City system

A city system; is a group of cities, which, in their evolution, have become interdependent because of the many relationship networks that they have and that interconnect them to a greater extent than other cities located in the environment. It is often the borders of a national territory that constitute the boundaries of a city system, because of the homogeneity of the norms the territory imposes, which contribute to forming some of their relationships. With time, city systems have indeed formed as groups of interconnected cities in continuous spaces, often because of exchanges based on proximity relationships, in territories where political and economic relationships were greatly constrained by commuting difficulties. They first of all developed on a regional scale and centred on city-states, market-towns, or on centres of political or religious power, before these prerogatives were gradually taken over by the nation states. However, some groups of cities, united in a certain period by exchanges on long-distance roads on which they were used as stop-offs, show that systemic co-evolutions can occur between cities that do not belong to the same politically defined territory (for example, the cities of the 13th century Hanseatic League, the cities on the silk road in Central Asia between Antiquity and the Middle-Ages, or the cities of the world financial networks from the mid 20th century).

The properties characterizing city systems were identified a long time ago. Since the independent emergence of cities in four or five regions of the world some 3000 years after the advent of agriculture, and whatever the form of organization of the societies concerned, city systems exhibit a regular hierarchical differentiation, with a reverse geometrical relationship between the number of cities and their size (measured here by the number of inhabitants, the surface area occupied or the value produced). This regularity, which was coined the rank-size rule by the statistician Zipf, can be observed in many other complex systems. A geographical-economic interpretation was given by geographer Walter Â«ChristallerÂ», basing it principally on the role of cities as centres for services to the surrounding population, constrained by proximity. This "central place theory", which also notes the relative regularity of city spacing, needs to be completed by integrating evolving processes, such as the hierarchical Â«diffusionÂ» of innovations. These processes can explain other regularities observed in all systems, such as the growth rate similarities in cities in the medium term, or the diversity of their functional specializations that develop as a result of waves of innovation based on resources that are not uniformly distributed across the system. All these regularities are sufficiently robust to enable retrospective simulations that reconstruct the evolutions observed, and establish a relatively reliable forecast of the transformations of large groups of cities in the next few decades.

Beyond the similarity of their dynamics, a comparison of city systems in the different regions of the world however reveals a fairly wide variability of configurations, linked to the fact that the system integrates successive bifurcations specific to the history of each territory. A first divide opposes systems where early settlement can explain the higher density of the cities and their smaller size (Europe, Asia), to systems where a more recent territorial settlement gave rise to a less dense distribution, and also to greater size contrasts between cities, some being able to reach larger dimensions because they emerged at a time when more powerful technical tools were available (U.S.A., Australia).
The regions in the world that bear the mark of colonisation have given rise to city systems characterised by the duality between a spontaneous urbanisation, adapted to the local functioning of the territory, and city models that were imported or imposed from outside, often resulting in one or several cities exhibiting primacy or macrocephaly, i.e. disproportionately large in size compared to the other cities in the system. Generally speaking, there is a tendency for city systems to have one "prime" city, as Jefferson had pointed out as early as 1939, attributable to a wider opening of these political or economic capital cities towards long-range networks, linking the territory with its environment or the rest of the world.

It is also because of this property, specific to city systems among complex systems a whole, that it is still difficult to establish a clear-cut distinction between the system and its environment, inasmuch as the frequency, intensity and range of relationships tend to increase with the size of the cities within a given system. This increase in a certain number of attributes, which is not proportional to the size of the cities, has been formalised as a set of scale invariance laws. It contribute to the historicity of the cities which leads to a refinement in social organisation in terms of division of labour and the accumulation of values as the cities grow. The increase observed in these different attributes has also led to formalisations that are too partial or simplistic, such as the theories of scale economies or the urban balance theories which neglect the fundamentally evolving character of the formation of a city system.

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