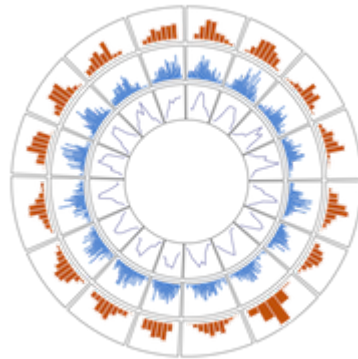


Infrastructure

Markets, Space and Infrastructure



Dr. Kumar Aniket

17 June 2022

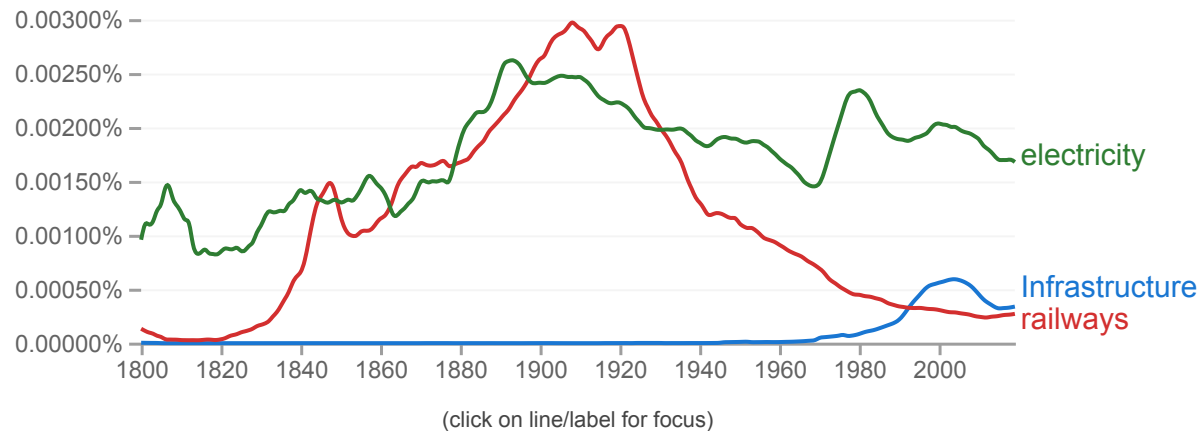
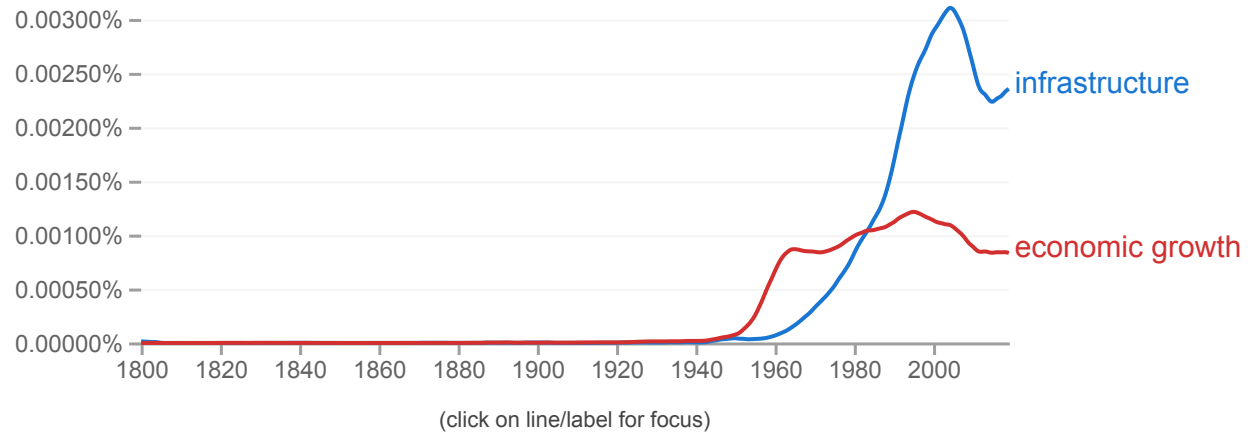
Market

Space

Infrastructure

Infrastructure

Definition



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.

Torrise (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.

Torrise, 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

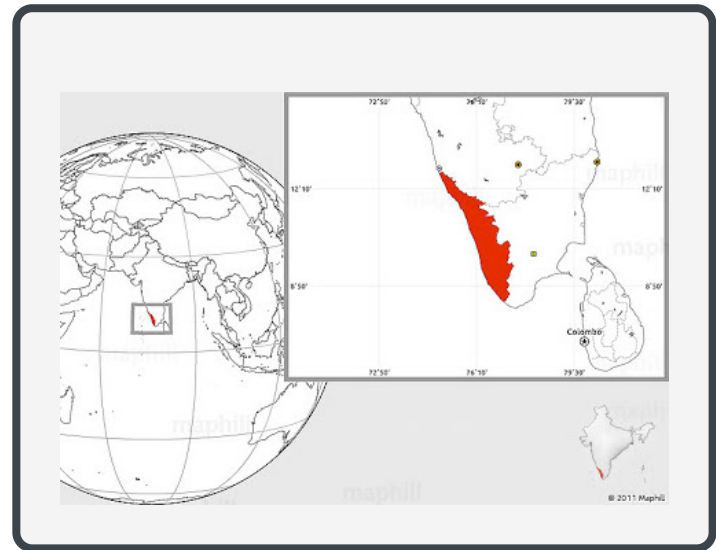
Fish is the staple diet in Kerala, India

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

Fisherman have a choice of which markets they want to 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.

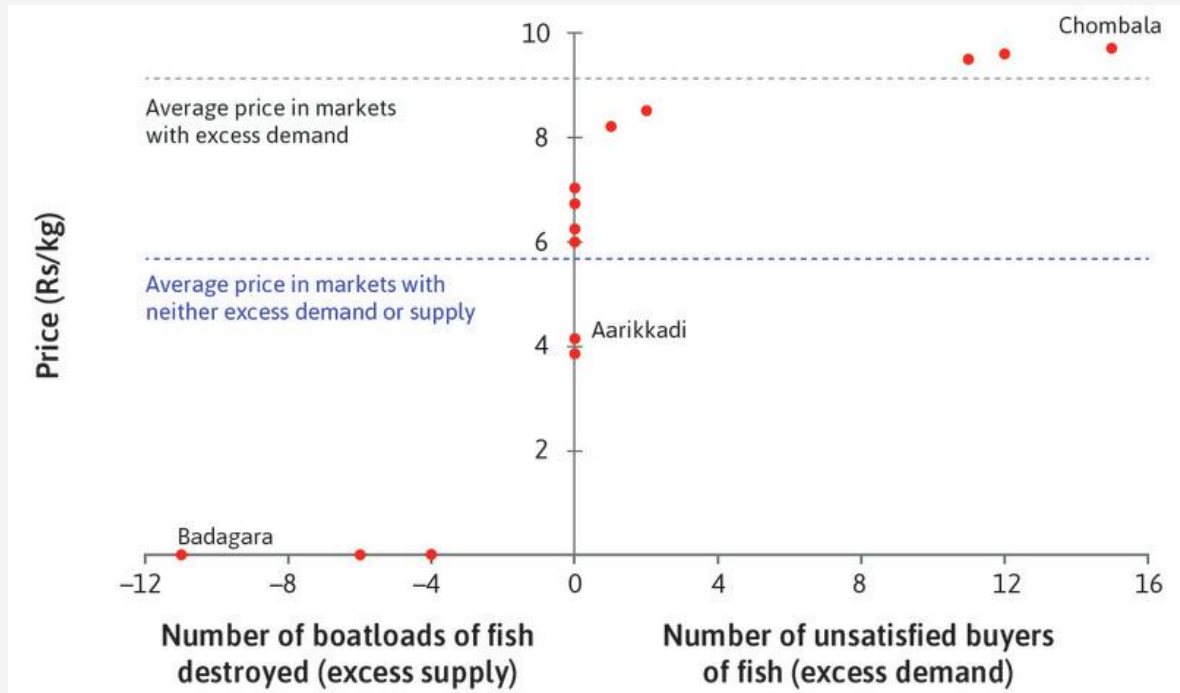
Kerala Fish Market

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 high* and fisherman's *profits low* due to **wastage** and **bargaining power** of fish merchants who bought from the fisherman and sold to the consumers

Market Conditions on 14th January 1997 in Fish Markets in Kerala



Badagara: 11 boats jettisoned their catch due to excess supply

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

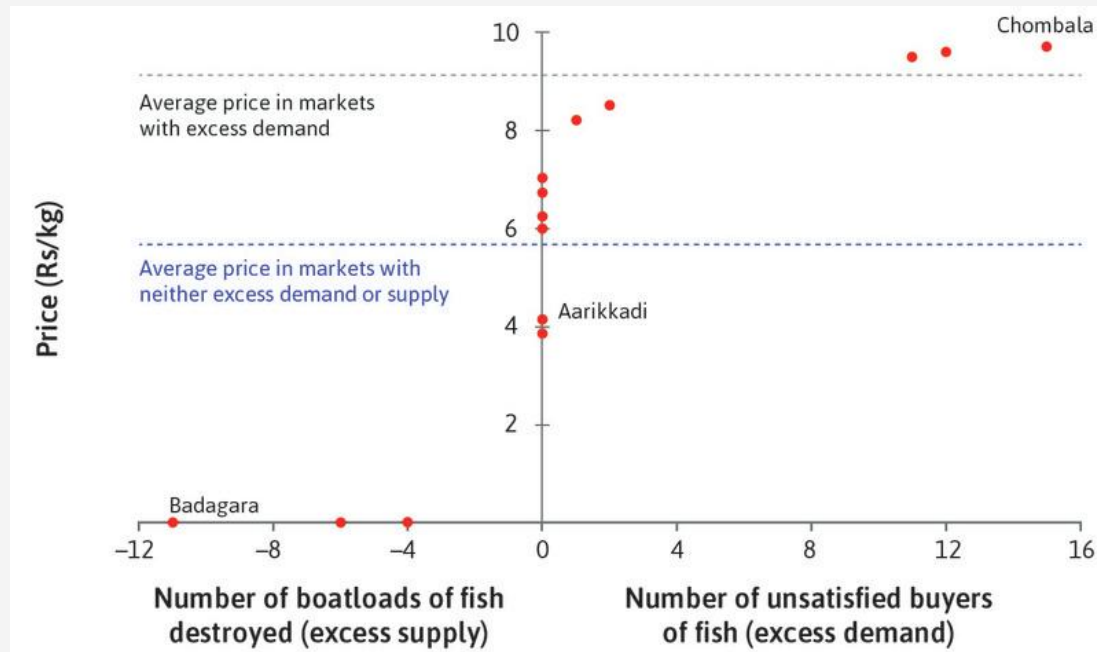
Notes

Markets stop working if there is either excess supply or excess demand.

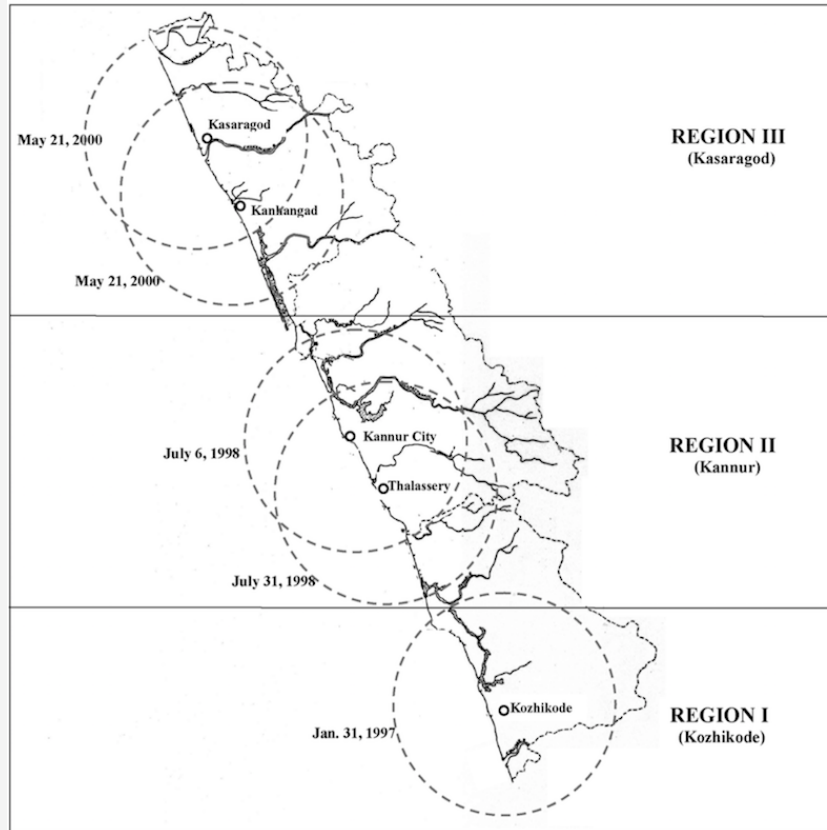
- If there is **excess supply**, the prices drops to zero.
- If there is **excess demand**, the price rises initially but the price of last few transactions don't signify anything once there is no fish left for customers to buy, at any price.
- The **market clears** if the demand and supply are equalised. The price in these markets are above zero and below the price in the markets with excess demand.

Average market price across markets

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



Sequential roll out of mobile phone coverage



Notes

We can see in the previous figure that the mobile phones were rolled out sequentially in the three areas (Region I, II and III) the paper studies. What is striking is the *drop in volatility of daily prices* as the mobile phones are rolled.

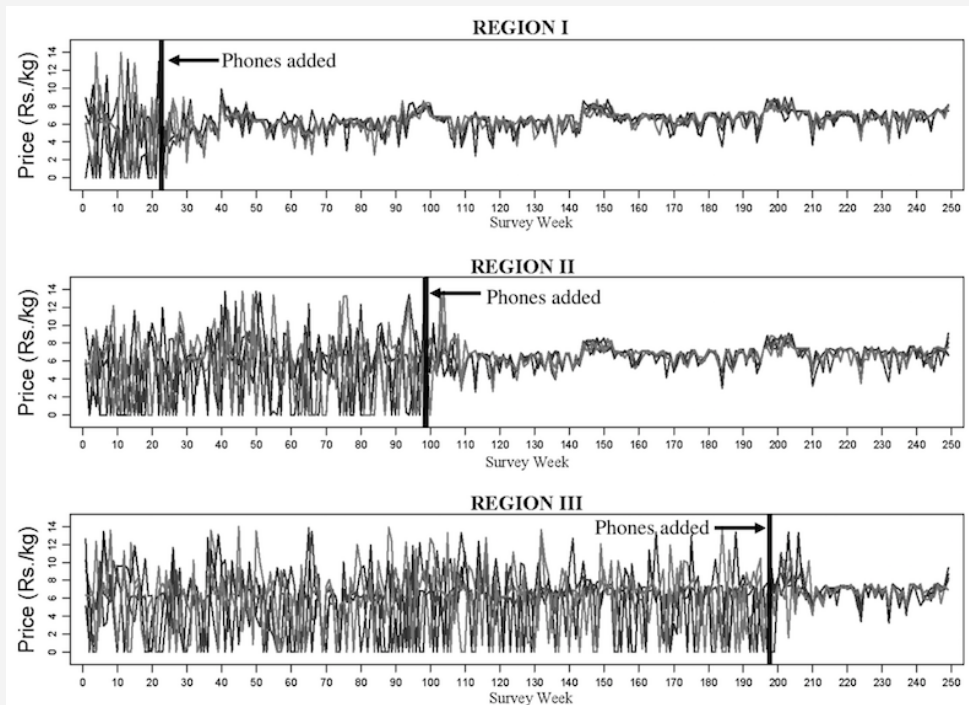
The drop in volatility of price leads to both fisherman (people who supply the fish) and consumers (people who demand the fish) being better off. Consumer price drops and the fisherman's profits increase.

This is because the **transaction cost**¹ in the market has decreased. In the fish market, the cost of acquiring information was a large part of the the transaction cost. The transaction cost dropped because of the introduction of a **public good**, i.e., the mobile phone network.

It is public good that would have been too expensive for the fisherman to provide for themselves because of the increasing returns to scale.

[1] **Transaction cost** is simply the cost in making a economic trade.

Introduction of mobile phones



Sharp decrease in **price** volatility.
Reduced **waste** & elimination.

Fisherman's **profits** went up by 8%.
Consumer **prices** decreased by 4%

Notes

Mobile phone network is public good that has a very *high increasing returns to scale*. The **scale** here is the **number** of people who have access to mobile phones. If the number is small, the benefits are more limited. As the numbers increase, the benefits increase too. If we start from a very small scale, say one-tenth of the population being covered by mobile phones and double the network, so that one-fifth of the population is covered, it is intuitive that the pecuniary and non-pecuniary benefits accrued will be more than doubled. This will keep happening till the full population is covered.

Mobile phones have two components in its provisions. The first one is establishing the network. This entails creating a regulatory framework within which mobile operators operate. Only once this regulatory framework is established and mobile phone operators obtain their licence to operate that they start making their private investments in building mobile phone base stations that facilitate mobile phone communication.

The *private investment* (private capital formation) only happens once the *public good* (public capital formation) is in place.

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%

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

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

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.

Well-functioning markets:

- No one has market power
- No information problem between the buyer and the seller
- No externalities

Kerala Fish Market

Space

Infrastructure

Marketspace

contiguous space between all potential buyers and sellers through which **price information, goods** and **money flow**.

Marketspace

location where the **exchange** of goods and money.

Market

Fulton Fish Market
New York City

Fulton Fish Market



Wholesale fish markets in New York where restauranters buy fish in large quantities

Fulton Fish Market



Unloading the fish from the boats



Fish stalls in the Fulton Market

Graddy (2006)

Studied the transactions for **whiting** in Fulton Fish Market in 1995.

Found that **Asian buyers paid 10% less** for the same quality of fish as compared to other white buyers.

Graddy, K. (2006). Markets: The fulton fish market. Journal of Economic Perspectives, 20(2), 207–220.

Power relationships in the Fulton Fish Market

Asians buyers were **socially organised** and could **boycott** the sellers that cheated them

Why couldn't new sellers **enter** the market and **compete** with the old sellers

Mafia controlled the **parking** in the streets around the market

It controlled the **loading** and **unloading** of the fish

Only **sellers** that had a **relationship** with the local **mafia** could sell in the Fulton fish Market

Market

Power

Infrastructure

Space

What is space?

What is space?

Cartesian coordinate system

empty three-dimensional space
(a vacuum)

physical space that that can be
occupied by animate and inanimate
objects.

(René Descartes)

Human experiential space

Space as experienced by humans

Includes social relationships

Power relationships

What is the relationship between **Cartesian space** and **Social space**?

Lefebvre (1974)

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

Endogeneity

feedback loop

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

Social Space

Lefebvre (1974)

- Physical space is *vacuum*
- Physical space and social space are *entangled*
- More **complex** the place, the more the **signs** are needed
- Humans develop **formal** and **informal representation** of space in their minds¹

[1] Norman's conceptual model seems relevant here.

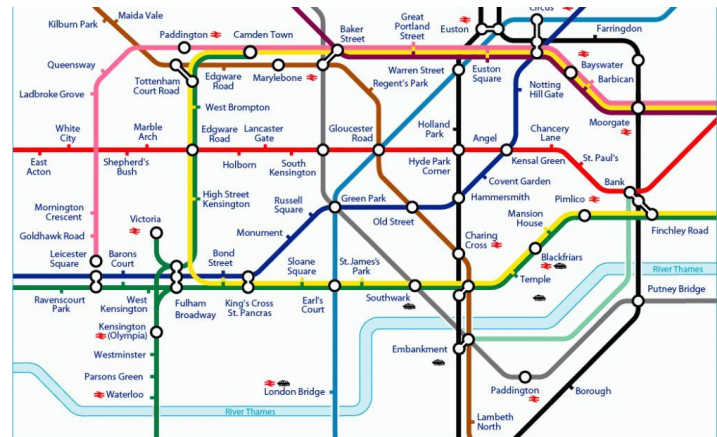
Norman, D. A. (1998). The invisible computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution. MIT press.

Formal Representation: Maps

London's actual tube map



London's simplified tube map



Informal Representation

Social Rules

Difficult to disentangle the
intangible **"rules of the space"**
from the **tangible space** itself

Social Space = Cartesian Space + Social Rules

Power

Rules that apply in a particular space are determined by the entity that possesses the **power** in that space

Government

- Legislative,
- Executive and
- Judicial bodies
- Community
- Mafia
- Privately owned firms

Lefebvre (1974)

People in power **impose spaces** on the people who live in them

If the imposed space alienates people, people **invent spaces** through the **acts of resistance** to overcome the alienation.

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

Lefebvre, H., 1991. The production of space. Translated by D. Nicholson-Smith. Cambridge, MA: Blackwell Publishers.

Market

The **marketspace** for a **competitive market** is a **public good**, i.e., it is non-rival and non-excludable for market participants.

Market **decentralisation** creates a **power vacuum**, giving incentive for entities to try own or exert control over the the market-space.

The market is only able to **facilitate decentralised transactions** if the market space is **owned by a benevolent entity**, which chooses not to influence transactions.

Supermarkets

Right to buy

Right to sell

Supermarkets have **expanded the right to buy** and **curtailed the right to sell**.

Elinor Ostrom

Sociologist, Economics Nobel Laureate (2009)

Natural resources are **rival** and **non-excludable**

Studied on how people in small, local communities **manage shared natural resources** - pastures, fishing waters, and forests.

Joint use of natural resources **require rules** agreed and **enforced** by the community

Stable membership of communities critical for rules to develop organically.

Internet and Automated Algorithms

A **social space** constructed through **automated algorithms**

- Facebook
- Amazon
- Wikipedia

Intermediating our social experience of
the world and each other

Wikipedia

Community driven social rules

Wikipedia works in the same ways
as *rural communities* manage
natural resource

(Elinor Ostrom)

Amazon?

Virtual market place

Free entry of sellers and buyers

Does not like *twitchiness* in the
social space

Facebook

Frances Haugen:¹ Facebook whistleblower

Facebook found that a *twitchy* social network (where people get angry and hate others) increases usage

twitchiness to increases advertising revenue

Social rules designed entirely within Facebook

Social Rules close to Fulton Fish Market

[1] Link to Frances Haugen's profile.

Functions of Infrastructure

to protect

to connect

to protect

to connect

Tentative Defintion of Infrastructures

Problems in private provision due to

- High degree of **increasing returns to scale** leading to market structure problems
- **Non-rivalry** and/or **Non-excludability**

Solving the problem of infrastructure provision

- expands the **boundaries** for economic unit
- reshapes the **identity** of the economic unit
- creates **new social rules**