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THE NETWORK MEGALOPOLIS : A CREATIVE AND SUSTAINABLE PATH FOR URBAN FUTURES?

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ABSTRACT :

This short paper summarizes findings from some recent studies undertaken by the author and his colleagues concerning metropolitan development in the industrialized world. Three particular aspects are stressed :

(1) The need to extend the way in which we analyze city systems — from the traditional perspective of centres within subnational hierarchies of settlements to the cosmopolitan perspective of urban nodes, corridors and hubs forming a complex system of interdependent cities feeding on various transnational networks.

(2) The need to modify our lifecycle theories of urban development in order to cater for the dynamic synergies inherent in these networks, and the fact that collective stocks of knowledge reside in constellations of net-work cities rather than in any single centre alone.

(3) The need to recognize the different speeds of urban adjustment processes, and the fact that because infrastructure is one of the slowest facets of development , it actually plays a fundamental role in controlling the nature and pace of other faster processes of adjustment.

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1. INTRODUCTION

Throughout the world, cities serve as regional centres for business and governmental decision-making, for negotiations, for knowledge creation, and for numerous other face-to-face activities. Many cities also drive their nation's industrial systems. A select few have been instrumental in a global perspective, serving as principal nodes in one or more of the various international networks facilitating migration, trade, finance and information exchange. Irrespective of the spatial boundaries limiting their domain of influence, cities are the key driving forces behind regional, national and international economies. Consequently, studies of their development are at least as important as nations or even clusters of nations in any comparative framework (Jacobs, 1984).

Like products, cities follow a lifecycle trajectory. They possess vintage properties, in the sense that large and previously prosperous ones eventually decline in the absence of sufficient renewal and revitalization activity. The rise and fall of cities is indeed well documented in all parts of the world. To catch a glimpse of this lifecycle phenomena, we may turn to Europe over the last millenium (see Table 1). Many European cities which dominated several centuries ago are relatively small today, whereas many of those which have grown to greatness in our lifetime were quite small a few centuries ago.

Table 1 : The Ten Largest Cities in Europe, 1000 - 2000
(By Population in Thousands)

1000		1400		1700		1900		2000	
CITY	POPULATION	CITY	POPULATION	CITY	POPULATION	CITY	POPULATION	CITY	POPULATION
Constantinople	450	Pris	275	Constantinople	700	London	6480	Moscow	3000
Cordoba	450	Milan	125	London	550	Paris	3330	Paris	3500
Seville	90	Bruges	125	Paris	530	Berlin	2424	London	7000
Palermo	75	Venice	110	Naples	207	Bienna	1662	Leningrad	5500
Kiev	45	Granada	100	Lisbon	188	Leningrad	1439	Madrid	3000
Venice	45	Genoa	100	Amsterdam	172	Manchester	1255	Berlin	3000
Pegensburg	40	Prague	95	Rome	149	Birmingham	1248	Rome	2300
Thessalonika	40	Pouen	70	Vunice	144	Moscow	1120	Birmingham	2500
Amalfi	35	Seville	70	Moscow	130	Glasgow	1072	Manchester	2500
Rome	35	Gnent	70	Milan	124	Liverpool	940	Budapest	2100

Sources : Hohenberg and Lees (1985) and author's estimates.

In this paper, we argue that the future prospects of a city during the next millenium will be strongly influenced, among others, by the following factors :

(1) the nodality, density and efficiency of all tangible networks (i.e.infrastructure) linking it to the rest of the world ;

(2) its strategic position in the cosmopolitan system of intangible networks which facilitate the global exchange of people, knowledge, money, goods and services ;

(3) its creative and adaptive capacity to exploit the potential synergies (e.g. economies of scope) inherent in these networks , as well as the collective knowledge permeating across them (see Batten, Kobayashi and Andersson, 1989).

These three factors are important when we come to examine urban renewal and revitalization activities for the cosmo－creative city of the twenty－first century.

2. NETWORK CITIES VERSUS CENTRAL PLACE CITIES

It is often argued that city size fosters innovative propensity. This has even been given a title: "The HVLT hypothesis" (after Hoover, Vernon, Lichtenburg and Thompson), since these authors emphasized the unique advantages enjoyed by New York City in the production of those commodities for which continual innovation or a constant flow of new information played an important role (see Hoover and Vernon, 1959). Whilst the supportive evidence linking size and innovative capacity is impressive, some recent observations suggest that part of the innovarive growth potential which traditionally resided in larger U.S. and European cities may now be found in somewhat smaller urban concentrations (see, for example, Norton and Rees, 1979 ; Hohenberg and Lees, 1985). The innovative activity of multinational companies may be seeded in various locations simultaneously, and is by no means restricted to the creative resources of the big cities.Table 1 also reminds us that size alone has rarely been an adequate guarantee against eventual decline and obsolescence.

Such a trend reversal is consistent with the ongoing transition towards a global network economy. The internationalization process implies a weakening in the relative importance of intraregional accessibility in favour of stronger international contacts. Mushrooming growth among firms responsible for information processing, telecommunications and air transport capacity is greatly facilitating point－to－point contacts between many dispersed locations, thereby increasing the network character of the world economy. Knowledge about important innovations can spread rather quickly under these conditions. As these tendencies proliferate further, the geographical contiguity of regions and the relative size of places in a local context may become less important than they were in the past. Instead we must concern ourselves with diverse changes permeating across interdependent networks. In this new arena, a global perspective is mandatory.

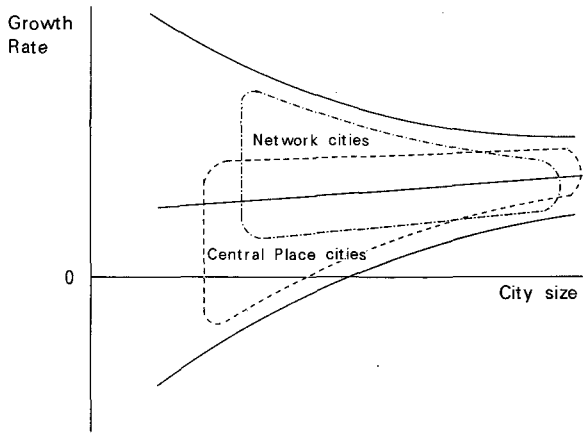

Figure : 1 The Relationship of Growth to Size in Two Urban Systems

In the traditional theory of central places, growth potential is proportional to size. This need not be the case for a network city. It is in fact network cities or urban "hubs" that have accounted for an above-average share of all urban development in today's Europe (see Figure 1). Although larger cities and urban hubs (Like the Randstad system) possess both network and central place characteristics, it is the smaller network cities that have counteracted the central place trend towards primacy and contributed to the **size-neutrality** of urban growth (see Robson, 1973 ; Hohenberg and Lees, 1985).

A natural extension of this trend is that future phases of growth and decline among systems of cities may be intimately associated with each city's acquired role in both national and international economies. It also suggests that competitive leadership may not be restricted to those few larger urban centres who have served traditionally as the seedbed of innovative activity. Smaller settlements may be able to enjoy relative prosperity by specializing in specific innovations which capitalize upon their "interactivity" across associated networks. Knowledge-sharing becomes a more realizable process.

3. YESTERDAY'S NETWORK ECONOMY OF EUROPE

The seeds of a new European network economy were sown as far back as the 11th century, when safer trade routes triggered the revival of many medieval cities (Pirenne, 1925 ; Mees, 1975 ; Andersson, 1986). To see this network economy transformed into its modern eqivalent, we may turn to the Netherlands in the 19th century. The new economic stimulus of development along the Rhine and its tributaries prompted the rapid growth of two Dutch cities to challenge Amster-dam's primacy-The Hague as the royal residence and political capital and Rotterdam as the port commanding the mouth of the Rhine. Their relative growth paths may be traced more closely by reference to Table 2.

Table 2 : Population Growth in Three Dutch Cities, 1800 to 1985

City	Average Growth Rate (% p. a.) over the Period		
	1800 – 1900	1900 – 1950	1950 – 1985
Amsterdam	0.94	0.91	0.62
The Hague	1.73	2.08	0.36
Rotterdam	1.81	1.63	1.02

Source : European Historical Statistics, 1750 – 1970 and Statistical Yearbook of Sweden, various years.

Rotterdam and The Hague grew from 26% and 19% of Amsterdam's size, respectively, in 1800 to 102% and 67% by 1985. What appeared to be a balancing procedure was actually the formation of a well – articulated, polycentric **urban hub** that came to be known as Randstad. The network patterns are possibly clearer in Holland because its land has been so actively managed. Today Randstad Holland incorporates a number of other towns, such as Leiden, Haarlem and Utrecht in particular. In this type of network system, close links are forged between places of **complementary** function rather than simply on the basis of distance or demand thresholds. A similar hub system is developing in the Kansai region of Japan, focusing on Osaka, Kyoto and Kobe.

The hub system may generally be viewed as a more sophisticated combination of **corridors.** The latter consists of two (or more) major nodes linked by a linear segment of intrastructure. It may also include some smaller intervening nodes and is often associated with a science park and/or clusters of high – technology firms. European examples of this type of corridor development include the Mll Corridor linking Cambridge and London, as well as the Stockholm-Uppsala corridor. Each of these corridors also incorporates an international airport. Not surprisingly, the airport – university combination turns out to be one of the most synergistic factors currently contributing to faster and more prosperous urban growth in the European context (Andersson, Anderstig and
Harsman, 1987).

4. THE SYNERGISTIC ROLE OF INFRASTRUCTURE

When viewed in terms of key service attributes, the evolutionary patterns of infrastructure become relatively clear and predictable. Figure 2 illustrates this observation. Both transport and communication systems have evolved by embracing faster, more flexible and reliable means of in-teraction offering a much larger choice of destination possibilities. It may also be frutiful to regard many other types of infrastructure as **network systems** of social and economic overhead capital, and then to distinguish between intranodal and internodal networks (Batten, 1990).

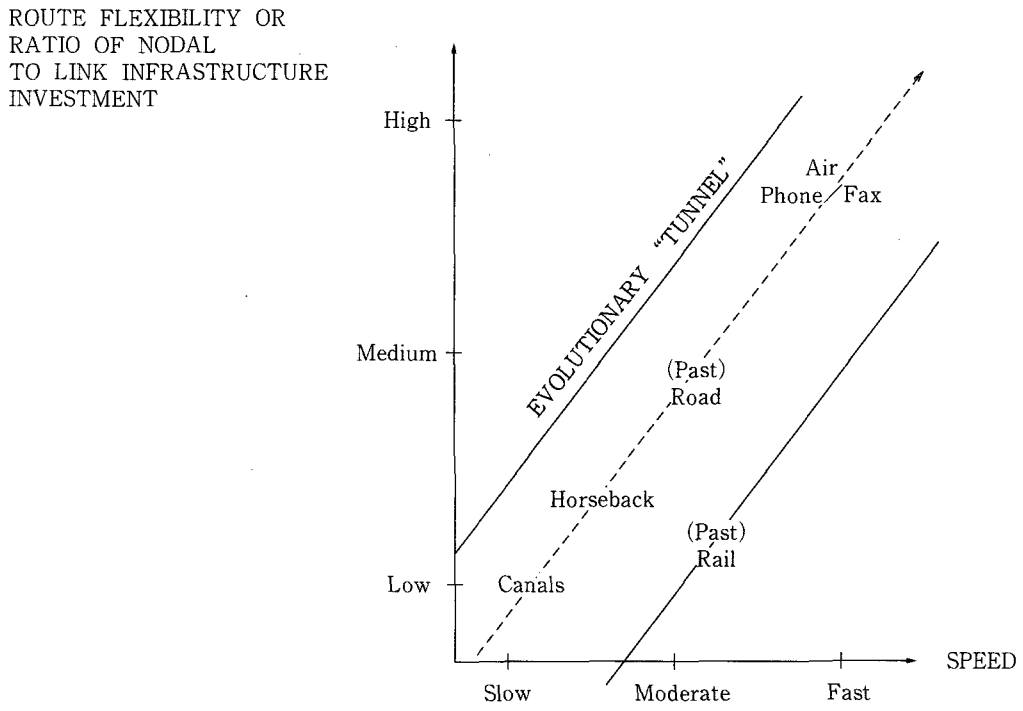

Figure2 : Evolutionary Pattern of Two Network Systems in terms of their Service Characteristics

One key observation is that the growing tangible networks of today invest a higher share of their budget on nodal rather than link infrastructure. As our societies become more " node – intensive", the contiguity of various places is becoming less important. Instead it is accessibility to other key nodes and their collective stocks of knowledge, the degree of interactivity with them, and the ability to exploit those scope economies arising from the interactive character of different networks, that signifies the successful cosmo – creative city of tomorrow.

The mobile telephone is an elegant example of transport communication synergies (or scope economies) at work. Today's important savings are measured in units of time, so the ability to communicate while on the move is invaluable. Integrated systems like the mobile telephone clearly demonstrate the principle of synergy, where the whole is superior to the sum of the parts. One of the crucial differences between the more prosperous and the less prosperous cities of the next century will be the ability of the former to identify and exploit a wide range of synergies inherent in the many different network combinations. In this context, a crucial policy change will be the need to address the interface between processes which are relatively slow (e.g. the evolution of transportation networks) and those which are much faster (e.g. the decision to use a particular street).

5. SLOW AND FAST PROCESSES OF ADJUSTMENT

A common characteristic exhibited by metropolitan development as a whole is a degree of inertia in the adjustment mechanisms of some processes, which may result in the appearance of location-specific bottlenecks or tensions. For example, when new housing is constructed in peripheral rings to accommodate an increase in population, pressure on the land in the central business district may accelerate and the demand for cross-city travel may increase. Various relocation patterns among households and workplaces give rise to tensions in the land market, the job market and the transportation system. Some of these subsystems may be slow to respond because the existing infrastructure (e.g. road and rail networks, pipelines, telephone lines, etc.) is heavily constrained by the date and place of its initial installation.

Such differences between the speed of replacement or relocation of capital stock (typically a slow adjustment process) and changes in factor mobility (typically a fast adjustment process) create bottlenecks and capacity tensions simply because they operate on different time scales. Tension signals arise when a state of excess demand or excess supply worsens owing to inconsistencies in the speed or direction of change of the underlying components ; namely supply and demand.

Many metropolitan management decisions correspond to strategies devised to remove the underlying imbalances and alleviate capacity tensions in the urban system . The supply capacities might refer to given types of dwellings, categories of land or floorspace, human skills or transport and communication modes. The conditions specified in (1) typically manifest themselves in the from of price movements or changes in the length of consumer queues.
Changes to supply capacities are often delayed by inadequate information or time-consuming decision processe . Adjustments will therefore tend to be slow and discontinuous as depicted in Figure 3. The staircase character of these adjustments may not result simply from rigidities in the decision system but also from sunk costs and indivisibilities with respect to capital. The latter consideration causes realized capacity changes in specific locations to occur quite abruptly in discrete jumps, even though the overall adjustment process may appear to be quite slow.
For example, the annual construction of new dwellings would amount to about 2-3 percent of the value of the existing housing stock in Sweden and a number of other industrialized countries.
However, the demand for new dwellings in specific locations may be 4 to 5 times greater. Recognizing the different speeds of various adjustment processes can be very helpful in our attempts to explain, model, and forecast metropolitan dynamics. For example, we often find that a typical slow variable - such as the macrostructure of the urban economy - is actually changing at a variety of speeds in different cities. Nevertheless, in each case the restructuring process is proceeding at a steady pace and the pattern of change is thererfore readily predictable (Batten, 1985). If we choose to study only the fast adjustments, then the slower processes will remain disguised in the form of seemingly constant parameters within the chosen model. On the other hand, a model

addressing the slow adjustments will contain parameters which are either explicitly or implicitly affected by the faster adjustment processes. In each case, these parameters are not really constants but will change over time.

The field of synergetics, pioneered by Hermann Haken, affords us the opportunity to study the effects of fast and slow adjustment processes within the same framework. Sometimes we may then identify sudden shifts (based on singularities or bifurcations) in the value of the fast variables for a specific range of parameter values. This means that although slow phases of urban development will prevail for the vast majority of the time, a sudden and unexpected fast phase may transform the system into a completely new regime. This new regime may be brought about by a relatively small change initially, but the final ramifications may be quite profound.

6. FINALE : TOMMOROW'S COSMO－CREATIVE NETWORKS

During the seventies and eighties, the study of cities and city networks has been directly related to the world economy. Questions about the spatial organization of the new international division of labour have prompted various approaches toa **world city hypothesis.** Does this world network of cities correspond to the new regime we referred to above ? Not exactly. What the world－city hypothesis reconfirmed is that size may be less important than socio－economic function in assessingglobal influence, thereby demonstrating that global networks are becoming increasingly independentof national boundaries. Furthermore,prominence in more than one global network－such as London's key role in financial (banking and brokerage), insurance and merchanting networks－stresses the need to explore multiple networks and their potential synergies.

To fully understand the new regime we must probe more deeply than this. Two of the key trends proliferating across the industrialized nations are the growing importance of **knowledge－oriented activities** and the pursuit of higher levels of **infrastructure quality** (e.g. in transport, communications, other services, and the environment). These are arguably the two most important components of tomorrow' cosmo－creative network of cities. Why ? Because in order to properly explain differences in economic (i.e.urban) development, we must search for those slow variables of the collective variety which have significant implications for the faster economic, cultural and political processes. In essence, the faster processes are intrinsically constrained by the slower ones. Infrastructure, in both its tangible and intangible forms), constitutes this slowly changing public capital, providing the **arena** upon which the faster technological, economic, political and social games are played. Most forms of daily life may be analyzed as if this arena was stationary and stable. But when it comes to developments in the longer run, infrastructure does change (albeit very slowly). The consequences are complex and difficult to predict, but certainly require a cosmopolitan perspective.

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