Role of Infrastructure in Organizing Space

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Space

Markets

Infrastructure

Infrastructure

Definition

Infrastructure

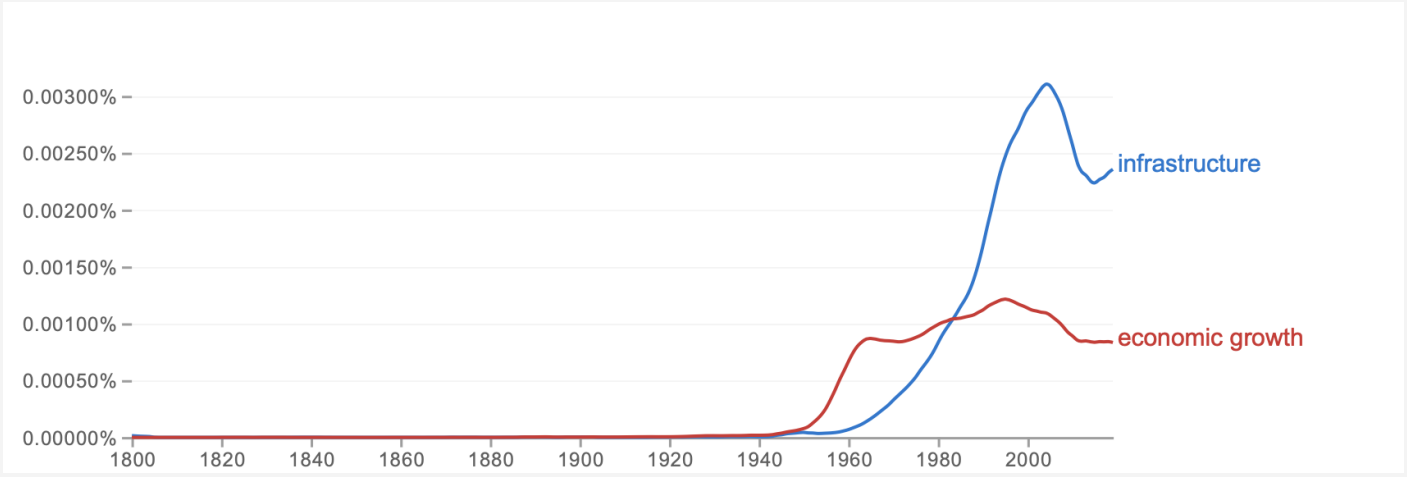
Firm level infrastructure

City level infrastructure

Village level infrastructure

Country level infrastructure

Global infrastructure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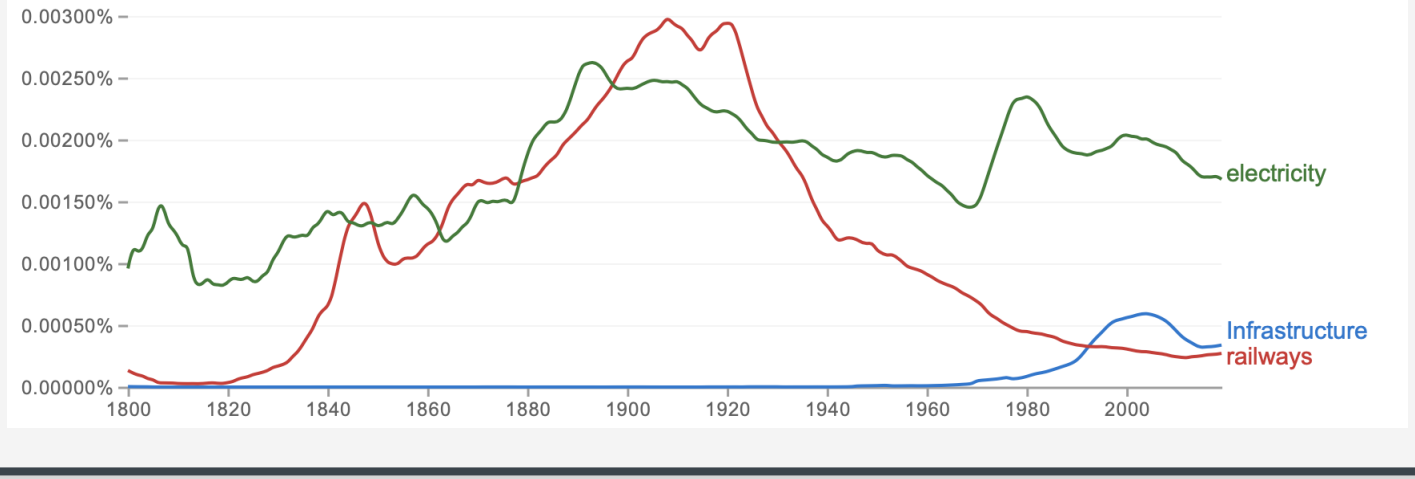
economic growth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electricity
Infrastructure
railways

ONS, May 2022

There is currently **no universally agreed upon definition of infrastructure** in either the UK's National Accounts, or the international guidance embodied in the System of National Accounts: SNA 2008 and the European System of Accounts: ESA 2010.

- functional definition
- narrowly defined **economic infrastructure**, namely *transport*, *energy*, *water* and *waste handling assets*, *digital communications*, *mining* and *quarrying*, and other
- Neither *housing* nor *social infrastructure* (such as the *education*, *health* and *care systems*) are included

ONS (May 2022) Infrastructure in the UK, investment and net stocks. | Link.

The basic physical and organisational structures and facilities (buildings, roads, power supplies) needed for operation of a **society** or enterprise: the social and economic infrastructure of a country.

Physical components of **interrelated systems** providing commodities and services essential to enable, sustain, or enhance **societal living conditions**

Infrastructure as the network of assets where the **system** as a whole is intended to be maintained indefinitely at a **specified standard** of service by the continuing replacement and refurbishment of its components.

Infrastructure is the set of fundamental facilities and systems that support the **sustainable functionality** of households and firms.

Hard infrastructure refers to the **physical networks** necessary for the functioning of a modern industry. This includes roads, bridges, and railways.

Soft infrastructure refers to all the **institutions** that maintain the economic, health, social, environmental, and cultural **standards** of a country. This includes educational programs, official statistics, parks and recreational facilities, law enforcement agencies, and emergency services.

Gramlich (1994)
definition that makes most sense from an economics standpoint consists of a **large capital intensive natural monopolies** such as highways other transportation facilities, water and sewer lines and communication systems. Most of these are publicly owned by some are owned privately. An alternative version that focuses on **ownership** includes just the tangible **capital stock** owned by the **public sector**. Broader versions include successively human capital investment and/or research and development capital.

Torrisi (2009)
originated by investment expenditure and is characterised by **long duration**, **technical indivisibility** and a **high capital output ratio**.

Aschauer (1989)
infrastructure is often defined as a **public good**.

Goldsmith (2015)
infrastructure provides lasting **public service** in a **specific location**.

Page Pande (2018)
We conceive of invisible infrastructure as the **social** and **human systems** that enable citizens to realize their **capabilities** and **escape poverty**. This comprises traditional elements of social infrastructure like health care and education but also, importantly, the **incentive** and information structures that bring the **actions** of those who **control resources** in line with the **needs of the poor**.

Aschauer, David Alan. "Is public expenditure productive?." Journal of monetary economics 23.2 (1989): 177-200.

L. Page and R. Pande. Ending global poverty: Why money isn’t enough. Journal of Economic Perspectives, 32(4):173–200, 2018.

Goldsmith, Hugh. "Actors and innovations in the evolution of infrastructure services." The Economics of Infrastructure Provisioning (2015): 23-91.

Gramlich, E. M. Infrastructure investment: A review essay. Journal of economic literature, 32(3):1176– 1196, 1994.

Torrisi, Gianpiero. "Public infrastructure: definition, classification and measurement issues." Economics, Management, and Financial Markets 4.3 (2009): 100-124.

Market

Kerala Fish Market

Coastal Fish Market in Kerala

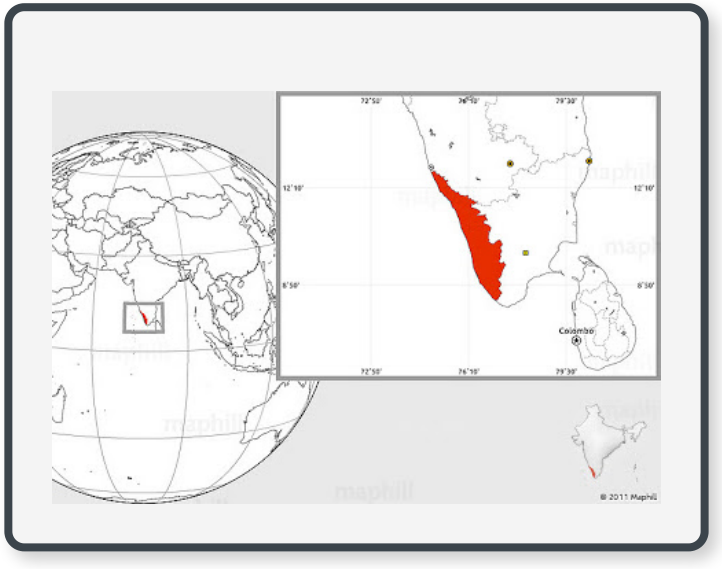
Fish is the staple diet in Kerala, India

Kerala has a long coastline with fish markets dotted along the coast

Fisherman have a **choice** of which fish market they land their fish in

Information problem after the fisherman catch their fish

They do not **know** the **price of fish** in each market on a particular day



Kerala Fish Market

Jenson (2007) studied of **15 fish markets** along the 225 km **Northern coast of Kerala** to understand whether the market for fish was working.

Jensen, Robert (2007). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector." The quarterly journal of economics.

Kerala Fish Market

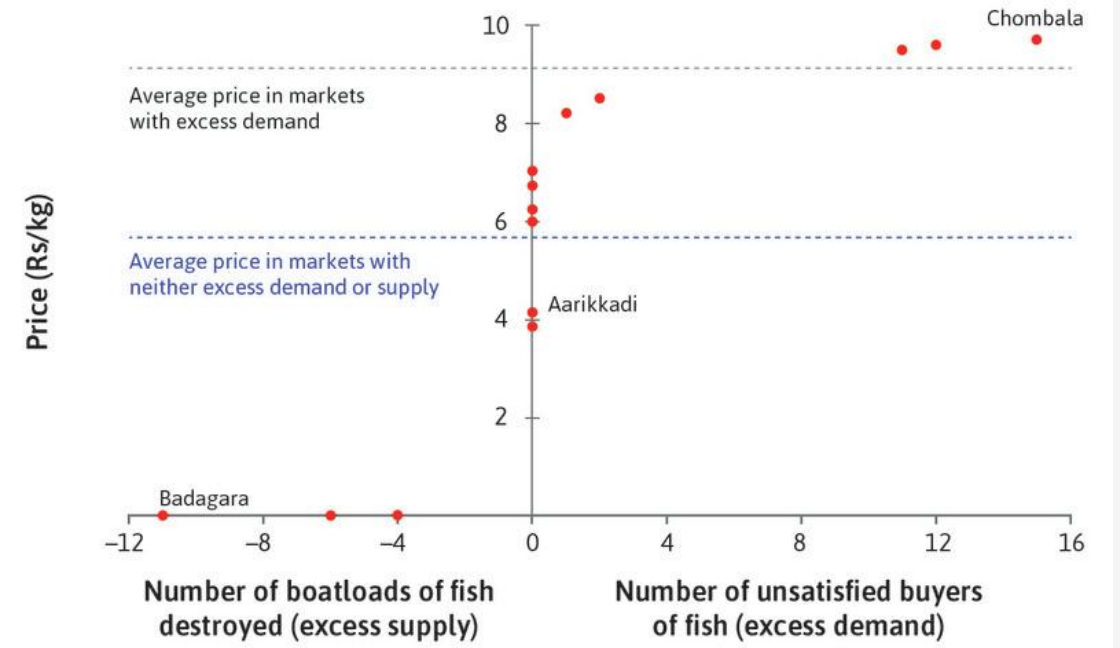
Jenson (2007) studied of 15 fish markets along the 225 km Northern coast of Kerala to understand whether the market for fish was working.

- Fisherman had to **choose** the port/market where they would get the best price for their catch
- Fish merchants **bought** the fish from the fisherman and sold it to the consumers
- If fish merchants already had enough fish on the port they landed, the fisherman would just **jettison** their catch

Fish **prices** were **volatile** and fisherman's **profits low**

due to **wastage** and **ex-post bargaining power** of fish merchants who bought from the fisherman and sold to the consumers

Market Conditions on 14th January 1997 in the Fish Markets

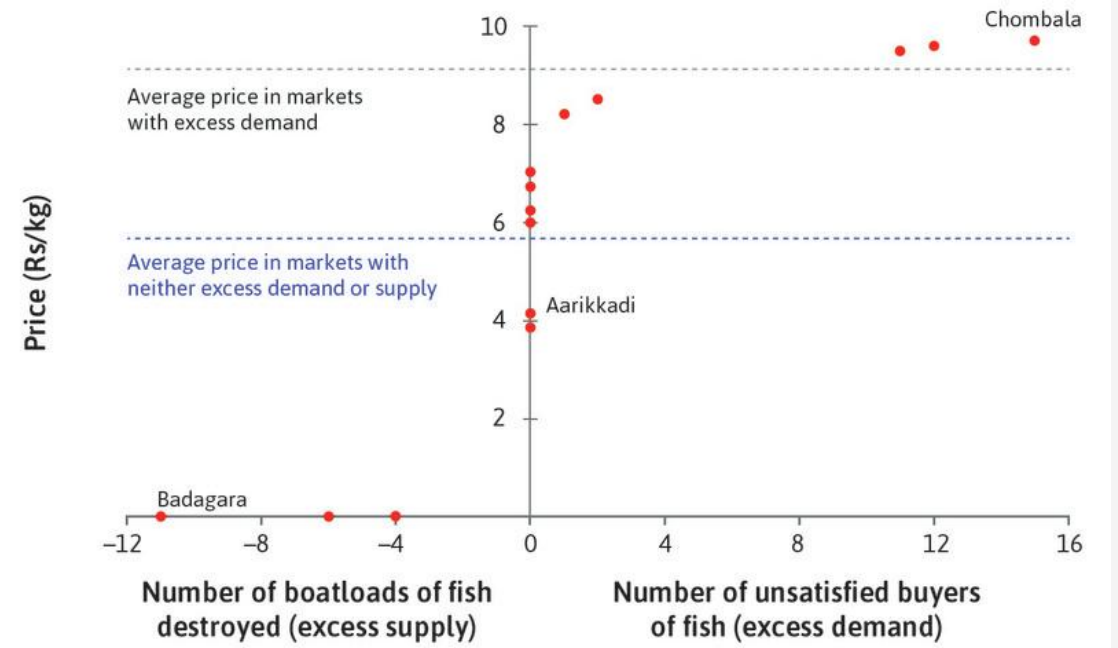


Badagara: 11 boats jettisoned their catch due to excess supply

Chombala: 15 buyers left unable to purchase fish at any price

Average market price across markets

Excess supply	Market Clearing	Excess demand
₹ 0	₹ 5.9	₹ 9.3



Efficiency

Vilfredo Pareto

Italian polymath (1848 – 1923)

Civil engineer

Sociologist

Economist,

Political scientist

Philosopher

Pareto Efficiency

Pareto efficiency situations are one where you cannot make anyone better-off without making anyone worse off.

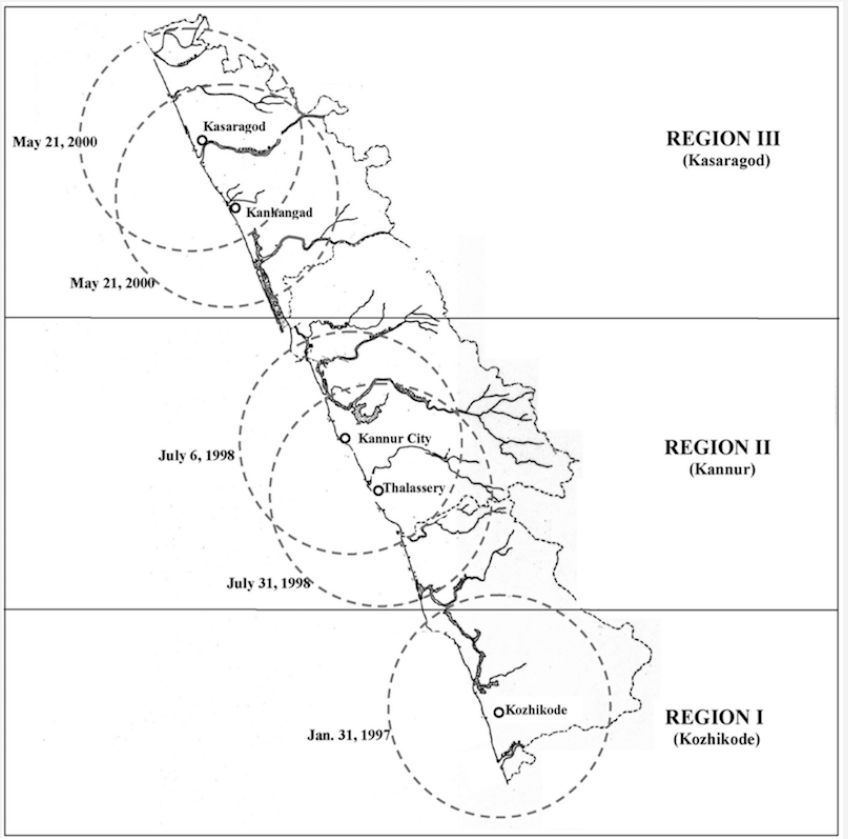
Winners and **losers** in the society

Pareto Improvement

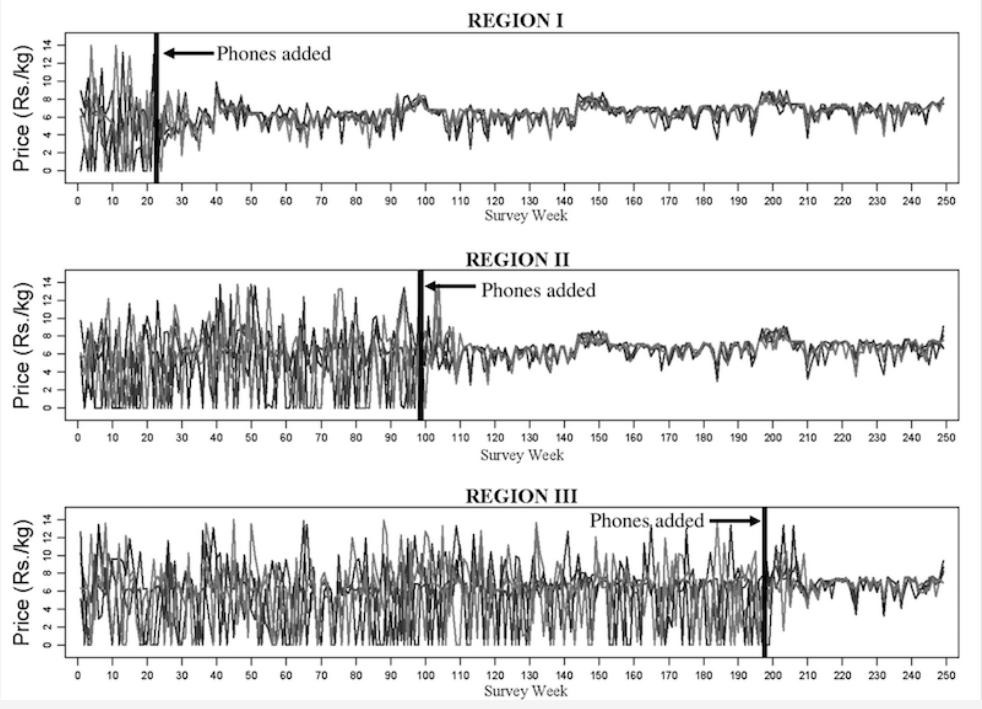
An intervention that makes some people better off without making anyone worse off is called a **Pareto improvement**.

Winners but **no losers** in the society

Sequential roll out of mobile phone coverage



Introduction of mobile phones



Sharp decrease in **price** volatility.

Reduced **waste** & elimination.

Fisherman's **profits** went up by 8%.

Consumer **prices** decreased by 4%

Market Efficiency

Introduction of mobile phones made the fish market more efficient

i.e., **a Pareto Improvement**

- Reduced waste & elimination
- Sharp decrease in price volatility
- Fisherman's profits went up by 8%
- Consumer prices decreased by 4%

Adam Smith

Influential thinker (1723 -- 1790)

Economist

Philosopher

Key figure in
Scottish Enlightenment

Adam Smith's insight

Well-functioning **markets** are Pareto **efficient**.

That is *all mutually beneficial trades are undertaken* and no trades than can make someone better off without making anyone worse off are left unexploited.

Unanswered question

How do the buyers and seller **find** each other?

Who **owns** the space where the buyers and sellers meet?

Co-incidence of location

Before mobile phones

Price information previously **flowed** the through the **physical space** which

it **required co-incidence of location** to exchange price information

After mobile phones

price information **flowed** through a **different space**

freed individuals from **co-incidence of location**

Co-incidence of location

Before mobile phones

Price information previously flowed the through the physical space which

it required co-incidence of location to exchange price information

After mobile phones

price information flowed through a different space

freed individuals from co-incidence of location

Payment systems free people from co-incidence of location

Co-incidence of location remains for **goods**

Markets unlikely to become aspatial

Coda

Kerala Fish Markets

Atypical example because most places are landlocked.

Buyer's ability to move across space is determined by the **transport network**

> Numerous options in **urban areas**
>
> Limited options in **rural areas**

Space

Conceptual Framework

Conley (2012)

Place is simply *there*, while space is *produced* or *invented*.

Conley, V. A. (2012). Spatial ecologies: Urban sites, state and world-space in french cultural theory (Vol. 21). Liverpool University Press.

Lefebvre (1974)

Humans produce *space* & the **humans** in turn are produced by *space*.

> *Feedback loop*

> *Endogeneity*

Lefebvre, H. (1974). La production de l'espace. Paris: Anthropos.

Michel Serres (1995)

> If you take a handkerchief and spread it out in order to iron it, you can see in it certain fixed distances and proximities. If you sketch a circle in one area, you can mark out nearby points and measure far-off distances. Then take the same handkerchief and crumple it, by putting it in your pocket. Two distant points suddenly are close, even superimposed. If, further, you tear it in certain places, two points that were close can become very distant.

M. Serres with B. Latour, Conversations on Science, Culture, and Time, trans. Roxanne Lapidus. Ann Arbor: University of Michigan Press, 1995, pp. 60–61.

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linking places through

> **high speed railway line**
>
> **Expressways**

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Enclosure movement

Political borders

high speed railway line

Expressways

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Mapping the space through night light

Rehman, S., Honap, V., Siddiqui, A., Maske, A., & Maithani, S. (2021). Spatio-temporal variations in night lights, economy and night light emissions in states of india. Journal of the Indian Society of Remote Sensing, 49, 2933–2943.

Road Network

Table 2: Table 2: Road Network[8]

Country	Population Density (people/4km^2)	Road length (km)	Road density (km/4km^2)	Surfaced (%)	Surfaced road density (km/4km^2)
India	1,878.64	6,331,757	7.70	64.69	4.98
France	493.60	1,053,215	7.67	100.00	7.67
Germany	952.08	830,000	9.30	100.00	9.30

Aniket, K. (2024). Markets, space and infrastructure. In B. Banerji & S. Sharma (Eds.), Public policies and business strategies in india and europe: Ideas for a sustainable, inclusive and resilient society. Springer.

Rail Network

Table 1: Table 1: Railway Network[7]

Country	Surface area (km^2)	Rail length (km)	Rail density ($km/400km^2$)	Stations	Station density (per 400 km^2)
India	3,287,260	68,103	8.29	7,337	0.89
France	549,087	27,716	20.19	3,000	2.19
Germany	357,140	33,401	37.41	5,681	6.36

Aniket, K. (2024). Markets, space and infrastructure. In B. Banerji & S. Sharma (Eds.), Public policies and business strategies in india and europe: Ideas for a sustainable, inclusive and resilient society. Springer.