Commons, 1934).

iii. *Empowerment, Inclusion & Social Capabilities:* Moderate scores (Members: 70; BoDs: 53) point to training and NGO support, but reveal that elite capture, youth disempowerment, tokenistic gender inclusion, and exclusion of oral tenants[9] remain barriers. The findings confirm Ostrom's emphasis on social capital and Sen's focus on capability building . Polanyi's concept of embeddedness is critical here—structural inequalities are socially rooted, and mere inclusion mechanisms fail without genuine empowerment.

iv. *Sustainable Agriculture & Long-Term Resilience:* Members report high enablers (97), citing composting, seed banks, and pest alerts, but note gaps in climate strategy and water planning (86). BoDs offer a more pessimistic view (61). This disparity reflects an implementation asymmetry. Top-down sustainability measures lack embeddedness, reaffirming Polanyi's socio-ecological critique and Ostrom's emphasis on nested ecological governance. Kerala's

environmental vulnerability demands institutional coupling between ecological practices and market planning.

v. *Externalities & Institutional Failure:* High enabler indices (Members: 88; BoDs: 86) arise from collective sales, dispute resolution, and buyer partnerships. Still, intermediaries, payment delays, and contract failures persist. These align with North's institutional persistence and Stiglitz's market failure mitigation theories (North, 1990; Stiglitz, 1989). Kerala FPOs operate as ambivalent institutions, both offsetting and suffering from weak external institutions. Their maturity is evident, but full insulation from systemic failures remains elusive.

vi. *Income Security, Employment & Market Participation:* Moderate–high performance (Members: 83; BoDs: 82) reflects value addition, price pooling, and aggregation. Yet missing buyer contracts, price volatility, and brand weakness limit stability. Williamson's and Grossman & Hart's contract theories help explain persistent risk exposure (Grossman & Hart, 1986).

vii. *State Capacity, Decentralisation & Institutional Intermediation*: Enabler scores (Members: 76; BoDs: 73) cite Panchayat links, credit access, and Krishi Bhavan support. Yet bureaucratic delays, weak convergence, and compliance burden hinder coordination. This paradox—decentralised structure with centralised inertia—supports Buchanan and Hayek's arguments for localised autonomy and knowledge (Buchanan, 1975; Hayek, 1945).

5. Discussion and Conclusions: Institutionalising the Future of FPOs in India

FPOs in India are no longer peripheral; they signify a shift in how rural institutions are imagined and governed. Drawing on our framework and field insights, this section synthesises theory, evidence, and policy.

(i) Global Resonance and Institutional Legacy

Globally, institutional economics has shaped farmer collectives by embedding cooperation, governance, and adaptive learning. Foundational thinkers—Veblen, Commons, North, and Ostrom—demonstrated how shared norms and institutional rules reduce transaction costs and support enduring cooperation. Notably, Ostrom's eight design principles and North's "rules of the game" remain influential in cooperative reforms.

These ideas are evident in practice: Rwanda's coffee[10] cooperatives apply Ostrom's principles to ensure local accountability and transparency, while Vietnam's rice collectives employ inclusive mechanisms to curb elite capture (Francesconi & Wouterse, 2022; Powell, 2011). Thailand's farmer organisations reflect Sen's capability approach, fostering sustainability and farmer agency (Nicolas Faysse, 2018; Widadie et al., 2021).

Comparative insights from Africa, Latin America, and Asia show that FPOs thrive when economic coordination is linked to research, policy, and grassroots governance. Rooted in the *Farmer-First*

ethos, such collectives bridge institutional gaps and co-create innovations for resilient, sustainable agriculture (Scoones & Thompson, 2009). These cases affirm that robust FPOs are institutionally enabled—not spontaneously formed—and evolve through bricolage and layering in response to neoliberal shifts, environmental stress, and digital transformation.

These international patterns reinforce Kerala's findings: resilient FPOs arise from embedded, co-evolving relationships among communities, markets, and the state.

(ii) Field-Level Diagnostics and Constraints

Field data from Kerala reveal FPOs as both institutionally promising and structurally fragile[11]. Some other examples include:

- *MahaGrapes*[12] in Maharashtra, which exemplifies transaction-cost reduction and relational contracting, using traceability, member-led committees, and residue monitoring to ensure compliance—an application of Williamson's governance logic and reputational enforcement.
- AMUL's federated model reflects Acemoglu and Robinson's (2013) idea of inclusive institutions through internal transparency, benefit-sharing, and democratic participation.
- *Kudumbashree's*[13] women-led initiatives in Kerala apply Sen's capability approach by integrating agroecology, financial access, and decentralised skill-building.

Yet several systemic constraints persist:

- Capital scarcity limits aggregation, infrastructure, and value-chain integration, forcing dependence on intermediaries.
- Legal ambiguity between the Companies Act and cooperative laws creates friction in registration, taxation, and audits[14] (Buchanan & Tullock, 1962; Neti, 2022).
- Social hierarchies distort governance, enabling elite control over BoD selection and weakening accountability.
- Inadequate monitoring, weak digital systems, and poor board training fuel free-rider issues and erode trust.

These constraints suggest that FPO sustainability requires not just technical fixes, but institutional recalibration: clear rule frameworks, democratic governance, and context-specific support to build adaptive capacity.

(iii) Role of the State and Intermediaries

The Indian state and international actors act as *institutional intermediaries* that shape the rules, capacities, and legitimacy of FPO ecosystems. National schemes—such as the 10,000 FPO Programme, e-NAM, and the DNP—aim to lower transaction costs and digitise market access through structured incentives. Yet, regulatory overreach, fragmented facilitation, and digital asymmetries often exclude smaller or remote FPOs.

International bodies provide complementary scaffolding. The Tata-Cornell Institute (TCI) uses digital traceability to monitor active FPOs, operationalising bounded rationality through data-based

governance[15]. The FAO's cooperative templates and World Bank financing reflect Birchall's mutualism and Arrow's risk mitigation logic, respectively. However, these models must adapt to India's diverse institutional contexts to avoid technocratic overdesign.

Our Kerala fieldwork highlights the importance of nested institutions. Panchayat-linked FPOs, embedded in local governance and trust networks, benefit from civic intermediation and participatory planning—demonstrating how decentralised institutions can amplify state effectiveness.

(iv) Institutional Roadmap: A Five-Pronged Reform Strategy

Sustaining India's FPO movement requires not only capital and technology but institutional reform rooted in adaptive design, inclusion, and feedback. Based on field insights and institutional theory, five strategic priorities emerge:

- *Simplify governance and ensure regulatory coherence:* Fragmented oversight and legal ambiguity raise transaction costs and erode trust. A semi-decentralised facilitation council can align national policies with local realities.
- *Build internal capacities and embed inclusive governance:* Elite dominance[16], weak leadership[17], and token gender roles undermine accountability[18]. Ostrom and Simon recommend modular training, simplified decision rules, and quotas to democratise governance (Singh,2023).
- *Finance institutional resilience through patient capital:* Capital gaps block value addition[19]. Transaction cost logic supports pooled lending, credit guarantees, and reputation scoring to ensure liquidity and scaling (Nikam et al., 2023).
- *Enable embedded diagnostics and reflexive feedback:* Adaptive institutions require learning loops[20]. District-level think tanks (Jose & Chathukulam, 2025) and a national FPO observatory[21] can track inclusion, governance, and performance for real-time policy correction.
- *Foster polycentric and multi-sectoral alliances:* FPOs thrive in polycentric governance systems with civic intermediation[22]. Federated structures foster co-produced accountability and innovation across state, civil society, and markets.

(v) Institutional Implications of the Seven-Cluster Framework:

The Kerala study translated seven institutional clusters—transaction costs, governance, inclusion, sustainability, externalities, income security, and state intermediation—into diagnostic enabler and barrier indices. Each cluster maps onto a core performance domain: transaction cost reduction fosters stable exchange; participatory governance builds accountability; gender agency advances empowerment; ecological resilience depends on sustainable practices; externality management supports public goods access; income security rests on market integration; and effective state intermediation ensures coherence and embeddedness. These clusters are interlinked—e.g., reducing transaction costs depends on good governance; income gains require both inclusion and institutional scaffolding. This framework offers a context-responsive lens for designing resilient, scalable FPOs.

(vi) FPOs as Co-Evolving Institutional Forms:

FPOs must be understood not as static legal entities but as dynamic, co-evolving institutional forms, continuously shaped by "working rules" negotiated through collective learning, adaptation, and embedded social norms. Their long-term viability rests on how well incentives, governance structures, and member capabilities are aligned within supportive institutional ecosystems.

This calls for institutional convergence, not replication—merging the participatory ethos of cooperatives with the managerial discipline of corporate models, supported by decentralised training, inclusive governance, and reflexive policy feedback. A harmonised governance architecture must enable region-specific pathways while maintaining coherence across national objectives.

FPOs are far more than market aggregators. At their best, they are anchors of rural democratisation, ecological stewardship, and livelihood resilience—realising the constitutional promise of economic justice and decentralised development. Their future role aligns with India's Viksit Bharat @2047 vision and the SDGs—especially on poverty, gender equity, livelihoods, and climate resilience.

Realising this potential requires policy actors to embrace embedded autonomy, institutional pluralism, and context-responsiveness—hallmarks of institutional economics. FPOs, in this light, are not policy endpoints but living institutions capable of transforming India's agrarian future through collaboration, inclusion, and innovation.

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Appendix

Appendix Table 1: Comprehensive Profile Variables of 12 Sample FPOs in Kerala

Sl. No.	Key Variable	Summary Description
1	Name and Year of Incorporation	Registered between 2017–2022; all names associated with localities.
2	Legal Form	9 are FPO companies; 3 are cooperatives.
3	Board Composition	10% Women; Youth nil; SC/ST nominal presence.
4	Board Size	Average of 10 members.
5	Board Meeting Frequency	Monthly meetings held (12/year).
6	AGM Participation Rate	60–70% of members attend AGMs annually.
7	CEO Qualification	MBA, B.Sc. Agri, Agri-Business Management.
8	Key Staff Positions	CEO, Accountant, Quality Controller, Marketing Officer.
9	No. of PT Staff	12 total; members are paid on a piece-rate basis (even members join)
10	Office Ownership	Yes, office space is owned.
11	Number of Active Members	Approx. 350 per FPO.
12	District & Sub-District Presence	Each FPO is named after and operates within its local district/sub-district
13	Member Involvement	Members function as owners; active involvement.
14	Member Education Programs	Regular programs are conducted.
15	Training Exposure	4–5 trainings per FPO, including interstate exposure visits.
16	Equity Capital	Ranges from ₹2,000 to ₹5 lakhs.
17	Profit Status	Profit-making entities; breakeven crossed.
18	Net Profit/Loss	₹30 lakhs annual average net profit.
19	Annual Turnover	₹150 lakhs/year.
20	Gross Turnover/Month/Member	Approx. ₹4,570 per member per month.
21	Key Commodities/Products	Banana, Tapioca, Jackfruit, Pineapple, Millets, Fruits, Vegetables, Honey
22	Broader Commodity Type	Dairy, Spices, Meat, Food Products
23	Product Basket Diversity	Multi-commodity focus with integrated offerings.
24	Commodity-Activity Link	Value chain linkages evolving; not fully developed.
25	Collective Activities	Input procurement, marketing, processing
26	Dominant Marketing Channel	Trader-driven; direct marketing is also active.
27	Price Discovery Method	Negotiation is the primary method.
28	Presence of Formal Contracts	Only 10% have formal contracts; gradually improving.
29	Direct Market Access	Yes, some direct sale channels are in place.
30	Market Constraints	Market entry and competition barriers reported.
31	Use of ICT Tools	Good usage, especially social media & digital comms.
32	Type of Digital Tools	WhatsApp, e-commerce platforms.

33	Accounting Software	Yes, used for financial management.
34	ERP/Digital Accounting	ERP and digital accounting have been adopted.
35	Use of UPI/Digital Finance	UPI and online banking are actively used.
36	Mobile Network Availability	Yes, connectivity is present in offices.
37	Aggregation Centres Present	Yes, 70% of FPOs use them.
38	Ownership of Aggregation Centres	Yes, owned by FPOs.
39	Storage Capacity	Avg. 10 metric tonnes.
40	Processing Unit Presence	8 out of 12 FPOs have units.
41	Equipment Ownership	Yes, essential tools & machinery owned.
42	Types of Infrastructure	Includes land, buildings, and vehicles.
43	Infrastructure Utilization	High, approx. 80% of owned infrastructure is used.
44	Promoting Agency	Mostly NGOs.
45	NGO/CSO Support	Yes, both technical and managerial.
46	Panchayat Engagement	Full engagement from Gram Panchayats.
47	LSG Support	Good support in infra, finance, and convergence.
48	Govt. Dept Linkages	Strong linkages with Agri/Horti Depts.
49	District-Level Representation	Yes, FPOs participate in district-level committees, headed by the District Collector, coordinated by DGM NABARD (One coordination Committee is in operation at the State Level)
50	Number of Govt. Schemes Accessed	Multiple schemes accessed across FPOs.
51	Types of Schemes Accessed	Input, credit, subsidy; support staff mobilise schemes.
52	Scheme Mobilisation Staff	Dedicated persons in some FPOs.
53	Grievance Redressal Mechanism	Exists; often mediated by 'Parish Vicars'.
54	Agroecological Practices	Yes, reflected through the adoption of organic farming and water harvesting measures (reinforced by the state-led push for pesticide-free farming).
55	Climate Resilience Practices	Initiated (e.g., millet cultivation)
56	Innovation Adoption	Yes, examples are reported, but networking remains weak.
57	Operational Constraints	Networking and market reach are challenges.
58	Debt Burden	Avg. ₹50 lakhs loan burden per FPO.
59	Access to Credit	Yes, loans from financial institutions.

Note: Data in Appendix Table 1 are aggregated averages of 12 FPOs, validated collectively in a review meeting where all FPOs confirmed accuracy. This process enhances both reliability and representativeness.

Source: Based on annual reports of 12 FPOs, and discussions with FPO Board of Directors and CEOs.

Appendix Table -2: Index of FPO Institutional Performance: Farmer Perceptions across Enabler and Barrier Dimensions (n=52)

Mediating Variable (Practice/Mechanism): These mediating variables reflect member-experienced enablers or barriers that directly influence FPO performance.

Thematic Cluster 1: Transaction Costs & Institutional Efficiency

[Institutions reduce transaction costs and improve coordination; role of property rights and local knowledge in reducing operational frictions].

Sl No	Mediating Variable (Practice/Mechanism)	Likely Impact	Nature	Index*
1	Collective purchase of inputs	Reduces input cost	Enabler	4
2	Joint marketing of produce	Increases price realisation	Enabler	5
3	Aggregation of members produce before sale	Reduces per-unit marketing cost	Enabler	4
4	Centralised transport coordination	Reduces logistics costs	Enabler	3
5	Access to bulk discounts through input tie-ups	Lowers input costs	Enabler	4
6	Timely distribution of inputs	Minimises planting delays	Enabler	5
7	Shared machinery (e.g., harvesters, graders)	Reduces fixed costs	Enabler	4
8	Warehouse/storage facility availability	Reduces post-harvest losses	Enabler	4
9	Digitised procurement and accounting systems	Reduces error and corruption	Enabler	3
1	Delay in Labour availability	Causes uncertainty	Barrier	1
2	Price manipulation by local middlemen	Increases transaction risk	Barrier	4
3	Inadequate market intelligence (e.g., price signals)	Suboptimal sales decisions	Barrier	4
4	Frequent last-minute price fluctuations	Creates uncertainty	Barrier	2
5	Poor internal record-keeping	Reduces trust and efficiency	Barrier	5
6	Limited bargaining power with traders	Lowers income margins	Barrier	2
7	High cost of input credit	Adds financial burden	Barrier	5

Thematic Cluster: 2. Collective Governance & Institutional Design

[Internal organisational processes, member engagement, rule enforcement, and leadership structures that shape participatory governance and internal accountability]

Sl No	Mediating Variable (Practice/Mechanism)	Likely Impact	Nature	
1	Transparent election of Board/office bearers	Builds trust, reduces elite capture	Enabler	5
2	Clear bylaws and rulebook shared with all members	Enhances procedural clarity	Enabler	5
3	Leadership accountability mechanisms (e.g., feedback forums)	Improves responsiveness	Enabler	5
4	Regular and well-attended General Body Meetings (GBMs)	Encourages member voice	Enabler	4
5	Member representation in key decisions	Strengthens ownership	Enabler	4
6	Rotation or term limits for board positions	Prevents dominance by a few	Enabler	3
7	Training for board and office bearers on governance roles	Increases professionalism	Enabler	5
8	Public disclosure of FPO financials	Promotes transparency	Enabler	5
9	Functioning grievance redressal system	Boosts internal legitimacy	Enabler	4
1	Poor attendance in meetings	Weakens collective oversight	Barrier	4
2	Board not responsive to member concerns	Erodes trust and motivation	Barrier	4
3	Domination by a few individuals or families	Leads to capture and exclusion	Barrier	5

4	Non-participatory decision-making processes	Alienates ordinary members	Barrier	5
5	Lack of clarity on member rights and responsibilities	Creates confusion and disengagement	Barrier	5
6	Infrequent communication between the board and members	Breaks accountability loops	Barrier	5
7	Absence of formal accountability mechanisms	Promotes misuse of authority	Barrier	5
8	Poor record-keeping of meeting minutes and resolutions	Weakens traceability	Barrier	5
9	Elite members monopolising procurement or benefits	Breeds inequity	Barrier	5
10	Low awareness among members about the governance structure	Limits meaningful participation	Barrier	4
Thematic Cluster: 3. Empowerment, Inclusion & Social Capabilities [Member empowerment, skill development, gender and caste inclusion, and institutional support systems that enable more equitable and capable participation in FPOs]				
1	Skill training for members, including women and youth	Enhances capacity and agency	Enabler	5
2	Capacity building by an NGO or facilitating agency	Strengthens organisational know-how	Enabler	5
3	Special training for Board members from marginalised groups	Improves inclusive governance	Enabler	2
4	Regular awareness campaigns on FPO roles and entitlements	Builds informed participation	Enabler	5
5	Functional literacy training for members	Improves decision-making capacity	Enabler	5
6	Support for first-time participants (e.g., women/youth orientation)	Reduces entry barriers	Enabler	4
7	Reserved representation for women or SC/ST in governance	Institutionalizes inclusion	Enabler	2
8	Peer learning visits to other FPOs	Builds confidence and leadership	Enabler	5
9	Dedicated support staff for training follow-up	Reinforces learning retention	Enabler	4
1	Women's participation is still tokenistic	Symbolic, not substantive inclusion	Barrier	1
2	Illiteracy limits effective participation	Reduces voice and oversight	Barrier	5
3	Over-dominance by male leaders in meetings	Suppresses diverse viewpoints	Barrier	1
4	Lack of materials in the local language or dialect	Limits training effectiveness	Barrier	5
5	Exclusion of tenant farmers or landless people from benefits	Weakens equity and legitimacy	Barrier	4
6	Cultural norms restricting women's mobility or participation	Limits involvement in decision-making	Barrier	4
7	Gender-insensitive meeting timings or locations	Disincentivizes attendance	Barrier	5
8	Absence of gender/disability-inclusive planning	Reduces reach and relevance	Barrier	1
9	Youth are not offered leadership roles	Stagnates innovation	Barrier	2
10	Training programs are too technical or one-off	Lowers retention and usability	Barrier	5
11	The perception that only elites benefit from NGO programs	Breeds disillusionment	Barrier	5

Thematic Cluster: 4. Sustainable Agriculture & Long-Term Resilience [Ecological practices, risk mitigation systems, adaptive strategies, and environmental governance mechanisms that influence the long-term resilience of FPOs and their members]				
1	Promotion of organic/natural farming inputs	Enhances soil health and sustainability	Enabler	5
2	Dissemination of pest/disease alerts via WhatsApp or mobile groups	Reduces crop losses	Enabler	4
3	Crop diversification initiatives	Reduces dependency risk	Enabler	5
4	Training on climate-resilient agronomic practices	Enhances adaptive capacity	Enabler	5
5	Seed banks or local seed saving initiatives	Ensures input security	Enabler	5
6	Encouragement of agroforestry or mixed farming	Builds ecological stability	Enabler	5
7	Support for water-efficient technologies (e.g., drip irrigation)	Enhances water sustainability	Enabler	5
8	Collective composting or bio-input production	Lowers input costs and builds ecology	Enabler	5
9	Inclusion of sustainability goals in FPO business planning	Aligns market with ecology	Enabler	5
1	No climate adaptation strategy	Exposes members to weather risks	Barrier	3
2	Absence of water conservation measures	Heightens vulnerability in dry spells	Barrier	5
3	Overuse of chemical inputs is encouraged by local suppliers	Degrades soil and ecosystem health	Barrier	4
4	Lack of early warning systems (pest, flood, drought)	Leads to preventable crop loss	Barrier	5
5	Inadequate training on sustainable practices	Limits behaviour change	Barrier	5
6	Monoculture crop focus due to market incentives	Increases long-term risk	Barrier	4
7	Weak institutional linkages to weather or agricultural advisories	Reduces preparedness	Barrier	5
8	Limited support for transitioning to organic farming	Slows the adoption of sustainable methods	Barrier	2
9	Short-term profit focus of FPO leaders	Ignores long-term ecological risks	Barrier	3
10	Poor storage for organic or perishable produce	Leads to high post-harvest loss	Barrier	5
11	No inclusion of sustainability indicators in performance evaluation	Weakens ecological accountability	Barrier	3
Thematic Cluster: 5. Externalities & Institutional Failure [Market distortions, regulatory voids, informal power structures, and coordination gaps that disrupt the FPO's ability to function as a fair and stable collective institution]				
1	Dispute resolution through general body meetings	Reinforces trust and fairness	Enabler	5
2	Collective or bulk selling to reduce price volatility	Enhances price stability	Enabler	5
3	Partnership with institutional buyers (e.g., government, NGOs)	Reduces market risk	Enabler	4
4	Use of written contracts with buyers and vendors	Improves transaction security	Enabler	5
5	Access to price and demand information	Reduces exploitation by intermediaries	Enabler	5
6	Inclusion of default handling clauses in contracts	Protects members against losses	Enabler	4
7	Linkage with legal aid or mediation services	Strengthens institutional redress	Enabler	5

8	Monitoring of buyer behaviour through feedback or ratings	Encourages fair trade practices	Enabler	5
1	Delayed payments from buyers	Weakens trust and financial stability	Barrier	2
2	Continued dominance of local intermediaries	Undermines collective bargaining	Barrier	5
3	Price deduction without explanation by buyers	Creates a perception of unfair trade	Barrier	5
4	Lack of enforcement of buyer contracts	Exposes members to non-payment risk	Barrier	5
5	Frequent changes in government procurement rules	Adds unpredictability	Barrier	5
6	Bureaucratic delays in subsidy or scheme benefits	Disrupts financial planning	Barrier	1
7	Collusion between local traders and external agencies	Weakens FPO market position	Barrier	5
8	Absence of regulatory support for enforcing price transparency	Fosters asymmetric information flows	Barrier	5
9	Political interference in FPO decision-making	Undermines autonomy	Barrier	4
10	Disputes over land, infrastructure, or market space	Delays collective operations	Barrier	5
11	Lack of insurance or safety nets against buyer default	Heightens vulnerability	Barrier	5
Thematic Cluster: 6. Income Security, Employment & Market Participation [Economic outcomes for members shaped by market linkages, aggregation efficiency, buyer contracts, price stability, and employment generation through the FPO ecosystem]				
1	Direct marketing linkages with local or institutional buyers	Improves price realisation	Enabler	4
2	Aggregation of produce enabling bulk sales	Increases bargaining power	Enabler	5
3	Facilitation of MSP procurement or government market linkage	Ensures price floors	Enabler	3
4	Buyer contracts guaranteeing a minimum price	Reduces income uncertainty	Enabler	3
5	Market information is shared regularly with members	Helps members time sales better	Enabler	5
6	Pre-season marketing planning with members	Strengthens collective decision-making	Enabler	5
7	Price pooling or average pricing mechanism	Stabilises incomes across members	Enabler	5
8	Processing or value addition facilities (grading, packaging, etc.)	Enhances price premium	Enabler	5
9	Local employment through FPO operations (e.g., sorting, packaging)	Adds livelihood opportunities	Enabler	5
1	The price offered by FPO is not better than the open market	Reduces member motivation	Barrier	5
2	Lack of buyer guarantee contracts	Increases post-harvest market risk	Barrier	4
3	Delays in payment after sales	Weakens income security	Barrier	3
4	Insufficient quantity aggregation	Fails to attract bulk buyers	Barrier	2
5	Lack of market diversification (overdependence on one buyer)	Heightens vulnerability	Barrier	5
6	No access to premium or certified markets (organic, export, etc.)	Limits income-enhancing potential	Barrier	4
7	FPO is unable to store and time sales	Results in distress selling	Barrier	4
8	Absence of tools for price discovery or comparison	Allows trader manipulation	Barrier	5
9	Weak brand identity of FPO products	Lowers buyer interest	Barrier	5
10	Middlemen re-enter through informal channels	Dilutes direct marketing gains	Barrier	5

Thematic Cluster: 7. State Capacity, Decentralisation & Institutional Intermediation [The responsiveness, accessibility, and institutional support provided by the state and intermediary agencies, including regulatory facilitation, service delivery, and convergence with FPO goals]				
1	Easy access to subsidised credit via government banks or NABARD	Enables timely investment	Enabler	4
2	Regular contact with local agriculture officers or extension agents	Improves technical awareness	Enabler	5
3	Timely registration and renewal of FPO under the Companies Act	Maintains legal continuity	Enabler	5
4	Support from state agencies for FPO business planning and DPRs	Strengthens long-term viability	Enabler	5
5	Availability of facilitation by NGOs or cluster-based business organisations (CBBOs)	Eases navigation of bureaucracy	Enabler	5
6	Inclusion in state procurement or public distribution schemes (e.g., PDS, ICDS)	Expands market access	Enabler	2
7	Participation in government FPO federations or umbrella networks	Enhances collective voice	Enabler	5
8	Timely release of scheme funds or subsidies	Builds trust in state support	Enabler	4
9	Assistance in documentation for government schemes	Reduces barriers to access	Enabler	4
10	Financial or technical support from Gram Panchayat /Block Panchayat/District Panchayat	Strengthens local ownership of FPO	Enabler	4
11	Allocation of local government plan funds for FPO infrastructure	Enables asset creation	Enabler	4
12	Panchayat facilitation in FPO registration/documentation	Reduces bureaucratic friction	Enabler	4
13	Convergence between the Panchayat agriculture plan and FPO activities	Aligns local development with collective farming	Enabler	5
14	Joint initiatives (e.g., agro-processing unit) co-owned by LSGs and FPOs	Enhances local economic linkages	Enabler	4
15	Regular interface between the FPO office bearers and the Panchayat Standing Committee	Improves responsiveness	Enabler	5
16	Support from church/CSO-based farmer outreach networks	Enhances farmer mobilisation	Enabler	5
17	Long-term handholding by civil society (e.g., women's groups, cooperatives)	Builds trust and resilience	Enabler	5
18	Use of Kudumbashree or other SHG networks to mobilise marginalised farmers	Expands participation	Enabler	5
1	Political interference in Panchayat-level FPO affairs	Undermines autonomous governance	Barrier	1
2	Difficulty accessing government schemes	Frustrates member expectations	Barrier	5
3	Delays in FPO registration, renewal, or compliance	Interrupts operations	Barrier	2
4	Complex documentation and digital hurdles for scheme application	Excludes small/marginal farmers	Barrier	2
5	Lack of awareness among members about relevant schemes	Results in underutilization	Barrier	5
6	Non-cooperation from local officials or agricultural staff	Hinders FPO-state collaboration	Barrier	4
7	Political favouritism or elite capture in scheme allocation	Breeds inequity and resentment	Barrier	5
8	No convergence between line departments (agriculture, irrigation, etc.)	Reduces institutional efficiency	Barrier	1

9	Absence of grievance redressal mechanisms for scheme delays	Weakens institutional credibility	Barrier	1
10	FPO not included in state/district agriculture planning	Marginalises collective enterprises	Barrier	5
11	Delays in subsidy reimbursement for FPO-led input supply	Strains financial flows	Barrier	4
12	Conflict between Panchayat priorities and FPO business plans	Creates duplication or resource mismatch	Barrier	5
13	Selective support to politically aligned FPOs	Breeds perceptions of unfairness	Barrier	5
14	Civil society over-dependence without FPO capacity-building exit plan	Leads to dependency	Barrier	4
15	Lack of convergence between NGO and government-led FPO efforts	Causes fragmentation of support	Barrier	5
***For Enablers: 1= Strongly Disagree, 5 = Strongly Agree. For Barriers: 1 =Strongly Agree , 5 = Strongly Disagree**				

Appendix Table -3: Index of FPO Institutional Performance: Board of Directors' Perceptions across Enabler and Barrier Dimensions (n=38)

Thematic Cluster 1: Transaction Costs & Institutional Efficiency

These mediating variables reflect the Board of Directors–experienced enablers or barriers that directly influence FPO performance.

	Mediating Variable (Practice/Mechanism)	**Likely Impact**	**Nature**	Index*
1	Coordination of bulk procurement to reduce member input costs	Reduces cost variability and improves trust	Enabler	4
2	Inventory and logistics optimisation for output aggregation	Increases efficiency and coordination	Enabler	4
3	Digital recordkeeping to minimise transaction errors	Improves auditability and transaction tracking	Enabler	5
1	Difficulty in aligning procurement timing with member needs (e.g., sowing)	Leads to inefficiencies and dissatisfaction	**Barrier**	3
2	Inadequate transport infrastructure for moving goods efficiently	Increases transaction costs and delays	**Barrier**	5
3	Frequent price fluctuations due to a lack of market data integration	Reduces the ability to plan aggregation and sales effectively	**Barrier**	3
4	Low member compliance with collective sale agreements	Undermines price negotiation power and trust	**Barrier**	4
Thematic Cluster 2: Collective Governance & Institutional Design				
1	Timely disclosure of board decisions to the general body	Enhances transparency and member trust	**Enabler**	5
2	Regular board training on governance roles and legal compliance	Improves decision quality and accountability	**Enabler**	5
3	Use of standard operating procedures (SOPs) for board functioning	Promotes consistency and reduces ambiguity	**Enabler**	5
4	Board evaluation and self-assessment practices	Supports leadership improvement and course correction	**Enabler**	3
5	Conflict resolution mechanisms between the board and general members	Maintains cohesion and trust in leadership	**Enabler**	4
1	Dominance of a few individuals in board decision-making	Reduces inclusivity and weakens collective ethos	**Barrier**	5
2	Irregular board meetings or low quorum	Weakens governance functioning and responsiveness	**Barrier**	5

3	Lack of clarity in the division of responsibilities among board members	Leads to inefficiency and internal confusion	**Barrier**	2
4	Political interference in board composition or functioning	Compromises autonomy and credibility	**Barrier**	5
Thematic Cluster 3: Empowerment, Inclusion & Social Capabilities				
1	Leadership mentoring programs for women and youth members	Builds second-line leadership and enhances inclusion	Enabler	2
2	Representation quotas for women and marginalised groups in board committees	Improves diversity and voice in decision-making	Enabler	3
3	NGO- or CSO-supported capacity-building programs for directors	Strengthens soft skills, leadership, and governance abilities	Enabler	5
4	Use of mother tongue or inclusive language in meetings and documents	Facilitates participation from less-educated members	Enabler	5
1	Tokenistic presence of women on the board without real power	Limits genuine empowerment and reinforces structural bias	**Barrier**	1
2	Low confidence or participation by young or less-experienced board members	Reduces contribution diversity and innovation	**Barrier**	2
3	Cultural norms discourage women from speaking in meetings	Suppresses voice and marginalises perspectives	**Barrier**	5
4	Board dominance by local elite or upper castes	Reinforces exclusion and hinders participatory governance	**Barrier**	5
Thematic Cluster 4: Sustainable Agriculture & Long-Term Resilience				
1	Initiating partnerships with agencies promoting sustainable agriculture	Builds ecological credibility and long-term resilience	Enabler	5
2	Promotion of organic inputs and certification programs	Enables premium markets and reduces input risks	Enabler	4
3	Use of ICT tools (e.g., WhatsApp alerts on pests/weather)	Strengthens preparedness and minimises losses	Enabler	4
4	Board-led awareness campaigns on soil health and water conservation	Deepens member commitment to sustainability	Enabler	5
5	Integration of climate resilience in business plans	Improves risk assessment and continuity planning	Enabler	4
1	Limited knowledge among board members about climate-smart practices	Reduces capacity to lead sustainability transitions	**Barrier**	3
2	Lack of incentives for members to adopt ecological practices	Slows behavioural shift toward sustainability	**Barrier**	3
3	Absence of board-level sustainability benchmarks or indicators	Weakens accountability for long-term resilience	**Barrier**	2
4	Dependence on chemical-intensive farming due to market or input pressures	Undermines agroecological objectives and increases vulnerability	**Barrier**	2
Thematic Cluster 5: Externalities & Institutional Failure				
1	Establishment of internal dispute resolution committees	Reduces internal conflicts and builds organisational stability	Enabler	3
2	Collective bulk selling strategies to stabilise prices	Protects members from market volatility and price crashes	Enabler	5
3	MoUs or agreements with reliable institutional buyers	Reduces risk of default and ensures payment predictability	Enabler	5
4	Periodic review of buyer performance and grievance logs	Enhances buyer accountability and trust	Enabler	5
5	Board facilitation of timely payment follow-ups with buyers	Strengthens financial liquidity for members	Enabler	5
1	Delayed payments from institutional buyers	Strains FPO's cash flow and member trust	**Barrier**	5

2	Influence of powerful intermediaries disrupting collective sales	Undermines aggregation efforts and bargaining power	**Barrier**	5
3	Lack of effective legal mechanisms to address buyer default	Leaves FPO vulnerable to external exploitation	**Barrier**	3
4	Parallel informal trade channels operating within the member base	Creates leakage and disincentivises collective marketing	**Barrier**	4
Thematic Cluster 6: Income Security, Employment & Market Participation				
1	Facilitating direct linkages with local and institutional buyers	Improves price realisation and reduces dependency on middlemen	Enabler	5
2	Organising aggregation for bulk sales and processing	Enables higher margins and scale economies	Enabler	5
3	Providing market intelligence and pricing data to members	Supports informed sales decisions and planning	Enabler	5
4	Introducing value-addition initiatives (e.g., grading, packaging)	Increases employment opportunities and member income	Enabler	4
5	Setting up rural retail outlets or collection centres	Enhances market participation and accessibility	Enabler	5
1	Lack of assured buyers for members' produce	Increases income uncertainty and post-harvest losses	**Barrier**	4
2	Failure to compete with open market prices	Undermines trust and discourages participation	**Barrier**	4
3	Delays or inefficiency in aggregation and dispatch	Leads to market rejection and lower earnings	**Barrier**	3
4	Limited access to cold storage and transportation infrastructure	Reduces shelf life and profitability	**Barrier**	4
Thematic Cluster 7: State Capacity, Decentralisation & Institutional Intermediation				
1	Regular coordination with the Agriculture Department officers	Enhances access to schemes, training, and expert advice	Enabler	5
2	Support from local government (Panchayat) for infrastructure or services	Strengthens convergence with local development and visibility	Enabler	5
3	Handholding by NGOs or CSOs for compliance and reporting	Builds administrative capacity and sustainability	Enabler	5
4	Timely access to subsidised inputs and credit via government channels	Reduces member financial strain and improves trust in FPO	Enabler	4
5	Leveraging convergence across departments (Agriculture, Irrigation, Finance)	Expands resource access and coordination	Enabler	4
1	Delay in FPO registration or renewal processes	Hampers formal functioning and financial access	**Barrier**	2
2	Lack of clarity or overload in compliance requirements	Reduces time for field operations and increases administrative burden	**Barrier**	2
3	Poor responsiveness from local agricultural offices	Weakens link to state support and undermines motivation	**Barrier**	5
4	Limited inclusion of FPOs in panchayat-level planning or budgeting	Misses an opportunity for embedded institutional support	**Barrier**	4
***For Enablers: 1= Strongly Disagree, 5 = Strongly Agree. For Barriers: 1 =Strongly Agree , 5 = Strongly Disagree**				

Notes

[#] The authors express gratitude to the anonymous reviewers for the insightful and constructive comments.

The authors are grateful to the BoDs of all the selected 12 FPOs. We express our gratitude to all the farmers who participated in the FGDs. We acknowledge the National Bank for Agriculture and Rural Development (NABARD), India, for partly supporting us in organising a two-day national seminar titled '*Revitalising Farmer Collectives in Kerala: Evaluating Performance and Strategising for a Sustainable Future*'.

The authors gratefully acknowledge the contributions of Dr. Nidhi Karwasa and Dr. Vaishali Gupta, researchers at Amity Business School, for their support with bibliometric analysis, and Ms. Samiksha Yadav, PhD scholar, for organising and managing the bibliometric references using Mendeley.

[1] Throughout this paper, the term 'FPOs' is used as a broad, inclusive category to refer to all forms of collective institutional arrangements created by and for farmers. This includes but is not limited to Farmer Producer Companies, agricultural cooperatives, self-help group federations, and other mutualistic organizations engaged in agricultural production, marketing, and support services. While FPOs in the Indian policy context often refer to legally registered producer companies under the Companies Act, our conceptual framework encompasses all democratic, farmer-led institutions that aim to empower marginal and smallholder farmers by enabling collective action in market and institutional spaces.

[2] The three-stage design ensured (a) refinement of survey instruments through stakeholder consultation, (b) real-time triangulation of seminar insights with primary data, and (c) incorporation of the paper reviewers' recommendations to enhance validity and contextual relevance.

[3] The sample was not intended for performance evaluation of FPOs in Kerala but to assess the proposed methodology and conceptual framework; hence, a limited number of respondents - 52 FPO members and 38 board directors across 12 FPOs were selected purposively. The second field study, conducted in June–July 2025, was undertaken in response to reviewer comments during the journal's peer-review process.

[4] Cognitive interviews are a pre-testing technique used in survey design to evaluate how respondents understand, interpret, and mentally process questions, helping researchers refine wording and structure to improve clarity and validity.

[5] From this larger body of literature, 81 core articles were selected and cited across the seven thematic clusters

[6] While the bibliometric analysis revealed five dominant co-occurrence clusters, the seven thematic domains constructed in this study are informed by a broader body of theoretical and empirical literature. These additional categories—such as externalities, institutional failure, and state capacity - reflect key concerns in the Institutional Economics tradition that may be underrepresented in keyword networks but are central to understanding FPO governance in the Indian context and beyond.

[7] Mahagrapes is a successful grape-exporting FPO consortium in Maharashtra, India, known for its stringent quality-assurance systems, including residue monitoring, batch-wise traceability, and adherence to international phytosanitary standards to ensure export-grade produce (Roy & Thorat, 2008).

[8] The thematic indices presented in Table 3 are derived from composite scores based on stakeholder perceptions of mediating variables (enablers and barriers) across seven institutional clusters. The detailed list of variables, their qualitative interpretations, and index values used for constructing these thematic indices are provided in Appendix Tables 2 and 3. Appendix Table 2 reflects FPO member responses; Appendix Table 3 captures perceptions of Board Directors.

[9] Oral tenancy refers to informal, unwritten land lease arrangements that remain outside legal frameworks. As Eswaran (1990) shows in the case of Kerala's Kuttanad region, such tenancies, though widespread, lack legal enforceability and institutional support, often excluding tenants from formal credit systems and state entitlements.

[10] The first author taught at the National University of Rwanda (1999–2011), gaining insights into farmer collectives' role in post-genocide reconstruction, and served on the Academic Board of AERC, visiting several African countries. The second author studied farmer collectives during an eight-day field visit to Rwanda as part of the 2023 Commonwealth Local Government Conference. These experiences inform this paper's perspectives.

[11] The authors presented a paper at the 18th ICA Asia-Pacific Conference on 'The Political Economy of Cooperatives in Kerala.' To prepare this paper (Jose & Chathukulam, 2024), the authors conducted extensive fieldwork in Kerala, engaging with stakeholders of Farmer Collectives. Over the last three decades, the second author has undertaken more than 100 major research projects mostly on Local Self Government institutions & rural development across India. The authors' field observations in Kerala and across India also contribute to the arguments in this section.

[12] The authors did a telephonic interview with Sachin Korde, Technical Manager, MahaGrapes, Pune Maharashtra on November 23 and 25, 2024.

[13] Kudumbashree integrates microfinance, skill-building, and agro-ecology through women-led participatory structures linked to the Panchayati raj system, enhancing agency and environmental stewardship (Chathukulam & Thottunkel, 2010).

[14] Discussions with 35 Board of Directors (BoDs) from 12 FPOs revealed widespread frustration with complex bureaucratic procedures. Many shared personal stories about their FPOs, with some preferring FPOs to avoid the hurdles of registration under the Registrar of Cooperative Societies. They stressed the need for procedural simplification. As one BoD noted, *"License Raj Persists in Indian agriculture."* While the new economic policy ended 'license raj' in other sectors, its impact has yet to reach agriculture, leaving FPOs to face frequent bureaucratic challenges (interviews on July 3,4,5,17,18 and 26, 2024).

[15] TCI's real-time tracking platform supports FPO-level decision-making by reducing uncertainty—an application of bounded rationality in institutional governance (TCI, 2024).

[16] Elite capture often translates to the influence of vested interests in many FPOs. In Kerala, political parties frequently leverage these collectives to advance their political agendas.

[17] FPOs face significant challenges in recruiting qualified Chief Executive Officers (CEOs). All 12 FPOs reported difficulties in finding suitable candidates with professional qualifications and experience. Human resource planning is urgently needed, as staff turnover is high, and those who do join often leave within a short period. During the critical early stages of FPOs development, capable CEOs are essential

but remain unavailable. One major factor cited is the low salary offered, which, as revealed by some FPOs, is only ₹25,000 (less than $300) per month (interviews on July 3,4,5,17,18 and 26, 2024).

[18] Among the 12 FPOs we visited, none were women-led. Of the 35 BoDs we met, only six were women, representing less than 20% female participation. Similarly, SC/ST representation was minimal. These findings highlight the pressing need for inclusive governance in FPOs. Proper training for BoDs in business management is essential, as is fostering transparent and efficient management practices. Data from the TCI similarly underscores poor management issues among FPOs in India (interviews on July 20, 21,25,27,28, and 30 2024).

[19] Interviews with older FPOs in August 2024 revealed significant challenges in resource mobilization after government support ended, and banks were reluctant to lend to both FPOs and individual farmers. Farmers noted negative bank attitudes during FGDs held from August 22 to 24, 2024, and similar concerns emerged at the CRM seminar on November 1–2, 2024. However, by mid-2025, sample respondents opined that farmers who joined FPOs secured loans more readily than individual applicants and noted a marked improvement in credit access through collectivization.

[20] Our interviews revealed that all the FPOs operate as stand-alone entities, with no coordination among them. There was unanimous agreement on the need for a district-level coordination center, with suggestions to establish links with Local Self-Governments (LSGs) (interviews on August 13, 14,15,17,18, and 20, 2024). Similarly, majority of the farmers agreed the need to establish links with LSGs. (FGDs with farmers on August 22, 23, and 24, 2024). The seminar at CRM on Farmer Collectives (1 and 2, November 2024) also reached a similar conclusion, recommending the formation of a district-level think tank.

[21] In our interviews, all respondents expressed that they lack the time for research and are unaware of market trends and international business opportunities, which are essential for farmers. One BoD emphasized, "This is the era of the knowledge economy; knowledge is power, and knowledge is money" (interviews on August 13, 14,15,17,18, and 20, 2024). Similarly, 52 farmers highlighted the need to align crop cultivation with market demand (Three FGDs with farmers on August 22, 23, and 24, 2024).

[22] BoDs of FPOs emphasized that during the initial stages, collaboration with exporters is crucial, as there is much to learn about international marketing (interviews on August 13, 14,15,17,18 and 20, 2024).

Indian Public Policy Review 2025, 6(3): 85-103
https://doi.org/10.55763/ippr.2025.06.03.003

IPPR

Reforming the Indian Bar: The limits of technological solutions

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Abstract

A majority of Indians do not have effective access to legal services, despite the constitutional promise of access to justice. There are two intertwined reasons for this: the unavailability of a sufficient number of good quality lawyers, and the high costs of accessing legal services. The Indian legal profession is highly unequal, with 'prestige' being the currency of upward professional mobility. The professional regulator, the Bar Council of India, simply lacks the capacity to regulate quality. As a consequence, clients lack the information to access lawyers, and to understand the outcomes they desire from them, and the fees they have to pay. Legal aid solutions are only able to cater to a fraction of these unmet legal needs. In this paper, we observe that in the absence of regulatory reform, the Indian state and private players are attempting to use technology to address this capacity problem. The Supreme Court's e-Courts project promised to transform the system through information technology enablement of courts, while the private legal tech sector has designed several solutions, including lawyer matching platforms for delivery of legal services. However, the success of the e-courts project remains mixed at best, with the litigant remaining underserved, and private sector solutions have failed to reach scale due to regulatory uncertainty and their inability to build trust. The paper argues that technological solutions as currently designed are useful in fixing process-specific issues, but are inadequate to address the more fundamental problem of misaligned incentives and deep-rooted regulatory design flaws of the Indian legal profession, which require much broader scale reform.

Keywords: Technology, Solutions, Legal System, Lawyers, State capacity, Access to Justice.

Publication Date: 27 August 2025

[#] Varsha Aithala and Karthik Suresh are Assistant Professors of Law at the National Law School of India University, Bengaluru. We thank Ajay Shah, Akshay Jaitly, Amrita Agarwal, Amulya Purushothama, Hrishikesh Datar, Mugdha Mohapatra, Pavithra Manivannan, Pratik Datta, Renuka Sane, Sharada Shindhe, Shubho Roy, Susan Thomas, T. S. Somashekhar, and two anonymous reviewers for useful comments. We also thank Fuaad Vellakat, Sayan Dasgupta, and Tushar Anand for their assistance with data extraction and analysis. Author names appear in alphabetical order of surnames. Both authors contributed equally

1. Introduction

A country as vast and diverse as India must build independence and responsiveness in its judicial system to be able to safeguard the rights of its disadvantaged citizens. Ultimately, the legitimacy of the state is built on its citizens' trust in state institutions and in their capacity to govern. The paradox is that Indians show a high level of effective trust in the judiciary, but they do not show the same level of trust in legal professionals (CSDS, Lok Niti and Azim Premji University 2019). Indians view lawyers with scepticism, and do not report achieving satisfaction when seeking legal assistance (Krishnaswamy and Swaminathan 2019; Krishnan et al. 2014).

The Indian legal profession suffers from significant capacity constraints — symptoms of this problem include the unavailability of a sufficient number of good-quality lawyers and the high costs of accessing legal services. These costs include not only financial costs but also the time and effort spent on hiring and following up with a lawyer. This has been attributed to the lack of reliable information on the costs and benefits of pursuing legal action, and on the role of the lawyer in court. The Indian legal profession is highly stratified and unequal and does not seem to demonstrate effective signals of quality. This only serves to aggravate the feeling of distrust.

Attempts are being made by both the executive and judicial branches of the Indian state, as well as private sector actors, to resolve these issues using technological solutions. These solutions are intended to generate more information about court processes and provide information about the services offered by courts and lawyers along with their costs. However, while the use of technology can meaningfully contribute to the reform process, we warn against a 'digital first' approach that veers into the path of technological solutionism (Morozov 2013). Solutionist thinking 'presumes, rather than investigates, the problem it is trying to solve'. This approach could result in unintended consequences without solving the problem in the first place.

Our study begins with an explanation of the key issues preventing Indians from accessing lawyers to resolve their legal problems. It then highlights the various attempts made by the Indian state and India's rapidly growing tech sector to address these issues. We conduct a detailed evaluation of the available technological solutions offered by various private sector providers, and show how these have failed to overcome the significant market failure in the delivery of legal services. The paper concludes with the view that technological solutions, as currently designed, are limited in impact and highly inadequate for large-scale systemic reform of the legal services market in the country. Only full-scale regulatory reform can address the problems of access in the Indian legal profession.

2. The problem of unmet legal needs

Access to legal services in most countries is a right guaranteed by law. In India this right is guaranteed by the Constitution. However there is a large gap between assurance and access. This is the problem of unmet legal needs.

The problem of unmet legal needs is global in scope. The World Justice Project's global legal needs survey, conducted across 100,000 households in 101 countries, found that almost half of the respondents had experienced at least one legal problem in the last two years (World Justice Project 2019). These included problems related to housing, land, family, employment, and other issues critical to people's economic and social well-being.

Among those who reported experiencing a legal problem, more than half were unable to meet their needs for legal representation. The scale of this gap amounts to 1.4 billion people with unmet civil and administrative justice needs globally. This also imposes a heavy cost on societies, as people experience physical or stress-related ill health, loss of income or employment, or the need to relocate. Unmet legal needs also present serious macroeconomic challenges. It has been estimated that legal problems represent a cost of between approximately 0.5 and 3% of GDP annually for all countries (Organisation for Economic Co-operation and Development and the World Justice Project 2019).

While the problem of unmet legal needs is very much global, there are three specific causes in the Indian context: (i) low judicial capacity, (ii) high costs of accessing the legal system, and (iii) the difficulties of accessing a lawyer.

2.1 The problem of low judicial capacity

The judicial capacity problem in India has been discussed extensively, not only in the academic space but also in the Economic Survey and even in popular culture (Ministry of Finance, Government of India 2018; Aithala, Sudheer, et al. 2021).

One symptom of low judicial capacity is the low rate of civil litigation per capita. In 1881, 7198 civil suits were filed per million population — this number rose to 9931 per million by 1933. However, by the time of independence from British rule, this number had started to fall: to 3810 per million in 1947 and to a low of 1487 per million by 1967 (Galanter 2009a). In 2025, based on data from the National Judicial Data Grid (NJDG), 2650 civil suits per million population were instituted.[1]

The judicial system also suffers from low rates of productivity with wide variation across the country (Aithala, Sudheer, et al., 2021). Even when it comes to commercial matters such as debt recovery in large cities like Mumbai, the litigant has to contend with a 'substantive' hearing (i.e., a hearing that is not an adjournment) that comes only after two or three non-substantive hearings (Manivannan et al. 2023). All in all, this leads to a problem of predictability (Manivannan et al. 2024).

The capacity problem is complicated by the low availability of judges. In 2024, India had one subordinate court judge for every 63,000 people (Sir Dorabjee Tata Trust 2025). This is certainly an improvement since 1995, when India had one judge for every 100,000 people (Galanter 2009b). For comparison, England and Wales had a ratio of one judge for every 3750 people in 2023 (House of Commons, UK Parliament 2024).

2.2 The problem of costs while accessing the legal system

Accessing the legal system in India is a costly affair. It has been estimated that the high costs of litigation, e.g., travel to courts and conduct of cases, value of lost time, requirement of social support systems, litigants' expectations, etc. are collectively equivalent to 0.5% of India's GDP (Baruah et al. 2017). While the costs of hiring a lawyer vary widely across India, the costs of litigation (excluding lawyer's fees) was calculated at INR 1039 per day (i.e., roughly four days' worth of average wages) (Naik 2016). These observations, to a slightly lower extent, also hold for legal services availed by Indian corporations (Sankaraguruswamy and Varottil 2023).

2.3 The problem of accessing lawyers

When it comes to accessing lawyers, the state of affairs is even more concerning. To put it bluntly, the regulator for the legal profession in India, the Bar Council of India (BCI) (and the bar councils of India's 28 states) simply does not know how many advocates actively practise law in India.[2] The closest estimate available is that of the BCI Chairperson in 2013 — 'around 1.7 million registered advocates' in the Lok Sabha (2014). Using this estimate, the lawyer-to-citizen ratio would stand at one lawyer for every 752 Indians.[3] This ratio has doubled since 1989, when Marc Galanter estimated that there was one lawyer for every 336 Indians.[4] This problem alone provides deep insights into the lack of regulatory capacity at the BCI.

In most jurisdictions, the regulator for the legal profession performs the function of quality control and monitoring entry, such as by setting entry standards. This is done by one or a combination of methods, such as holding bar entrance examinations, mandating an apprenticeship or training with a full and senior member of the profession, or requiring continuing education and evaluation of quality every few years (Glen 2002).

In India, the BCI conducts the All India Bar Examination (AIBE) on an annual basis. Since 2010, a 'pass' grade in the examination has been necessary to obtain a certificate to practice law. However, while this examination imposes a qualification and enrollment condition on a new advocate's right to practice law, it does not help regulate quality effectively. The BCI itself observed that the AIBE's objective of improving the standard of the profession has failed — many advocates simply do not take the examination and continue practicing without the BCI's certificate of practice.[5] The examination is also plagued with administrative issues such as incorrect results being supplied, incorrect or badly framed questions etc. (Bar and Bench 2019). In other words, given the regulator's ineffective licensure controls upon entry, the regulator is forced to rely on ensuring post-entry competence of licensed practitioners (Trebilcock 2001).

Misconduct by lawyers is another area where the BCI and the state bar councils have drawn criticism. Under the Advocates Act, 1961 the client is required to file a complaint with the state bar council and the state bar council is required to dispose of the complaint within one year. If the complaint is pending for more than a year, under section 36B of the Advocates Act, 1961 the complaint is transferred to be heard by the BCI. However in December 2021 the Supreme Court noted that there is a practice among the state bar councils to 'deliberately delay the hearing of the

complaint' so that it automatically needs to be transferred to the BCI (Supreme Court of India 2021b).

The BCI's authority to decide whether an advocate has breached the rules of professional conduct has been described as a 'system of peer justice' where the disciplinary committees comprise only of advocates which has led to allegations of regulatory capture (Vidhi Center for Legal Policy 2020). This follows earlier remarks by the Law Commission of India which pointed out 'the crumbling regulatory structure' of the legal profession and its 'inherent problems of deficiency in professionalism, ethical decline and lack of devotion' (Law Commission of India 2017). The Law Ministry has attempted to frame new regulations to govern legal practitioners but so far there have been no major changes to the disciplinary mechanism.

3. The malaise in the Indian legal profession

Why do these deep and structural problems within the Indian legal system persist? There are multiple explanations. One explanation comes from the British practice of discouraging litigation by Indians by creating the 'myth of the litigious Indian' (Galanter 2009b; Moog 1993). Courts in British India were exclusionary by design — they imposed high rates of court fees, which discouraged all but the wealthiest litigants to file suits.

Another explanation comes from the Indian state's attempt to improve the judiciary by building carve-outs (specialised tribunals, consumer courts, alternative dispute resolution, etc.) rather than addressing the fundamental causes of delays and other factors that weaken the rule of law (Sahoo 2012; see also Kelkar and Shah 2022) This meant that most subordinate courts, and by extension the legal profession, did not develop deep institutional experience with complex cases of high value. As a consequence, the Indian judiciary decreases in capacity as one moves from the top of the hierarchy to the bottom (Robinson 2016).

However, the bulk of the academic literature addressing this topic in the Indian context has found that the deeper answers may lie with the notion of 'nobility' and 'prestige' in the Indian legal profession. This gap in 'prestige' between leading lawyers and others has deep colonial roots (Ballakrishnen 2012; Galanter 1974; D. B. Wilkins et al. 2017; Talesh 2013; Dezalay and Garth 2011). Colonial-era hierarchies between barristers trained in Britain and '*Vakils*' trained in India deepened professional hierarchies and created two separate classes of professionals (Galanter and Robinson 2013).

After India's independence from British rule, a small but elite cadre of lawyer-politicians, government lawyers and judges belonging to prominent families reimagined the concept of an 'Indian advocate' to protect their own prestige and political power. They have been termed the *Grand Advocates* — 'a stratum of legal superstars, advocates based at the Supreme Court and some High Courts, very visible, renowned and in high demand' (Williams 2020). Grand Advocates enjoy several advantages over other lawyers: fluency in English, family connections, being from a specific social

stratum (caste, religion, etc.) and junior lawyers found it easy to be referred to work with seniors from the same stratum.

Grand Advocates became sought after, since used the extensive human capital they have developed within the court system, nuanced knowledge of the formal and informal procedures and their reputational capital before judges to get more 'face time' and favourable verdicts for their deep-pocketed clients (Galanter and Robinson 2013). This steep and pervasive professional hierarchy continues to this day at the Indian Bar — for example, it has been argued that the notion of the 'Grand Advocate' persists in the formal recognition of the position of Senior Advocate in the Advocates Act, 1961 (Williams 2020).

The most significant consequence of this stratification of the Bar is that lawyers considered 'not prestigious' are underworked and underpaid. In India's lower courts, 'leading advocates' form a handful of the total advocates, followed by advocates who are 'below top' (established lawyers with more than ten years of practice), 'average' (men with many years of practice and some important position in the community outside the bar, but who lack the district-wide professional reputation of the top practitioners), and 'below average'. At the bottom, are 'briefless lawyers, struggling beginners or old, semi-retired practitioners' (Morrison 1972).

Lawyers from small towns often operate within existing constraints of lack of institutional support and pressures of social norms, social exclusion and local political positions. It is only through innovative methods, familiarity with disputants and the disputant's real interests, knowledge of specific laws that are pertinent to disputes, and network building with other small town lawyers, they manage to survive (Mamidi 2013). As a consequence, Indian lawyers are characterized by four distinctive features:

i. they practice the law as individual lawyers (as opposed to being part of larger law firms),
ii. they are oriented to courts and not other dispute resolution forums,
iii. they focus on oral performance (i.e., advocacy) rather than advising, negotiating, or planning for their clients, and
iv. they are relatively unspecialized as they do not limit themselves to one area of the law (Galanter 1968; Galanter and Robinson 2013; D. Wilkins 1992).

The client's engagement with the lawyer is episodic and not enduring and the lawyer is expected to deliver on performative aspects. This also means that Indian clients typically approach lawyers at a relatively later stage of the dispute.

It is therefore remarkable to us that most conversations concerning reforms in the legal profession in India today are about technological solutions. Technological solutions have focused on the problem of costs and, to a lesser extent, the quality of legal services. In the next section, we present some of these solutions.

4. Technological solutions

India has attempted to address the problem of low capacity with technological solutions. In this section, we look at various attempts by the state (i.e., the executive and the judiciary) and the private sector to fill the gap when it comes to accessing legal services.

4.1 The role of the state

The judiciary, along with the executive (i.e., the Ministry of Law and Justice, along with various state governments), have played a leading role in India's pivot towards the use of technology in enhancing access to legal services.

The *e-Courts* project, a 'mission-mode' project that has been implemented since 2005, seeks to employ information and communication technologies (ICTs) 'to transform the judicial system of the country by ICT enablement of courts and to enhance the judicial productivity, both qualitatively and quantitatively, making the justice delivery system accessible, cost-effective, reliable, and transparent' (Ministry of Law and Justice, Government of India 2023b) The project has a dedicated budget (receiving, on average, INR 2180 million each year after adjusting for inflation) and a dedicated coordinating agency (the e-Courts committee of the Supreme Court of India).

The e-Courts project has been carried out in three phases.

- In the first phase (2007-2015), the courts were computerised, court records were digitised, and case information systems were set up for litigants. Cloud computing architecture was applied to complement court capacities, and the infrastructure of Common Service Centres was widely utilised to ensure that litigants in rural regions of the country can access court services via phone and video conferencing facilities. In 2013, the government launched the eCourts website, which makes detailed case-related information available.
- The second phase of the project (2015-2023) has seen the development of litigant-centric software applications through the use of Free and Open Source Solutions (FOSS). This phase also saw some important initiatives, such as the *Tele-Law* scheme and the *Nyaya Bandhu* portal, which were started in 2017 (Aithala and De Souza 2018).
- The third phase, which is currently underway, is seeing the use of asynchronous virtual courts, Online Dispute Resolution (ODR) platforms, and the use of AI tools for document translation, prediction and forecasting of litigation patterns, automating judicial processes, use of natural language processing (NLP) for identifying patterns in statutes and precedents, automated scrutiny in e-filing, intelligent scheduling of cases, automated delivery of court summons by National Serving and Tracking of Electronic Processes (NSTEP), and litigant friendly chatbots.
    - Blockchain is being suggested for storing digital evidence and issuing warrants, in addition to other uses in judgments and court orders. The aim is to enable a 'unified technology platform for the judiciary, which will provide a seamless and paperless interface between

the courts, the litigants, and other stakeholders' (Ministry of Law and Justice, Government of India 2023a).

- In 2023, the Supreme Court inaugurated the Supreme Court Vidhik Anuvaad Software (SUVAS), an AI-powered translation tool to translate judicial documents between English and India's various regional languages. The transcription and live audio-visual streaming of court proceedings using AI was piloted in the Constitution Bench proceedings of the Indian Supreme Court with plans for its implementation to be extended across the country. Despite its limited reach, there is hope that this 'would truly transform the court into a court of record' (Spandana 2023).

While it is heartening to see the judiciary and the executive making efforts to improve access to legal services by adopting technology, we must also note that the record of the *e-courts* project is, at best, mixed (Aithala, De Souza, et al. 2021). At a design level, it is apparent that while courts are key stakeholders in these discussions, the litigant remains an unlikely recipient of limited tech-enabled solutions. When it comes to accuracy and correctness, the e-courts databases suffer from high rates of data errors, issues with standardisation and data quality, and the lack of systematic data quality reviews, and capacity building. The e-Committee's limited efforts to improve data standardisation and access have not yet seen success (Anand and Damle 2020).

4.2 Initiatives by the private sector

In recent years, India has seen many private sector providers offering legal technology products to lawyers, law firms, corporations, and consumers. The legal tech space can be divided into the following categories: legal service delivery, process efficiency, access to legal recourse, and do-it-yourself (DIY) tools (Shukla 2022).

Indian companies provide, and Indian clients (e.g., law firms and litigation offices) use document proofing, contract management, case management, document sharing applications, data security systems, virtual data rooms, and due diligence software. Consumers use legal tech tools for legal and statutory compliances like tax and intellectual property. There is an uptick in the use of online dispute resolution platforms. DIY solutions assist consumers in routine tasks like e-signatures, drafting, registration, and digital signatures. Several startups enable platforms and aggregation of legal services for consumers.

Startup firms that provide delivery of legal services and access to legal recourse occupy a unique space in India. Unlike other jurisdictions, Indian bar associations do not operate lawyer reference and search programs. Two types of portals exist. Some portals offer clients 'legal advice on a budget' from independent advocates and in-house counsel. Its objective is to standardise the quality and price of legal services, particularly for small businesses and individual clients, by clearly listing service delivery metrics and prices on the site.[6]

Others allow lawyers to list their personal information, professional experience, and services offered, with searchable profiles. To study the scope and operation for the market for legal services in India, we collected and reviewed information from the public profiles and lawyer lists available on an Indian lawyer-client matching website in April 2022, and analysed the extracted datasets. This platform has more than 5000 advocates registered on it.

Figure 1: Distribution of lawyers in India from a portal listing their services

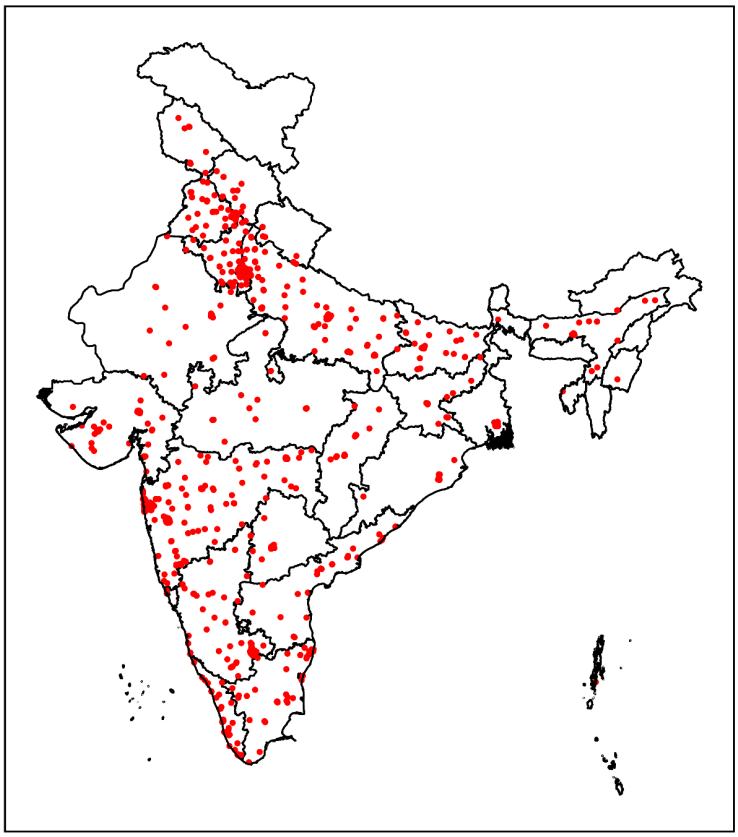

Figure 1: Distribution of 5040 lawyers in India from a portal for Indian lawyers. Lawyers are represented by a red dot. Source: authors' compilation.

A review of this dataset reveals that these lawyer platforms usually list the advocate's name, location/address, practice expertise, and years of experience; some also have an internal rating for the advocates on a scale of 1 to 5 and provide details of their hourly consultation fees. There is a concurrent, broad array of practice expertise among the advocates listed on these platforms in corporate laws, family laws, civil laws, including property, money recovery, consumer protection, employment, and criminal law matters.

They cater to the most common legal problems that everyday litigants face. Some offer specialist legal advisory services in addition to these general practice areas, including insurance law, taxation, and immigration laws. There is wide variation in the number of years of practice recorded for advocates listed on these sites, ranging from 1 year to more than 40 years.

With these web portals, we observed that lawyers are concentrated around India's urban centres, e.g., state capitals and large cities like Delhi, Mumbai, Bengaluru, Hyderabad, Chennai, Kolkata, etc. Ideally, while such portals could harness the efficiency of the private sector in terms of scale and reach, this would also mean that their adoption would be restricted to lawyers who have awareness of such portals.

Why are these platforms not reaching scale? One reason could be regulatory uncertainty. Rule 36 of the Bar Council of India Standards of Professional Conduct and Etiquette prohibits an advocate from soliciting work or advertising in any manner other than through personal relations.[7] At the same time, it remains unclear whether and how this rule could be made applicable to these platforms and advocates listed on them. The Supreme Court of India is currently hearing a writ petition that seeks to exempt such portals from the purview of the BCI rules (Supreme Court of India 2020).

The other reason could be that litigants may repose more trust in humans as trusted intermediaries when faced with opacity in the judicial system (Rostain 2019). When it comes to 'one-shotter' systems (like being a client of a lawyer in India), certain disparities are inherent in the transaction: individuals in lower socio-economic groups, those 'who do not speak one of the official languages', and individuals who live in larger communities with less social cohesion have fewer opportunities to know lawyers socially, and so, may not be able to rely on this means of information. Therefore, the lack of advertising tends to concentrate high-paying clients to the books of 'prestigious' lawyers, while clients with less capacity to pay would consequently need to engage 'non-prestigious' lawyers (Hudec and Trebilcock 1982).

5. The limitations of technological solutions

The problems of access in the Indian judicial system, at their core, are incentive problems. To begin with, the executive and the judiciary — let alone the public — do not have access to reliable information that would allow them to predict the quality of legal services, nor a sufficient baseline from which to evaluate quality.

Systematic collection and access to such information can constitute a comprehensive feedback loop that builds state capacity. Given the absence of information, actors within the system are incentivised to monopolise the flow of information, or at least, use one's access to superior information to seek an edge over others who don't. Galanter calls this the problem of 'repeat player' litigants being able to frustrate the attempts of 'one-shotter' litigants (Galanter 1974).

This asymmetry of information should be mitigated by using a combination of two methods. The first is to conduct periodic reviews of operational Management Information Systems (MIS) i.e., to study the inflow and outflow of cases and other events on a weekly, monthly, and annual basis.[8] The second is to conduct periodic needs surveys that ascertain how people understand and interact with the legal system and how and why they choose particular paths to justice, putting people's needs and capabilities at the centre of policy design and reform (Pleasence and Balmer 2019).

The e-Courts project has partially succeeded in setting up the infrastructure for courts to be able to review their MIS. However, when it comes to perceptions regarding the legal system, India has started to make progress only recently. In the United States, for example, the National Center for State Courts has routinely conducted state-level perception surveys over the last fifty years. These surveys are qualitative analyses of the experiences of litigants in different US states. In India, Baruah et al. (2017), as well as the survey by Manivannan et al. (2024) which analysed how practitioners and litigants perceived their experiences with the courts of Mumbai, are early attempts at qualitative analysis of litigant experiences. These are valuable efforts to reduce the information barriers, however these are cross-sectional surveys. A large-scale annual nationwide household panel survey, with state participation, that systematically assesses people's legal needs, has not been conducted so far in India.

Surveys, as a tool of research, provide powerful insights which should be read along with other empirical data (Clifton et al. 2022). Survey-based measurements that are conducted periodically at the household level can provide richer context while mitigating the infirmities of raw MIS-based data. They act as a strong complement to official statistics. Such exercises, for instance, crime victimisation surveys, provide a systematic, continuous evaluation of long-term trends (panel data) due to repeated measurements of individuals' behaviour and preferences across time for a selected range of experiences of the general public, including those not recorded by the authorities (Krishnaswamy and Aithala 2022). This makes it possible for us to understand how these institutions have evolved over time, and helps us to study changes in social or economic conditions of individuals relative to changes in macroeconomic conditions, or policy changes (Sane and Shah 2022).

We now come to the specific problems relating to the capabilities of the legal profession in India. Firstly, the BCI has flaws with its design and mandate which impact its capacity to regulate effectively. We have spoken about how the BCI simply does not know how many lawyers are practicing in India. This is because the BCI suffers from a lack of transparency, defensive reactions to social and technological changes that affect the profession, etc. (Shah et al. 2013). The Law Commission of India, for example, has provided a detailed treatment of these problems at the BCI and the state bar councils (Law Commission of India 2017).

Technological solutions could help address some incentives, such as the lack of information on the cost of legal services, but they cannot address the fundamental regulation design problems that the legal profession faces in India. As mentioned earlier, uncertainty regarding the legality of these portals is another reason why they have not been able to pick up scale. The current system for lawyers is highly regulated, and it restricts the potential to exploit economies of scale. We therefore suggest that the traditional all-encompassing ban on advertising of legal services should be relaxed.

In this model, the Bar Council of India operates as an 'enlightened self-regulated professional organisation', its interests fully aligned with the lawyers and focused on being 'truly irreplaceable' by re-focussing its attention on its highest value services (Shah et al. 2013). This would be a permissive system that enables Indian lawyers to use advertising portals by providing basic information about their services, including details such as: name, address, contact details, academic qualifications,

memberships to professional bodies, broad areas of practice, professional experience including duration of practice and a specified range of professional fees charged. These portals should be governed using appropriate measures to protect the public against misleading advertising, deception and misrepresentation, including about the fees charged.

Secondly, judicial delays and other issues could be monitored with regular feedback from MIS and perception surveys. However, the fundamental tension between 'one-shotters' and 'repeat players' (à la Galanter), which serves to frustrate the legal system, cannot be resolved solely through technological solutions. These issues need to be addressed by committing to broader systemic reforms to the Indian legal system e.g., by making suitable amendments to the rules of civil procedure, etc.

Thirdly, while countries such as Singapore have successfully solved their problems of access to lawyers through generous legal aid programs, the Indian experience with legal aid leaves much to be desired (Aithala and De Souza 2018). The Indian market for legal services is too large, the gap in access to information regarding costs is too wide, and its service potential is too small. Because of these and other reasons, an Indian lawyer is not incentivised to take up cases pro bono.

One approach, as D. Wilkins (1992) suggests, is to undertake efforts to strengthen the capacities of what he terms, 'sophisticated intermediaries' between the lawyer and client, like public interest organisations and grassroots community groups. Successive perception studies reveal that people tend to rely on such providers more frequently for support than legal service providers, and that they can be better positioned to support vulnerable populations, through service framing or community engagement (Balmer et al. 2023). They can be encouraged to adopt technological solutions to aid their constituents in obtaining quality, low-cost legal services, to partially address the failures of the State-run legal aid programs in India (Aithala and De Souza 2018).

6. Conclusion

In India, barriers to access to justice through access to lawyers are compounded by the capacity constraints faced by the regulator of the legal profession, the Bar Council of India, in overseeing the quality and delivery of legal services. As we explain in this paper, this is mainly due to the regulatory design of the Advocates Act, 1961, which prescribes different roles for the union and state bar councils that make coordination and effective governance a serious challenge.

These constraints have effectively meant that the Supreme Court of India and other institutions have taken over the role of overseeing the regulation of the legal profession. For instance, after seven years of indirect oversight, in April 2023, the Supreme Court of India set up a committee on the recommendation of the Bar Council of India, to monitor the exercise of verification of practicing advocates.[9]

However, the courts — which are responsible for resolution of people's everyday legal problems — are also plagued by several capacity issues. The absence of a functional legal aid programme means an

alternative approach is necessary to reduce access barriers. In the Indian context, this has been the widespread adoption of technological solutions by courts and the legal profession.

While this is extremely important and welcome in the Indian context, and can 'usher in a regime of maximum ease of justice', these solutions are useful mainly in fixing process-specific problems, and can only help improve well-designed legal processes (Ministry of Law and Justice, Government of India. 2023b). Technological solutions are not effective when the problem is more fundamental e.g., situations where incentives and institutional structures are the cause of problems in the legal system that need deeper change.

This, of course, applies to all kinds of technological solutions — including solutions that originate from the fields of artificial intelligence (AI) and blockchain. AI solutions have shown a lot of promise when it comes to improving the daily workflow of lawyers, particularly as regards communication with clients and speed of service provision (Shukla 2022). Their widespread use can positively transform the traditional mode of delivery of legal services and solve a limited range of specific problems, but not the fundamental problems of the legal profession in India, which we have discussed earlier in this paper.

We are cognizant of the BCI's efforts to improve the quality of the Bar. A recent example comes from the regulations that now allow foreign lawyers a limited right to practice in India. The BCI's intention in promulgating these rules is to "*promote the growth of the legal profession in India ... and address concerns about the flow of FDI*" (Bar Council of India 2023). However, these reforms are only scratching the surface of the changes that are required (Aithala and Suresh 2023).

The need is for the executive and the legislature to step up efforts to promote larger scale reform of the legal profession. Historically, these are done by the legislature, especially the relevant Departmentally-Related Standing Committee, that calls for evidence and submits reports that document regulatory failures in each case. Government research organisations such as the NITI Aayog are also tasked with doing this. Consequently, Parliament has enacted laws that reform the governance of specific professions, either by creating an entirely new regulatory body for the profession, or by making significant amendments to the powers of existing bodies.

For example, the National Medical Commission Act, 2019 abolished the Medical Council of India and created a new National Medical Commission, aimed at improving delivery of quality health services in the country. Similarly, the Companies (Amendment) Act, 2019 created the National Financial Regulatory Agency which undertakes investigations and imposes sanctions on auditors and audit firms who violate the rules on quality, professional ethics and public confidence.

It is too early to say if these reforms have solved the fundamental malaises in these professions. Nevertheless, it is important that these diagnoses of the regulator's performance be done on a periodic basis, which we will endeavour to address in future research.

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Notes

[1] For comparison, in England and Wales, 25,146 civil suits were instituted per million population in 2023, see House of Commons, UK Parliament (2024)

[2] The Supreme Court ordered the BCI, along with the state bar councils, to conduct a nation-wide verification exercise of advocate registrations to 'weed out fake lawyers' and improve the quality of the Bar. However, as of July 2025, the BCI has not been able to obtain the necessary information on the number of registered advocates practising in India. Many of the state bar councils had not taken action to submit the final verified list — the Supreme Court noted that the BCI 'appears to have no effective administrative and disciplinary control over the state bar councils and local bar associations'. See Supreme Court of India (2021a).

[3] This is close to the estimate provided by the Commonwealth Human Rights Initiative i.e. one lawyer for every 736 Indians. See Commonwealth Human Rights Initiative (2018).

[4] Galanter (1989) For comparison, England and Wales has one solicitor for every 312 individuals. See Solicitors' Regulatory Authority (n.d.).

[5] *Ajayinder Sangwan vs. Bar Council of Delhi* 2017 INSC 795.

[6] Notes from our conversation with the company's founder and CEO on 23 May 2022.

[7] This restriction has its origins in the deep association of 'prestige' with the Indian legal profession and its strong hierarchical nature. The Supreme Court of India observed that if a lawyer were to solicit briefs, 'he is a very unworthy member of the learned profession'. See Supreme Court of India (1962). Also see, Bar Council of India, Press Release "Bar Council of India takes strict view on unethical legal advertising, misleading social media promotions, and professional misconduct by advocates and legal influencers" 17 March 2025

[8] Currently, in India, this is done at an aggregated level by the e-Courts Committee of the Supreme Court of India. In other jurisdictions, disaggregated court-specific and even judge-specific data is available for public access. The data is published by specialized executive agencies (e.g., His Majesty's Courts and Tribunals Service in the United Kingdom) or statutory bodies (e.g., the Federal Judicial Center in the United States).

[9] *Ajay Shankar Srivastava vs. Bar Council of India* (2023) 6 SCC 144.

Indian Public Policy Review 2025, 6(3): 104-110
https://doi.org/10.55763/ippr.2025.06.03.004

IPPR

Designing for Trust Amidst Information Chaos

COMMENTARY *27 Aug 2025*

Ishoo Ratna Srivastav*

The 2025 Edelman Trust Barometer highlights a concerning trend about the declining credibility of news and information media (Edelman Trust Institute 2025). Information, like clean air or safe streets, is a public good, and it's indeed paradoxical that its technology-driven abundance is now leading to chaos and a pervasive crisis of truth.

Nobel laureate economist Joseph Stiglitz argues that without mechanisms to ensure fair access to trustworthy information, both markets and communities fail. Using information as a strategic tool is not a new phenomenon -- people twisting or withholding facts, turning interactions into opaque guessing games, is a routine behaviour -- however, in modern times, the chaos seems to have supercharged. This corrodes social cohesion, impedes collective knowledge creation and leads to poorer outcomes for organizations and communities.

The challenge requires rethinking institutional schemes to foster trust and enhance the utility of information; leading to richer social interactions, more efficient markets, and better informed political choices that maximize public good. The key stakeholders in creation of such designs are legislators, who set the framework; institutional and system architects and regulators, who enforce and shape its operation; and citizens, who hold these arrangements to account. These designs should encourage truthfulness as the default and promote cooperation. Before dismissing this as wishful thinking, let's assess whether historical lessons or current ideas can tackle the issue.

History, for example, provides a seemingly simple yet interesting instance of the invention of money. Primitive economic interactions usually involved a cumbersome process of barter, where if you had a sack of grain but needed a shovel, you first had to find someone who not only had a shovel, but also wanted your grain, thus a cumbersome 'double coincidence' of wants. The use of money solved this inefficiency. While early forms of money, such as commodity money or precious metals were practical as convenient substitutes for barter, the state's role in issuing currency added a critical layer of trust (Asmundson and Oner 2012). It emerged as a universally-accepted medium, simplifying transactions and enabling clearer expressions of demand and supply.

This innovation paved the way for more efficient markets, allowing people to exchange goods and services with confidence. Just as money provided a trusted layer to channel economic interactions

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towards utility, we now need to conceptualize new designs to channel the informational abundance towards greater clarity and public interest.

In recent times, online marketing platforms (e-commerce) have pulled off a parallel feat. On these platforms buyers and sellers transact with confidence without even coming face to face or knowing much about each other. In this case, unlike money, trust is not a result of state intervention ; it is introduced through platform designs which incorporate reputation systems as part of their governance schemes.

Amazon's review system incentivizes honest feedback by marking verified buyers' reviews with a "Verified Purchase" badge, signalling authenticity to shoppers. Reviews which are helpful and truthful are voted up by the community and gain prominence. This encourages buyers to share balanced feedback for recognition. These reviews drive seller success as high ratings boost sales and at the same time, Amazon's algorithms penalize bot actions or fake reviews with removal or account bans, deterring dishonesty.

However, it is important to note that such mechanisms may not be perfect. Complex layers of biases and strategic play between the actors on the platform necessitate that regulation is so engineered that it constantly evolves to intercept any potential foul play. Take the case of eBay, which before 2008 had a feedback system for both buyers and sellers (Tadelis 2023). However, upon realising that the feedback from sellers were largely retaliatory, resulting in distortion of honest expressions; the platform shifted to one-sided feedback system only.

On the other hand, platforms like Airbnb may require two-sided feedback system as an operational necessity as the improper usage of the dwelling by a user should be recorded and accounted for (Tadelis 2023). X's Community Notes, where users add fact-checked context to misleading posts, are a mechanism to curb misinformation, but such notes are added only after the original post. As a result, inaccurate claims can amass millions of views, outpacing truth before cautionary notes appear.

In game theory terms, mechanism designs should encourage honest behaviour, naturally steering the society toward a cooperative focal point (Basu 2015). So, as everyone comes to expect a similar empirical and normative behavioural choice by others, these focal points reinforce expectations (Bicchieri n.d.). This may result in gradually locking in trust-based behaviours that harden into social norms.

As an example, consider the Nobel-winning second prize auctions (Vickrey 1961; Klemperer 2004).In a second-price auction, the highest bidder wins but only pays the amount of the second-highest bid. This means, it is best to just state your own true value or utility regardless of what others are doing. So, an honest expression of choice is incentivised. However, this is not to suggest that this mechanism is a perfect solution, as possible collusion by bidders cannot be ruled out.

Another interesting insight comes from the fact that index like "Quality Score" by Google, used for ranking the sponsored search links, do not reveal the exact estimation methodology (Tadelis 2023). As there is an apprehension that with such information the players may game the system. So, a

compromise on transparency paradoxically serves a greater utility here. These examples just emphasise the need for mechanisms to not only elicit honest behaviour but also withstand strategic exploitation.

Mainstreaming trust and cooperation in the long term

It seems fitting to look around and explore how the ideas of trust and cooperation are positioned in nature's scheme. Evolutionary sciences, especially when viewed through the lens of game theory, show that cooperation is not at odds with natural selection; rather, it often emerges as one of its most enduring outcomes (Cowden 2012). Interestingly this natural selection in the evolutionary space is intrinsically a long-term game with multiple interactions and exchanges of information.

American political scientist Robert Axelrod, whose simulations revealed that cooperation thrives in repeated interactions (Axelrod and Hamilton 1981; Levitt 2021).So, perhaps at the cellular level our genes might be wired for strategizing for survival but at the same time we cannot forget the fact that humans are profoundly social animals as well. Altruism and cooperative behaviour evolve and persist through stable patterns of interaction, particularly when people engage with each other repeatedly over time. These social behaviours flourish in a rule-based environment in our societies.

Now, as a large part of our interactions and information sharing takes place on social media or other digital spaces, it is important that rules for these interactions be inbuilt in their design. For example, shouldn't it be necessary that the algorithms running these platforms be tested and held accountable for any bias, as the customized feed that we receive (perhaps unknowingly) distorts and reinforces our misconceptions?

With payoff being the singular motivation for content creators, if clickbait reliably delivers more views, it's no surprise that it quickly overwhelms our feeds. But what if we could shift this fundamental dynamic? This is precisely where thoughtfully designed platform rules become crucial. To facilitate systemic checks, regulators could mandate *standardized API access* for accredited third-party auditors, allowing them to probe an algorithm's decisions without needing full source code disclosure (Digital Regulation Cooperation Forum 2022). Successful audits and demonstrated compliance may even lead to certifications or "trust labels" for platforms, and provide users with assurance that content curation algorithms are being run fairly and real consequences are imposed for manipulative feeds. This may set off a virtuous cycle, keeping everyone engaged in fair play without much need for constant and heavy-handed policing.

Calls for such audit mechanisms often stall over questions of liability, platform resistance and regulators limited technical capacity. Open-source options like Mastodon show that there are alternatives, but they have struggled to overcome the powerful network effects that keep users locked into dominant platforms (Iansiti 2021; "The Importance of the Network Effect to Become Mainstream" 2022).

How smart systems turn complexity into trust

Effective collective decisions depend on more than just gathering preferences; rather, they require sophisticated systems that can aggregate those preferences and create stable matches, closing critical information gaps along the way. Market design and matching theory pioneered by Nobel laureates Alvin Roth and Lloyd Shapley offer tools to bring order to informational chaos (Roth 2007).The key idea remains that markets don't emerge or function smoothly on their own; they are to be engineered with suitable mechanisms that align incentives and foster cooperation.

In this context Roth's work on kidney exchange offers valuable takeaways. In a kidney exchange, a patient may have a willing donor, but they may not be biologically compatible. Roth's mechanism links such incompatible pairs into a chain. This means that your donor gives to someone else's patient and in return you receive a compatible kidney from another donor in the chain (Roth, Sönmez, and Ünver 2003; Rose 2019).It's important to note that in Roth's kidney exchange, truthful reporting is the best way to maximize your own chances of a successful transplant and any attempt at manipulation is either pointless or harmful. Also, all surgeries in a cycle are carried out simultaneously, so that no participant is left exposed.

We realise that in absence of a mechanism design like this, patients and donors might hide or misrepresent their preferences, hoping for a better match, which might lead to overall poorer outcomes. The same principles now underpin how doctors are matched with hospitals, or students with schools, ensuring the right fit in high-stakes, imperfect-information settings.

In our times, as AI proliferates, suspicion and anxiety in job markets cannot be ruled out as prevailing paradigms of matching people to opportunities might rapidly fade. However, research suggests that tasks yet unforeseen, novel avenues to collaborate, and new agglomerations may also emerge; in such a scenario, the design of job-matching systems remains crucial (Shen and Zhang 2024). Platforms that encourage honest expression of skills and needs and make matching transparent help conserve or rebuild the trust between workers and employers.

Demand intelligent design and cultivate institutional literacy

Institutionalizing trust and cooperation demand a layered design that is built on sequential stages of reputation building, truth-revealing inputs, and then the subsequent outcome of fair collective decisions. Each layer cross-checks others, shrinks information asymmetry, and rewards honest cooperation to forge robust systems. The process may appear to be complex and challenging; however, as Nobel Laureate Paul Milgrom observes, AI and machine learning can be a crucial force multiplier in the design of such novel mechanisms (Milgrom and Tadelis 2018).

Thus, against this backdrop we should first assess whether current systems (social media or algorithms, public consultations, media etc.) reward truthful and honest expressions. The next step might be to design systems which elicit genuine preferences and contain inbuilt mechanisms for

penalty and rewards over quality of information. Ideas like disclosure tags on a customized feed and public declaration of algorithm bias should be evaluated. These ideas, no doubt, pose some technical and legal challenges for the regulators. However, a dash of pragmatism in our laws and a spirited regulator's urge to stay ahead in the technology game could make a difference.

Wide-scale cooperation in building capacities in the domain of mechanism design and behavioural insights could enable us to co-create more trustworthy systems. This would be vital for navigating AI-driven employment shifts, ensuring equitable sharing of benefits.

Conclusion

No doubt, the path to building such an architecture of trust is not without formidable challenges. The most significant obstacle often lies with interest groups, who may benefit from opaque systems and thus resist changes towards greater truth and transparency. We must convincingly demonstrate that while individuals may lose short-term advantages, trust-based systems foster resilience, efficiency, and lasting societal benefits that far outweigh those trade-offs. For example, tendencies to break a traffic rule for a short-term individual gain, like running a red light to save time, make a long-term impact on the safety and efficiency of the system for everyone.

Overcoming these tendencies demand more than clever institutional design; it requires sustained advocacy and a collective shift in mindset. Citizens must actively demand these changes, ensuring that outdated, trust-damaging systems become unsustainable in the face of a shared commitment to truth and cooperation.

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Indian Public Policy Review 2025, 6(3): 111-117
https://doi.org/10.55763/ippr.2025.06.03.005

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Huawei - A Case Study in China's Tech Ambitions and Geopolitical Power Plays

Book Review of "House of Huawei: Inside the Secret World of China's Most Powerful Company" by Eva Dou.

Shobhankita Reddy & Arindam Goswami[*#]

27 Aug 2025

In 2018, Meng Wanzhou, daughter of Huawei's CEO Ren Zhengfei and the company's Chief Financial Officer, was arrested in Vancouver under the provisions of the Canada-US extradition treaty. She was accused of fraud and violating US sanctions against Iran. Huawei was already the world's largest telecommunications equipment supplier, but Meng's arrest - and her sophisticated dressing sense through the three years she was under house arrest - raised the company's international profile. It also intensified public scrutiny of Chinese technology companies. The previous year, ZTE, another Chinese telecom giant, was subjected to US restrictions and penalties on similar grounds.

Separate from the issue of sanctions evasion, there was an ongoing debate about the security risks of companies like Huawei participating in Western countries' 5G infrastructure networks, including in Canada. 5G was just beginning to be considered a strategic technology, and Meng's arrest prompted many to ask if Huawei performed surveillance for the Chinese state.

In 2017, the Chinese government passed the National Intelligence Law, which stated that "all organisations and citizens shall support, assist, and cooperate with national intelligence efforts" (Daum 2024). This landmark legislation - among the first publicly available Chinese laws about national intelligence - brought global attention to the link between the Chinese private sector and the Communist Party of China (CPC).

Given that Huawei is the world's largest builder of "pipes" that made the world's internet networks, concerns arose about whether Huawei was relaying the data these pipes carried back to China. In short, what is the interplay between Huawei and the CPC, and is the company a national security threat for liberal democracies?

It is in this light that Eva Dou's *House of Huawei* is a relevant read. The book's success lies in its measured account of a notoriously secretive company - and its reclusive founder - exclusively through open-source information. In nuanced and precise detail, Dou, a long-time technology journalist, traces the company's rise since its founding in Shenzhen in 1987. The book situates Huawei's fortunes in the context of China's political economy. In doing so, Dou offers a glimpse into China's changing

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The authors would like to thank Manoj Kewalramani for his research guidance and valuable feedback

political landscape and international posture along with the shifting attitudes of other nations towards China. A few themes emerge.

Ren's 'Iron Army'

First, Dou highlights how Ren Zhengfei's personal experiences and ethos have shaped Huawei's organisational and business culture. The book delves deep into the life of Huawei's enigmatic founder, who grew up in a time of intense deprivation and famine. Ren's family also suffered brutal persecution during the Cultural Revolution in the 1960s and 70s. He would later go on to describe this period a "disaster for the nation" but a "baptism" that made him politically mature.

Upon graduating from college, Ren started his career in the military, working for the PLA Engineering Corps. This was a lucky opportunity - made possible by the American war in Vietnam - given that the Cultural Revolution was waging a war on intellectuals within China at that time.

These life experiences would shape his value system and outlook as he led Huawei. Ren prioritised discipline, personal sacrifice, and perseverance, even going as far as calling his employees an "iron army" and endorsing a competitive "wolf culture" in the company's sales team. The book presents Huawei as a Silicon Valley 'move fast and break things'-style startup but at the scale of a global conglomerate.

Ren also had a knack for witty, militaristic maxims capable of inspiring and galvanising people. "Even Deng Xiaoping could go down and up three times. Why can't you go down and up three times?" he asked, drawing parallels between the company's demotion policy and the nation's leader having been purged thrice in his career. This is reflective of a techno-nationalism widespread among the Chinese citizenry.

Ren's astute reading of the changing political winds in China and abroad, combined with his long-term strategic thinking, would serve the company well. Like many other companies were supported by technology transfers from joint ventures with foreign firms, Huawei and the broader telecommunications industry in China was propped up by Shanghai Bell. A lax intellectual property rights (IPR) regime further enabled the industry. In fact, many Chinese successes of the time had in common a willingness to push the boundaries of what may be legal; when in doubt, they would err on the side of taking action rather than seeking permission.

For instance, Huawei started out as a contract manufacturer of analog switches, and its first designed switch was admittedly a "copy-cat" that was eventually legalised. Accusations of such infringements would follow Huawei as it expanded globally in the 2000s, with Cisco, Motorola, and Xiaomi filing lawsuits against the company for IPR infringements until it emerged as an innovation powerhouse on the world stage.

This echoes China's journey from a manufacturer of cheap knock-offs to a global technological superpower that made large R&D investments. Huawei, too, consistently ploughed back a minimum

of 10% of its sales into R&D, as stated explicitly in its 'Basic Law' that "profit maximisation is by no means our only pursuit".

The name ‘Huawei Basic Law’ itself echoed Hong Kong’s mini-constitution, suggesting Ren’s ambition to build a company that was “radically different, something separate from China even while a part of it”.

Leveraging China’s Political Economy

The second major theme that emerges from Dou’s work is how Huawei navigated China’s political economy, while investing in its own capabilities and taking significant risks. Huawei’s first significant elevation to national champion status came through a joint venture with provincial and municipal telecom bureaus, who were also its customers. This was a gross conflict of interest, but such ‘win-win’ arrangements were characteristic of the early private sector in China, against the backdrop of "common prosperity" rhetoric promoted by the CPC to achieve greater social and economic equity across the country.

This complex interplay between the state and private sector in China, especially in an industry as sensitive as telecom, would continue through the decades. The company doubled down on this initiative by launching a nationwide partnership with local governments and restructuring into a "collectively-owned" enterprise, a move that granted it government protection as well as preferential access to loans.

Importantly, as evidenced by its R&D investments, Huawei was able to tread the cautious balance between being a national champion and strategically leveraging state support without becoming complacent. In acknowledging that becoming a wholly state-owned enterprise (with slow-moving bureaucratic and risk-averse tendencies) would be antithetical to its global aspirations, Huawei offers a cautionary tale for companies operating in sectors that are deemed strategic by their governments. While Huawei benefited from China's open embrace of its business sector in several ways, including with CPC executives extolling its products on their travels abroad, it was also careful to decline excessive offers of financial loans that may discredit its business charter and ambitions.

The book highlights Huawei’s relentless export-orientation. Huawei’s initial foray into the export market in the 1990s was checkered by its business ties in Iran, Iraq (then under UN sanctions), and various war-zones. These markets, often considered "rogue" regimes, had less fierce competition owing to the absence of western firms, and were designated as premium postings, with various incentives making them desirable for Huawei employees. This also reflected the Chinese population’s lingering sympathy towards countries under sanctions, which had been imposed on China post the 1989 Tiananmen Square protests and remained fresh in their memory.

Dou’s telling of the Huawei story also highlights the significance of technology to national power and security. Ren clearly understood this well. He famously told the then-president Jiang Zemin in 1994 that "a country without its own program-controlled switches is like one without an army".

Science and technology (S&T) has consistently been top priority at the highest levels of China's political leadership, and the country has a distinct state-led and top-down approach to technological governance. In China's drive for self-sufficiency without any foreign dependence in the sector, Ren appealed for more state intervention, not less. Eventually, Huawei's digital switch and its large rural presence would help it chip away at the market share of foreign firms operating in China.

Securitisation of technology continued through the decades, and in 2015, Xi Jinping announced the Made in China initiative, marking many critical and emerging sectors, including telecom, as important to transform the country into a high-tech innovation powerhouse and avoid the middle-income trap. This approach, coupled with the threat of a rising China, would later result in Western pushback against Huawei.

Learning & Adapting

Another key theme that Dou's book highlights is the humility, pragmatism, and willingness of the Chinese entrepreneurs and political leadership to learn from others, irrespective of political and ideological differences. Historically, this includes the Self-Strengthening Movement of the 19th century and Deng's visit to Japan in the 1970s, which are remarkable gestures in setting aside historical animosities in pursuit of progress (Schell and Delury 2014), (Arumi 2022).

China's opening up to the world and encouraging investments into the country, as evidenced by FDI being as high as 6.2% of the country's GDP in 1993, provides another data point ("Foreign direct investment, net inflows (% of GDP) - China | Data"). The book points to a few examples of this in Huawei's journey. In the style of Silicon Valley startups, Huawei had its own version of an employee stock option pool to incentivise loyalty, demonstrating an adoption of western incentives for a still-nascent Chinese market. Hiring IBM for management consultation so as to avoid the "long road of trial and error", the incorporation of references to "Japan's great management" and "Germany's meticulous hard-working people" in the company's oath, establishing an R&D base in the US as early as 1993, systematically recruiting global talent, all point to a defining corporate cultural ethos.

Additionally, the book draws attention to the impact of the export restrictions and international bans imposed on the company in recent times. Huawei has had to sell off a few subsidiaries, with Ren Zhengfei repeatedly emphasising that the company's goal was simply to survive, adapt, and be resilient in the face of external pressure. Huawei's research partnerships with Western universities have suffered, and efforts at self-sufficiency as well as domestic capability building and production are in a zealous overdrive. While the company is not growing in annual revenues since the institution of these bans, it continues to maintain its dominance both within China and in other emerging markets.

Similarly, it is also not clear what direction China's S&T ecosystem is headed towards. Tight regulations stifling China's international linkages, including the free flow of people, talent, R&D and capital, are likely to sober, if not derail, China's technological ambitions. Hostile external environments often push nations to prioritise S&T endeavours, likely leading to non-linear

breakthroughs in the short term. In his book *The Politics of Innovation* (Taylor, 2016), Mark Zachary Taylor calls this the theory of creative insecurity. However, it remains to be seen if Huawei and the broader Chinese tech ecosystem will not be slowed down relative to that of the US over the medium to long term.

One argument against the US institutionalisation of export controls in 2017 was that keeping an adversary dependent and under its watch was leverage worth cultivating. In retrospect, at least in Huawei's case, its relentless focus on advancing itself and investing in substantial long-term fundamental research makes it difficult to believe that this argument held much weight.

Huawei's Geopolitical Quagmire

Is Huawei a tool in the service of the CPC? The book lays out the facts to establish both sides of the argument. As far back as the 1990s, the company was approached for its sensitive capabilities in domestic surveillance and policing. There is now evidence that the telecom sector was always a potential conduit for a backdoor by the Chinese state. Huawei's complex entanglement with the state, and its founder's statements in light of the sector's importance to national security, make a strong case for a company capable of compromise.

Besides, the Xi Jinping administration has passed a flurry of laws granting state intelligence agencies unfettered access to private companies' data, intellectual property, and more if necessary (Nikakhtar 2021). Additionally, Huawei's role in Xinjiang as a major provider of advanced surveillance infrastructure, specifically targeting the Uyghur ethnic community, is well known.

While the book points out that critical applications pertaining to the military and defence almost always operate in secure environments, separate from civilian use cases, and that it is theoretically possible to operate secure software in unsecured hardware or conduct technical audits, it also underscores that the risk is too significant for a nation to outsource large scale network infrastructure projects to the company. As former Australian prime minister Malcolm Turnbull explained his decision to ban Huawei from the country's 5G networks - "Our approach was a hedge against a future threat: not the identification of a smoking gun but a loaded one". The decision, in many countries that are US allies or partners, was also likely a political one.

However, it must be emphasized that there are no saints here. IBM had provided technology services to the Nazi regime. China's own Great Firewall had been bolstered with Cisco's help. As the book underscores, in an ironic twist, the Snowden documents had revealed in 2014 that the NSA in the US had infiltrated Huawei's networks to snoop on its targets using the company's products, making Huawei the victim of Washington's surveillance playbook. Part of the US's confidence that Huawei could be a national security threat from China was because it had itself exploited the company's products for its intelligence goals.

The book provides a key lesson in realpolitik by drawing our attention to this. It presents Huawei as a tech conglomerate caught in the quagmire, a sharp reminder of the increasing distrust and zero-sum competition between the world's two rival superpowers.

While the criticism that the book offers no "secret" information (as stated by its subtitle), and does not draw from any new primary interviews, is valid, Dou does not disappoint in terms of the depth of research and synthesis of publicly available information (Gebski, 2025). The book is an engaging read about a boy from the Guizhou Hills who later founded a multinational corporation, and offers a vivid case study of what consistent investments in R&D, relentless hard work, and lots of tact can make possible. It is also a powerful illustration of the blurred lines between accountability and ambition, and the costs and consequences of one's actions.

In the case of Meng Wanzhou, she returned to much fanfare and public life in China after her release. Her detention improved her standing in the eyes of both, Huawei employees and her father, who had previously insisted that none of his children were worthy successors. Meng was no longer the pampered daughter of Huawei's founder and was seen to have personally sacrificed and suffered for the company. In fact, she had emerged victorious - a "fighter" - and demonstrated her commitment and resilience in the face of US pressure. In a way, she became the embodiment of the ethos that her father has sought to inculcate among Huawei's employees.

In conclusion, in its timely and accessible exploration of the geopolitical stakes that shadow global tech, *House of Huawei* is a valuable read for anyone interested in China, its technology development ecosystem, and global competition today.

House of Huawei: The Secret History of China's Most Powerful Company **by Eva Dou, Portfolio, 2025, Pages 432, Hardcover ₹1908; Kindle ₹371.**

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