

Infrastructure and Territory: a paradoxical effect

IHEDATE 16-17 mai 2013

Michel Savy professeur à l'Université Paris Est directeur de l'OPSTE codirecteur du Centre franco-chinois Ville & Territoire savy@u-pec.fr

Outline

- An old and pendent issue
- 1. Life cycle of a network
- 2. Infrastructure and territory: a changing effect (the TGV case)
- 3. A paradoxical effect: from scarcity and spatial unevenness to affluence and spatial neutrality
- References

Has infrastructure the power to structure space?

- A traditional issue, still pending
- Reasons why
 - an infrastructure is a major element of organization of a territory
 - it takes part to its development, possibly triggers it
 - an issue often used to justify new projects
- Reasons why (maybe) not
 - many exceptions, in both ways (development with poor infrastructure, little development in spite of abundant infrastructure)
 - a case often used in political discussions to justify unnecessary projects
- A question to address
 - □ in time (a long range process)
 - □ in space (different readings, according to the geographical scale)

1. LIFE CYCLE OF A NETWORK

Path dependency

- A new project in a virgin territory has more impact than an additional project in a previously densely equipped territory
 - absolute initial facility
 - or gradual upgrading (incremental)
 - or radical upgrading (break-through)
 - a new highway only provides a better service than a simple road, but few regions in Western Europe are actually landlocked
- A long range process
 - several steps characterised by different effects on territory
 - □ from segments to network

Birth of a network (rail)

- Initial segments
 - innovation
 - local, limited implementations
 - heterogeneous (no standardisation)
 - strong differentiation of space (to be or not to be linked)
 - example: French railways. Remarkable quick construction. Typical Parisian hub



Expansion of a network (rail)





Development of new lines. Local links are integrated into a

<u>network</u>.

Technical integration (interoperability) and cooperative marketing and management

Broad mesh: trunk lines and big cities, but many rural areas remain isolated

Maturity of a network (rail)



Densification, smaller mesh (covering all zones). <u>Homogenisation</u> of space. Acme of the French railway system: 1920

Destabilisation of a network (rail)

- Outside innovation factor: competing alternative solution (automotive road vs. rail)
- Inside innovation factor: radical upgrading, implemented only on a portion of the network (high speed train vs. traditional, heterogeneity: a two speed network)
- The network shrinks, is reduced to trunk lines (kernel)
- A new phase of differentiation of space



French highways

Late kick-off of highway building in France 1970 : only Lille-Paris-Lyon-Marseille (biggest cities in the country), enhancing geographical uneveness Parisian hub

1970

1980

1946-1960



French highways (continuation)

Continuous strengthening of the network: new links, loops, crossroads

Dual itineraries, metropolitan local subnetworks Homogenisation of territory (in connexion with secondary roads) Network nearly completed ("Grenelle" law) 50 years between initial and final phases



Successive networks: freight modal share



In the long term, the very volume (multiplied by 100) and structure of freight transport change, in relationship with the development and decline of infrastructure networks.

2. INFRASTRUCTURE AND TERRITORY: A CHANGING EFFECT (THE TGV CASE)

Differentiation of space

- As long as the network is uncompleted, it serves a portion of a territory
- Example of high speed trains: <u>uneven coverage</u> and <u>distortion</u>
- Concentration of traffic on new lines (the quickest route is not always the shortest one)
- <u>Tunnel effect</u> and <u>polarisation</u>

Diffusion of service

Service matters! High speed rolling stock can run on traditional tracks Service covers areas beyond new tracks Still, a two-speed territory

Perspectives

- An ambitious plan for 2,000 km of new high speed tracks before 2020 (and 2,500 km more, later)
- The new train sets a new standard: traditional train is slow
- 50 years between initial and final phases
- Homogenisation of territory, at <u>metropolitan</u> level (polarisation)
- At local, regional scale, a strong <u>discrimination</u> among territories (neglected, or crossed but not served)

Local scale:

- Homogenisation takes place at large scale (national network, linking metropolitan areas together)
- Locally, the same infrastructure generates scarcity, unevenness and discrimination resulting in structuring space:
 - if a highway serves a small city from the Northern or the Southern side, urban expansion (including activities leaving the city centre) will be located along the slip roads of the new equipment
 - some high speed train serve historical city centre stations (possibly renovated), others "green fields" in the outskirts. The influence on urban sprawl is different

From scarcity and spatial unevenness to affluence and spatial neutrality

3. A PARADOXICAL EFFECT

Scarcity and spatial unevenness

- A relationship between infrastructure and territory can be observed
- There is seldom a one way causation
 - infrastructure is considered as a <u>necessary</u> but <u>not sufficient</u> condition
 - to make the most of a facility, <u>projects</u> are required (endogenous and exogenous development)
- Uneven service and spatial discrimination
 - when a network is not completed, connected areas benefit from a <u>comparative advantage</u>, more particularly to attract investment (location criteria: ceteris paribus, a connected area will be preferred)
 - an <u>uneven development</u> can take place, the results of which will continue after the network is finalized (examples with power, phone, etc.)
 - therefore, the <u>schedule</u> of implementation of an infrastructure plan is as important as its final picture

<u>scarcity structures space</u>!

Affluence and spatial neutrality

- Expansion and completion of a network tend to homogenise space (at large scale)
 - more cites and regions are connected, competitive advantages and handicaps vanish
 - the availability of this infrastructure is no longer a crucial criterion for choosing a region vis a vis another one, discrimination disappears
 - the order of criterion changes: previously secondary factors now have priority (manpower, supply, market, cluster, etc.)
 - whereas infrastructure is forgotten: it proves the accessibility problem is solved!
 - exception: peripheral or landlocked areas suffer from an even stronger relative handicap than before (the new facility sets a new standard they are excluded from)

Formal paradox: the stronger a network, the weaker its influence on spatial structures !

- but it does influence the way the entire territory works
- at local scale, discrimination shapes spatial development

4. Infrastructure crisis? Perspectives

Political crisis

- Modernity is not what it used to be...
- Increasing length of decision making and building time
 - claims of neighbours (NIMBY)
 - criticism of environmentalists
 - public hearings
 - more complex, costly projects
- Average total necessary time: from 15 to 20 years, sometimes more (Lyon-Torino ?), but not in China!

Financial crisis

- Most profit making projects have already been built
 - easier building
 - more traffic
- Public debt and scarce public expense
 - □ set more severe priorities
 - central governments ask local authorities to take part in growing proportions (less transfer? less territorial equity?)
 - also for UE: TEN-T budget is marginal compared to the amount of investment it recommends
- PPP is not the miracle solution
 - private capital requires guarantees from public authorities

Scientific crisis

- Project appraisal methods are contested
 - cost-benefits analysis finally gives the heaviest importance, among benefits, to time saving, whereas time budget for transport does not decline. A single function optimisation (traffic)
 - do not sufficiently integrate environmental issues (whatever the valuation they make of CO², etc.)
 - ignore other external effects (influence on urban development)
 - 20 years of construction + 30 years of operation : what will be the environment of the transport system (energy resources and prices, etc.) and the demand for mobility in 50 years ? A long term approach is necessary (hidden by high depreciation rates)
- Politicians sometimes contradict scientific and bureaucratic advisers
- How to appraise, how to decide?
 - multi-criteria methods
 - political, geopolitical approach
 - but a real know-how remains!

Towards a comprehensive, territorial and

gradual response to mobility demand

- A territorial approach
 - transport as an element of a broader system
 - network and itineraries rather than single projects
 - multi-scale: European corridors, bottlenecks, metropolitan areas (serving, bypassing), local transport
- Better use of existing infrastructure
- Complementarity of modes
 - multimodal, intermodal, comodal, optimodal...
 - archs and nodes (terminals, hubs, etc.)
 - end to end (new interest for urban logistics)
- Example passenger trains: from "all TGV" solutions to varied adapted solutions
 - □ TGV (350 km/h ? 300 ?)
 - mixed track (freight + passengers)
 - existing upgraded track + high frequency and connexions
 - etc.
- **Comprehensive spatial scenarios**, preparing decisions
- Looking for solutions: exchange of practices at national and international level, European initiative ?

References

- Le transport de marchandises, Eyrolles Les Éditions d'Organisation, 2006.
- "Transport routier de marchandises et gaz à effet de serre", in *Pour une régulation durable du transport routier de marchandises*, La Documentation française, 2008.
- o <u>http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/094000193/0000.pdf</u>
- Le fret mondial et le changement climatique, Centre d'Analyse Stratégique, Paris, La Documentation française, 2010.
- o http://www.ladocumentationfrancaise.fr/rapports-publics/104000665/index.shtml
- Cinq scénarios pour le transport et la logistique en 2040 (avec Philippe Duong, Samarcande), recherche pour le PREDIT, 2011.
- http://www.predit.prd.fr/predit4/document/42639
- "Transport Management as a Key Logistics Issue", in PERRET F. L. et al., Essentials of Logistics and Management: The Global supply Chain, Lausanne, EPFL Press, 3rd edition, 2012.
- <u>http://www.ppur.com/produit/528/9782940222674/Essentials%20of%20Logistics%20and%20Management%20</u>
- "Logistics and the City: the Key Issue of Freight Villages" (with LIU Xiaoming), in MACKETT R., MAY A., KII M., PAN H. (ed.), Sustainable Transport for Chinese Cities, Transport and Sustainability, Volume 3, London, Emerald, 2013.
- <u>http://www.emeraldinsight.com/books.htm?issn=2044-</u>
 <u>9941&volume=3&chapterid=17072835&show=pdf&PHPSESSID=j00pgaqtjfosrqmdivfkcf3p97</u>
- Freight Transport and the Modern Economy, with June BURNHAM, London, Routledge, 2013.
- http://www.routledge.com/books/details/9780415577502/.
- Bulletin Transport/Europe