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Old and New Approaches to the City Optimal Size and Centrality

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Abstract

After a brief survey of the "city optimal size" question in the mainstream literature of urban economics, the paper will outline a new programming or planning-oriented approach to city policy and design. It will argue the need and opportunity to start from new conceptions and measurements of "urban centrality". Steps will be described towards a new organisation of land use on a large scale (regional and national) capable of respecting the constraints coming from the new concepts and measurements. The findings of a joint research initiative to implement the new concept of urban centrality developed by four European countries (France, Germany, Great Britain and Italy) will be exhibited.

Old and New Approaches to the City Optimal Size and Centrality

1. Relevance of the optimal centrality question to a new programming or planning-oriented approach to city policy and design

Linking socio-economic development to the quality of life has become the usual means of orienting urban and regional policies. In the European Union, the "cohesion policy" has increased the need to measure cohesion itself and the results reached by efforts to achieve it. In spite of many efforts to define and set such policies, we must acknowledge the very poor means of analysis at our disposal to define the territorial levels in which we measure the concepts of development, quality of life, and cohesion. The traditional concept of the "city" is vague and multifaceted. The traditional concept of "region", mainly based on largely arbitrary or casual administrative boundaries, is generally considered inappropriate for the effective comparison of different levels of development, quality of life, and "cohesion".

The result is a huge amount of collected and evaluated data which has very little meaning, and which induces the risk of reaching dangerous conclusions and policies.

It is time to revise the conceptual basis of many of our commonplace words, like "city" and "region", and to agree (at least in an academic environment) to some conventional notions which we can use to refer to comparable substantive objects and which we can offer to policy makers for their use in comparative distribution policies.

This paper intends to introduce such a revision with reference to:

1) first, the essential settling of the main strategic problems facing urban and regional policies today and in the future;
2) second, the background of traditional "economics" of urban "optimal size" and its practical uselessness;
3) third, some proposed features of an alternative policy approach (based on the concept of the optimal city)[1].

2. Strategic issues for urban policies

The main problem today for cities and urban organisation in Europe (and also in other economically developed parts of the world) can be summed up (with all the imperfections of any summary) in the conflict which tends to occur between two fundamental goals of urban settlement, which become the two contrasting goals of urban policy:

1. Ensuring a high level of access to the functions of "superior" urban services that produce the city effect which no modern citizen is prepared to give up (and which should be a policy goal guaranteed for all citizens).
2. Guaranteeing that the concentration of urban services (necessary for the city effect)

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[1] These features come from a study commissioned by the European Commission, and relating to four major European Countries (France, Germany, Italy and the UK). The findings of this study might be useful in revising the old concepts examined above, and may supply better instruments of analysis and comparison for European regional policy.

does not produce such an overloading of functions as to make liveability unacceptable or unsustainable from the environmental and social point of view.[2]

The two contrasting goals pervade the current "urban question", as characterised by:
− on the one hand, the contemporary tendency for a "total" urbanisation of the population;
− and also, on the other hand, the current effort to clean up the urban environment, which is compromised by pollution, traffic congestion, social separation and disintegration, the degradation of the urban landscape, etc.

It is the second of the two objectives (that of "liveability") which has attracted the attention of town-planners and the public in the debate on the future of the city.[3]

By contrast, the first objective, that of "city effect" - to be ensured for all citizens - has been assumed to be the automatic result of urbanisation, understood as a tendency of all citizens to live in or near cities (whether large, medium, or small) or at least as the result of a general tendency not to forgo, as happened in the past for important portions of the population, the city's superior services, i.e. those which produce the city effect.

This first objective has been assumed to be automatically achieved, not only through the trend towards urbanisation, but also through the effect of modern telecommunications technology which greatly reduces the need for spatial concentration of urban services whose access can now be reached a-spatially or telematically, thus making the city not a physical fact or system of 'distances', but rather a system of abstract communications via cables (the "wired" city).

Moreover, there is a tendency in the current debate to believe that telematics modifies the concept of "city effect" itself; not by eliminating it completely, but by affecting the way it was seen to be produced, namely through the proximity of the urban services to the catchment mass.[4] Thus not only is urbanisation considered the main answer, automatically achieved, to the need of the city (or of city effect), but it is also believed that the city effect is transferred in this manner to a territorial scale other than that of the urban level; more precisely, that it is transferred to a meta-territorial, meta-spatial scale. Thus it is believed that either the need for the city (considered as a physical entity) disappears entirely, or that it is automatically resolved by the progress and application of technology.

From this viewpoint, which considers technology largely exogenous to the development of the city, it also follows that technology not only makes the objective of achieving the city effect superfluous, but tends to resolve automatically, or "naturally", the second fundamental objective outlined above, that of the recovery of the urban environment, of "liveability", or of the "ecological city", as is said nowadays. If the city effect is not a physical phenomenon, if the city hasn't become a 'non-city', then (according to a "technologist" point of view) urban degradation and the negative effects

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[2] For an overview of the literature on how the urban "question" has matured, see many references in a recent book of mine entitled: *The Ecological City and the City Effect: Essays on the Urban Planning Requirements for the Sustainable City* (Archibugi, 1997).

[3] In the book quoted above, I have examined the vast extent of urban problems dealt with by the current literature and the main international initiatives on this subject. See also the overview of initiatives taken by many European countries before 1993 in a volume of the "European Foundation for the Improvement of Living and Working Conditions" (1993) of Dublin, and in the summary contained therein by V.Mega (1993).

[4] On the "wired city" much literature has also been developed, although the journalistic approach has largely prevailed over the scientific one. See bibliographic references in my work quoted above on the ecological city and the city effect.

on liveability (congestion, pollution, etc.), produced today by spatial, territorial 'overloading' of the urban services, will be eliminated with new technology; only time and the means to apply these new technologies are needed[5]. The wired city is a clean or ecological city and vice versa.

This vision of technology's automatic tendency to resolve both aforementioned fundamental town-planning objectives is predicated upon the assumption that the need for the city, and for the city effect, may be satisfied in an a-spatial manner, over distance, through telematic means. If this were not completely true, or were only true in part, then the envisioned automation (or the actions taken only to promote it, or rather to accelerate the application of the wired city, as the main - if not the only - solution to the problems of the city) could be translated into seriously negative factors for the achievement of the two basic objectives under discussion.

In fact, if the implementation - on which such efforts would be concentrated - of the wired city did not fully satisfy the needs of the city and did not achieve the city effect, then physical factors would continue to converge toward urban concentration and greater demands for "centrality". In this case, no actions would be taken toward the achievement of the city effect (the first objective), and the factors which - in seeking the city effect - overload the city and cause consequent degradation would be left to operate unhindered, and without an alternative strategy. At the same time, the achievement of the second fundamental objective (the recovery of the urban environment) would be delayed.

Leaving aside the question of whether telematics and information technology reduce, or replace, the need for the city,[6] the same over-attention to the problems of the urban environment (the second objective) - which are manifested today in such a widespread and redundant way - when accompanied by the equally widespread lack of attention to the problems of the city effect, tends to impede its own objective of the recovery of city liveability. In fact, the logic of systems, which is the logic of inter-dependencies (and which commonly tends to be ignored), tells us that if the overloading of the cities is furthered or rather determined by the citizens' desire for the city effect, an equilibrium between this desire and the needs of liveability may only be reached by producing the city effect in another way (or in another place), and not by ignoring it.

In conclusion, what we wish to emphasise here is that the two objectives in question are inversely dependent in their pursuit: i.e., actions which tend to pursue one, hinder the pursuit of the other. Consequently, a correct policy aimed at territorial achievement of the two fundamental objectives of the current urban question must deal at the same time and without preference with one and the other. In fact, obtaining results in one increases the chance of obtaining results in the other. Without pursuing both goals in tandem, policies directed at each individually risk being inefficient and inane.

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[5] This is, for example, the pervasive attitude which emerges in the majority of works on the "ecological city" proliferating at the moment. However, on reflection, this in fact was an attitude of the first experts who dealt with the subject in the 1960s: for example, the works of M.M.Webber (1963, 1964, 1982, etc.).

[6] A vast panorama of opinions on technology's possible impact on the future city may be found in the collection of essays on the 'future of urban form', already quoted, edited by Brotchie *et al.* (1985). See also Newton and Taylor (1985).

2.1 The role of the "city effect"

Joint attention to the two objectives is relatively absent from the current debate[7]. Today, the "ecological" city and factors in city liveability are examined separately and in and of themselves.

Tables ranking the liveability of cities through the use of "liveability indicators" recurrently claim that the most liveable cities are small and medium-sized and definitely not the large metropolises.[8] But these enquiries don't explain, perhaps because they never ask, why these cities are not chosen as preferred locations despite their decidedly higher liveability standards, even by their most dynamic citizens (the young, the 'brains', etc.). The most obvious explanation (often of a deductive and not an inductive nature) is that these cities do not present suitable work opportunities. We should ask ourselves, however, why these work opportunities do not develop. Why, all things considered, are unliveable cities preferred to the liveable ones, both in terms of contemporary production settlements (jobs) and homes? The most obvious answer and also the most overlooked is that cities of the first type are enjoyed whereas those of the second are not.

We will never succeed in making unliveable cities more liveable, on the one hand, or liveable cities more appealing, on the other, if we do not manage the city effect in a different way in the unliveable (because they are overloaded) cities, and if we do not create a city effect in the liveable cities. In short, in each case it is the city effect which constitutes the key to sustainable urban development, and liveability is a function which must be considered a variable dependent (and not independent) of this.

We repeat: this inter-dependency between the two objectives of contemporary urban development, which must change from being a negative to a positive relation, is not always present in the current debate. On the contrary, it tends to be neglected even when its separate parts are well understood. The objectives of liveability and/or local identity[9] are not necessarily in tension with those of sociality. They are, however, in potential tension (as is unfortunately widely manifest in almost all the European urban experiences) with the objective of the city effect. This occurs because the latter is strongly conditioned, as said, by a demographic urban dimension (with the constraints

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[7] There are naturally some exceptions (for example, Conti, 1990), but these still tend to see the problem from the angle of technological innovation.

[8] See for example a collective work edited by Elgin *et al.* (1974); an essay by Burnell and Galster (1992); and a work by Grayson and Young (1994).

[9] For example, in an interesting document related to the organisation of a research programme for the EU Commission (called "City Action Research") (EC Commission, 1994a), three fundamental objectives for a modern urban policy are listed: to create: a) the conditions for greater social cohesion and development ("agora city"); b) conditions for better local identity, in respect to global homologation ("global-local city"); c) conditions for environmental conservation and sustainability (the "sustainable city"). The agora city can be considered as interchangably analogous to the city effect, since social cohesion in the city may be strongly conditioned by the achievement of a critical mass of events and users which produce this social cohesion (level of human inter-communication); we may recall the studies by R.L. Meier (1962). But it can be considered a fundamental prerequisite of liveability. Thus also the global-local city (or "glocality" as it has been called in a curious but not pointless neologism) may be considered a requirement both of the city effect and of liveability, according to the point of view chosen on the global/local concept see also Knight, 1992b; Lipietz, 1993; Mazzoleni, 1993, whilst the sustainable city is decidedly an attribute of liveability.

of commuting accessibility)[10] and by a catchment area which is important enough to ensure the co-presence of all the superior urban services which are indispensable for its production. We can call this the 'critical mass' for obtaining the city effect.

2.2.   *Large cities and medium-small cities*

Despite noteworthy differences in the urban history of European countries and of the urban frameworks thence derived, the "urban question", as we have briefly indicated above, is emerging in a substantially uniform manner in both Europe and throughout the entire western world.[11] This may spark, or allow, a remarkable convergence of approaches to urban policy on the European or American contexts, founded on the development of 'new urban concepts'.[12]

In the urban geography of nearly all western countries (we are referring in particular to the United States), a situation is arising which can approximately be summarised as follows:

− On the one hand, there are important and larger cities which have reached the highest levels of the city effect (the great capitals, metropolises), but which, as a direct result, are experiencing a growing overload of their functions, with respect to their territory; this overloading is degrading urban quality and the factors of liveability. We can call these "LC–type" urban situations.
− On the other hand, there are small and medium-sized cities which, despite once being important and having recently recovered certain functions and experienced population increases (as a result of the overloading crisis of the great cities which has placed them in an advantageous position), still have not yet reached sufficient levels of city effect. We will call these "SMC–type" urban situations.

The two situations must be analysed separately since they present a somewhat different phenomenology in many respects. They must also be analysed in their mutual relationship, however, because they are largely interdependent in terms of the concrete national reality.[13]

2.3. *Various problems in the two types of urban situations*

The LC type cities already enjoy the city effect; they may have too much of it, in the

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[10] On this subject see a work by Clark and Kuijpers-Linde (1994).

[11] In the "third world", urban organisation is very different than that of the "western" world. Such differences would imply analyses substantially different from those applied to western cities. Strategies as well would be very different. Such a comparison leaves aside nevertheless the objectives of the present analysis which only concerns the European situation and that of the West.

[12] To use the terminology of the European Union Commission "Actvill Programme", mentioned in note number 8.

[13] This is what has been done in the 'Quadroter' research promoted by the Italian National Research Council as a 'strategic project', which hypothesises the identification of 37 urban eco-systems in Italy founded essentially on the effort to 'franchise' the small and medium-sized cities from the attraction and supremacy of the large metropolitan areas. (See chapters 8 and 9 of my book, *The Ecological City and the City Effect* for more details about Quadroter). For a more general examination of the relations between centralities and cities, see Bird (1978).

sense that the necessary "critical mass" is often over-abundant in relation to the available territorial resources and the degree of concentration inherited from the past.

In fact, because this agglomeration took place in the past with spontaneous gravitational force, an overloading has generally been seen in the 'historic' centre, and has spawned a sprawl-like expansion, with the creation of "peripheries" which, albeit autonomous, nonetheless depend on the congested historic centre for the city effect. The result of all this is the loss of human sociality ('sociality'), the loss of a sense of belonging and identity ('identity'), and the loss of environmental liveability ('sustainability').

The SMC type cities, whilst sometimes suffering in some central parts of the city from traffic congestion, pollution or urban landscape degradation, have a decidedly higher liveability and urban quality than LC type cities. In recent times, the shortening of distances (due to the lowering of transport times) and telematic technologies have greatly increased the ability of these cities to attract settlement, both for residential and production purposes.

Recently, the SMC type cities have drained the exodus from the country - where it still exists - to a greater extent than the LC type cities. This has given the impression of larger expansion of the SMC type cities of the same and of a sort of "de-urbanisation", as has often been said.[14] In the majority of cases, however, this impression is the product of the statistical error of not considering increases in the number of residents of municipalities in the first, second and third bands around the central band of LC type cities (hit by the spill-over phenomenon) as properly belonging, in the comparison, to that of the sprawl-like expansion of these cities.[15]

Therefore, the cities of SMC type certainly enjoy greater sociality ("agora"), "glocality" and "local identity", but unfortunately also have the defect of not reaching the critical mass for producing the city effect. This simple defect makes them vulnerable with respect to general increases in urban quality. They will continue to lose more sophisticated strata of residents (the 'brains' or class leaders) with a damaging effect on the quality of the sociality itself. Much of the pre-existing fixed social capital (health, education and cultural infrastructures) will be under-utilised, discredited, and insufficiently maintained: with the not indifferent effect of environmental degradation. The residents, despite the environmental liveability, will become more and more frustrated by a sense of marginalisation, in as much as – we must not forget – many of these SMC type cities enjoyed a good and satisfactory level of the city effect in the past.

All this translates into a great waste of territorial and urban resources, and a persistent flow of functions towards the LC type cities, with a further aggravation of their overloading crisis, which worsens the environmental crisis described above.[16]

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[14] On this phenomenon there are many descriptive analyses which have grasped, nevertheless, only some apparent numeric phenomena, and not their substantial meaning. This subject is treated more extensively in chapter 2 of my book, *The Ecological City and the City Effect,* where more extensive reference to the literature is made.

[15] To the extent that the actual phenomenon of 'de-urbanisation' or of 'counter-urbanisation' would deserve to be called 'hyper-urbanisation'. See chapter 2, paragraph 4, of ibid., for the studies mentioned.

[16] Many of the studies cited above talk of the "decline" of these cities, or of the"competitivity" between these cities, etc. (see for the USA, Bradbury *et al.*, 1982). These concepts should be revisited in the light of the conceptual parameters proposed here.

2.4. The two goals of urban policy: the city effect and liveability

Thus, city effect and liveability - whilst both represent un-renouncable goals for any modern urban policy, as said at the beginning, and whilst both are relevant in the conditions of any urban situation - are presented in such a way as to lead to two different town-planning strategies in the two city typologies, even if the two strategies are nevertheless very complementary and interdependent.

In the LC type cities, which are rich in city effect but lacking in liveability, the problem consists of finding the ways and means to resolve the problems of liveability ('sociality', 'identity', 'sustainability'), without compromising the existence of the city effect.

In the SMC type cities, which have good liveability standards but which lack the city effect, the problem consists of finding the ways and means to realise the city effect without compromising liveability.

2.5. The interdependency between the two policies

In paragraph 2.1, we argued the role of interdependency in the pursuit of the two goals of the city effect and of liveability or sustainability. Now we will examine this interdependence more deeply.

In fact, the two policies - which are somewhat different and will probably yield very different operational solutions, and which merits, in any event, being studied independently - have something in common (besides their two overarching goals): they are both strongly interdependent. The success of one, in fact, inevitably depends on the success of the other.[17]

It is unlikely that a policy aimed at resolving problems of liveability in the LC type cities will be successful if the settlement flow in these cities continues to exceed the critical mass levels which have conferred on them the level of centrality that they enjoy. As stated before, such an independent policy would be as ineffectual as a greyhound chasing after a mechanical hare. The desired level of liveability would never be reached, and the environmental, social and technological policies (intended to lighten or better distribute the overloading of these great cities) would not have the capacity to last over time; they would therefore represent irrational and disordered wastes of resources. Their level of effectiveness in reaching the goals would be very low indeed.

This flow of settlements would inevitably continue if the city effect in the cities and territories from which these flows originate is not produced in order to dissuade from moving the citizens who now desire more and more to enjoy modern urban life to the fullest and without restrictions (as happened in the past). Therefore, the success of overloading "re-equilibrium" or "depolarisation" policies to be implemented in the LC type cities in order to improve liveability depends strictly on the success of policies to improve the city effect in SMC type cities.

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[17] The interdependency which we are postulating on the scale of an entire country (and which often goes beyond the boundaries of a single country) draws on the logic of system analysis. For more details see a contribution by the author (Archibugi, 1990b). Many aspects of interdependency (which today are included in the term 'competition') have long since been highlighted by experts on urban problems: see the collection of essays edited by Mesarovic and Reisman (1972). Interesting information is in the volume by Neiman (1975) on "metropology".

Vice versa, it is unlikely that an increase of urban functions could be realised in SMC type cities (wherever and on the condition of an indispensable critical mass to obtain the city effect) if we continue to invest means and resources in strengthening the spontaneous growth of LC type cities, and if we continue to invest in the accessibility of these cities on the part of ever more distant territories as an apparent answer to the spontaneous demand, which today is justified only because real alternatives are lacking. The success of an attempt to increase polyvalent urban functions in these SMC type cities, and achieve a sort of alternative 'polarisation' to that of the great cities (the requirements of which we will outline in the following paragraphs), depends only on the success of a policy of depolarisation in the LC type cities.

In this sense, the two policies - although different in their contents - are strongly complementary and synergetic.

Notwithstanding this, it is very important to note that the difference between the two policies - whilst supported by the same principles or criteria - is substantial. These differences give rise to very different subordinate strategies.

2.6. *The typical strategy for the larger cities (LC type).*

Appropriate policies for LC type cities must respond to the question, *'how do we decongest, loosen up, lighten the hypertension towards the single, historic city centrality in question?'*; or, in other terms, *'how do we decentralise the functions?'* In fact, it seems that without this decentralisation of loads which exceed those acceptable for liveability, any environmentalist policy is destined to be precarious, based on chance, and unsuccessful.

Some attempts to decentralise functions can be found in the history of any LC type city. However, such attempts have rarely been successful in obtaining their goals of suitably alleviating the (more or less historic) centre, the 'downtown' area, of its hyper-functions. As a result, it has been difficult to alleviate city centres of their environmental degradation by creating peripheral alternatives capable of being self-sufficient with regard to the centre.

The whole history of town-planning as a discipline, since its first steps at the end of the nineteenth century and at the beginning of the twentieth (for example, the intervention by Ebenezer Howard and his disciples, Raymond Unwin and Thomas Adams, who were the first theoreticians of modern town-planning), is marked by the problem of 'decongesting' the spontaneous centralities of the large cities.

The garden city by Howard, Unwin and Adams; the *ville radieuse* by Le Corbusier; the rebuilding of the city by Gropius; the Brodoacre City by Wright; the innumerable urbanism "charts" (starting from the most famous one of "Athens" by CIAM of 1933); and almost all the guiding ideas which town-planning has brought with it - despite their different solutions - have not done anything other than rotate respectively around the same problem: how to decongest the city from its concentric pressures and from its excessive pressures with regard to the available territorial resources, and how to ensure an environmentally "liveable" character. From this point of view, the contemporary excitement about the "ecological (or sustainable) city" seems to be only the current version - more banal than innovative - of the eternal town-planning problem.[18]

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[18] Further considerations on the relationship between ecology and town-planning may be found in chapter 4 of my book, *The Ecological City and the City Effect*. For more complete information about the views of the author on the entire evolution of town-planning thinking, see the *Theory of Urbanistics: Lectures on a*

2.7.   The typical strategy for medium and small-sized cities (SMC type)

With a suitable policy for SMC type cities, the strategy must answer the question: 'how do we increase the urban functions of the city to the point of reaching such an effect as to adequately withstand a comparison and competition with the quality of the services provided by LC type cities?' In other words, 'how do we create a centrality which is sufficiently important and competitive?'

In this case as well, attempts are not lacking. Rather, there is a tendency common to almost all SMC type cities to take on - in one way or another - new functions which enhance services and image. Each centre tends towards 'parochialism'. And each 'parochialism' reaches some goals. But much more often it achieves such a dispersion of resources that it nullifies the apparent advantages, without reaching any strategic result. In the worst cases, local initiatives, unless supported by an economic rationale, tend to fail after making initial progress. In this case as well, the waste of resources is great and the effectiveness of the policies is very low.[19]

2.8. The suggested approach: searching for the optimal centrality

It has been said that the strategy applied to the LC type cities should answer the following question: *'How do we decentralise the great cities?'*

And the first answer expected for such a question (as we have also already said) is: *'by making sure that decentralisation takes place by 'units of decentralisation' which represent alternative centralities to the current overloaded centre, and which are sufficiently strong and important to compete with the centre to be counterbalanced'.* Otherwise the action is destined to fail from the outset.

Likewise, the strategy applied to SMC type cities will have to answer the following question: *'How do we produce the city effect in the small and medium-sized cities?'*

The first answer expected for this question is: *'by making sure that such centres reach, in some way (linking up between themselves, becoming agglomerated, interacting with appropriate networks and systems, above all, privileging intercommunication, etc.), a 'critical' mass which is sufficient for them to compete with the force of attraction of the great cities'.* Otherwise any effort to increase the coefficient of city effect within such centres will inevitably be insufficient for the aim pursued, and consequently ineffective and unsuccessful.

Nevertheless, in both cases the work must be based on a concept of sufficient, or rather, optimal "centrality" and of a sufficient catchment "critical mass" or threshold, in order to produce the indispensable city effect: this concept is hardly known however. Neither known are the effects which various technologies such as telematic and information technology, which are expanding at such a great rate, may have on it or on its single components.

Reappraisal of City Planning Foundations (Archibugi, 1995), where an overall review of the foundations of town-planning itself is attempted.

[19] It is advisable to remember this type of consideration when support and revitalisation policies are launched for 'medium-sized cities'. See on this subject the results of a meeting-survey promoted by the 'European Foundation for the Improvement of Living and Working Conditions' (European Foundation, 1994). The strategic lines for the medium- and smaller-sized cities are reconsidered and deepened in my book on "The Ecological City and the City Effect" (1997), in Ch. 3 (paragraphs 4 and 5.2), Ch. 8 (paragraph. 4) and Ch. 9 (para. 4.5).

Thus the first aims of urban studies today should be the in-depth examination of such a concept of optimal centrality, of how this concept can be a support for urban planning choices, and finally, of how it can be determined by a range of technologies already available or which are to be promoted.

The qualitative and quantitative definition of optimal centrality is therefore a preliminary goal of research (formulated in the aforementioned way) which is indispensable for the support of both strategies and policies to be pursued in the large cities and in the small-medium ones.

2.9. The need to provide the two policies with greater cognitive instruments (i.e. indicators) of urban policy and planning.

Adequate knowledge of the constraints, i.e. the conditions which have to be respected for the feasibility of a strategy, is often lacking in each of the two policies. These *constraints* must be the object of study, research and experimentation.

In the traditional experience of the master plans of European cities, many more plans have been produced without any reference to, or definition of, these constraints (and, moreover, without even taking them into serious consideration) than those which have given them serious consideration.

In the last section of this paper, we will address (as stated above) a recent European research initiative which has begun facing the need for greater cognitive instruments to detect the appropriate "optimal centrality" as a guideline for urban policy and planning.

However, before we go in this direction, it is important to make reference to the way in which the conventional approach of city or urban economics has been, given the proof of facts, only minimally useful in the search for optimal centrality. A glance at the evolution of the reflection we call "urban economics" is obligatory.

3. The Search for Optimal Centrality and the Abstract "Theories" of City Economics

The problem of optimal centrality, as posed by us here, brings to mind one of the classic themes of so-called "urban economics" (which is nothing but an application of the general theorems of economics *tout court* to the economic relations of the "aggregate-city"). We are here referring to the themes of "urban size", "equilibrium city size", and "optimal city size" of cities.[20]

This relationship, which undoubtedly exists, is, however, so weak in the epistemological approach that it begs a brief interlocutory comment. This comment will help us take more direct aim at our purpose: the search for the optimal centrality, as we have postulated is necessary for the formulation of a policy guideline for urban systems on a national scale.

On the optimum size of cities - whether it exists in the first place, and what conditions determine it - there are dozens of theoretical analyses which add up to a very

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[20] According to the above-mentioned theorems, equilibrium city size in the simplest model is defined by the (diagrammatic) intersection of the curve showing the population supply with the curve showing the population demand of the city. In order to determine the optimal city size, the surplus function of the city must be maximised (see, for example, Fujita, 1989, p. 133).

vast literature and which we have no intention of summarizing here.[21]

We would only like to point out that explanatory or interpretative models of the urban phenomenon, and in particular those connected to the "positive" identification of the optimal city size[22] (models which aim at the definition of the existence of an "equilibrated" or "optimal" city or of the city agglomerate), have little pertinence to the strategic issues mentioned above and to the need for discovering an appropriate territorial unit as a tool to measure and evaluate urban and regional policies.

In fact, even admitting, although not completely conceding, that such models may be useful for understanding urban organization *as it is* and as it manifests itself to us, I nonetheless maintain that such models have little usefulness - given the operational[23] problem which we face today - in determining *what* the optimal urban dimensions *should be*.

All this implies a question of approach to the problem of optimal centrality (which we are dealing with), on the subject of which it is obligatory to give a brief clarifying comment, at the risk of deviating from the argument.

By "sophistication" of the reference models we mean the procedure of reasoning, typical in neo-classical economics, which starts from functions (models) that are simple, consequently richly loads them with "assumptions" (concerning both the number of variables in play and their dynamic stability which is expressed in the well known expression "ceteris paribus"), and then gradually "releases" (or disengages) such assumptions by introducing new variables and new relations.

These relaxations and extensions - as it happens - are always introduced in the name of "greater realism".

3.1.   The "Ballet" of Assumptions

Taking, for example, a procedure pertinent to the regional and urban economy[24], we can summarize it in the following stages or steps:

A. We start from a simplified function, of a single object (let us say the *household*) which chooses its place of residence. It is supposed (and/or taken for granted) that this decision is made on the basis of certain factors. An attempt is made to classify such factors in an exhaustive way fand the following four categories are proposed: 1)

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[21] Among the first systematic studies there is the well-known contribution by Alonso (1971). Other contributions are in Neutze (1965-68), Evans (1972), Richardson (1972), Knox (1973). See also the more recent approaches in Bullinger (1986) and Begovic (1991).

[22] Regardless of the complexity and relative sophistication of such models, based on abstract or "theoretical" behaviour of the subjects: individuals-families, companies, collectivities, states, etc.

[23] The word "operational" is used here in they way that it is used today in "operational research"; i.e. with the meaning that a problem becomes operational when a multiple number of possible solutions are conceivable, amongst which one is selected as "optimal" in relation to a preference function previously prescribed. To the extent to which such a definition is accepted, two things become essential: a) the system must have open goals; and b) a defined preference function must be formulated. But in other senses as well we can understand the use of the word "operational": 1) in the meaning that only *observable* concepts are used, for which empirical correlates may be determined (in a particular context on the basis of various possible existing or conceivable statistical sources), which we will call *indicators*; 2) that the method of reasoning is *quantitative (or also qualitative, but in some way measurable quantitatively)*, in such a way that the planners and (on the basis of their work) the political decision-makers are helped in the process of the formulation of coherent and feasible plans and programmes.

[24] And which corresponds in a large degree to the evolution of "regional science".

accessibility (to goods and services); 2) space (habitational area of the land or dwelling); 3) environmental amenities; 4) distance from the town centre; and it is then proposed that this choice has two constraints: a) budget and b) time available[25]. Already, the selection of these variables (but also any other factors and constraints) implies an assumption: that these parameters are exhaustive.

The function-model thus derived must rest - from the start - on a series of assumptions[26].

1) that the urban area under consideration is monocentric;
2) that there is a relatively important radial system of transport;
3) that the territory is flat.

Other assumptions necessary for such a simple model:

4) that the family (but obviously all other institutional subjects that will be introduced later) intends,
  − to *maximize its function of utility* (subject to the indicated budget constraints), understood as the sum of goods and services to which access is possible (apart from the territory, because otherwise the house of cards which is spatial economics would collapse!) and,
  − to *maximise the consumption of territory* (for example, the size of the residential lot), which implies that the *function of utility is continuous and growing* with any increase of the above-mentioned consumption (goods and services and residential space), which is not always a valid assumption;

5) that there is an *ever-increasing cost for transport*, etc.

B. Next, such a model (defined as "basic") may be made more sophisticated, relaxing it from the assumptions of the few variables around which is has been organized: for example, introducing into the model:

6) *the "time" factor* (cost of commuting time)[27]. In such a manner, the maximisation of utility - by the single household - becomes subject also to access-time constraints. Therefore we can introduce:

7) the *"structure of the household" factor*, which - while assuming a supposedly "rational" behaviour - may also make possible behaviour that is very divergent from that in the preceding framework of functions (by using, for example, variables to take account of, the *number of components* and the *number of active persons* who work in the family)[28].

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[25] Here we are at the earliest stages of the theory of localization (Loesch, Isard, etc.). The classic and most familiar version - founded in fact on these hypotheses of factors and constraints - is that constructed by Alonso (1964).

[26] As does in fact the basic model to which we have referred (Alonso, 1964).

[27] This extension has been discussed by a great number of authors; it is particularly dealt with by Henderson (1977). The basic model, extended to include the time variable, has been augmented with the introduction of multiple forms of transport (see LeRoy and Sonstelie (1983).

[28] This sophistication - that we encounter very often in the literature - seems to have been treated first by Beckmann (1973). In any event, no scholar of "urban economics" exists who has not noted (in the reality of his personal experiences, "American" or "European") how numerous are the generational conflicts within a family regarding the preference to live in the centre of the city or in an "affluent" periphery.

C. To the "basic" model (concerning the behaviour of each single household) is added the more "realistic" circumstance that the household is never alone in deciding a localization, but in fact *competes* with all the other households; for this reason the concept of "competitive equilibrium" in land use is introduced, which refers to the fact that the decisions (theoretical and rational as supposed) of *all* households, taken under the constraint of a given curve of land rents, must be mutually coherent and compatible; and in particular that there are the conditions for equality between the supply and demand of land use. And, since the balance between supply and demand does not seem necessarily to be a desirable condition, although indispensable, the concept of *optimal allocation* of the land use still needs to be defined.

But already the condition of equilibrium of the territory assumes the concomitant presence of *other* particular conditions (and thus of other assumptions) which alter the validity of the basic model, for example,

8) the *perfect information* of all the operators (households and owners) of the land rents in the territory itself (in our case the city). Furthermore:

9) that *no participant*, or selected group of participants, *may exercise a monopolistic power*. As an alternative it should be assumed that each operator will receive the land rent in the city *as given* (which constitutes a further assumption).

D. But this is not enough. Subsequently, the equilibrium model, in order to function, needs to choose between two other cases:

10) if it is applied to a population "exogenous" to the city, (for example the model itself could be called the *closed-city model*), or

11) if it is applied to a population (households) of the city which are free to move without excessive expenses within the confines of the city itself (*open-city model*)[29]. Furthermore, some other important variables which condition the functioning of the model (and which link in particular with the two preceding ones but obviously interfere also with all the others) are

12) if there is a case of *absent land ownership* or

13) of *public land ownership*[30]. In the first case - still based on the assumption that all households are similar - the assumption is made that the supply of bid rent varies in a decreasing proportion to the distance from the centre. In the second case, the possibility is introduced that the determinant of the supply of rent is not the individual utility of the land owner but an undefined "public utility". By itself, this hypothesis renders insignificant the entire construction of a model of this type, even if it obviously does not dismantle its intrinsic logical-mathematical consistency (which draws on other factors which, however, have nothing to do with the object of the urban economy).

In any case, because of the presence alone of this possible extension of various hypotheses, which follows a sought-after "realism", there arises a "causistics" of crosses between assumptions which multiply the formulations of adaptive models (which are called, euphemistically, "refinements").

But, even if the equilibrium is assumed to be possible - on the condition of respect for the set of assumptions and/or specifications or "causistics" mentioned above - the analysis continues to be made more sophisticated through other cases or hypotheses.

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[29] It seems that the definition of "open city" was introduced by Wheaton (1974).

[30] The public property model was introduced by Solow (1973), and has been largely dealt with in works by Kanemoto (1980, 1987) on the "theory of urban externalities", which we will come back to later.

Leaving aside the hypotheses that are being born from alternative *objective functions*[31] (that are obviously the basis of measurement for the *optimality* and that would be valid, even in any case of a *decisional model*, which we, again, will come to below)[32], we recognize that the land use equilibrium can even be influenced by other parameters (and parameter changes) such as:

14) *agricultural rent*,

15) *population*,

16) *household income*,

17) *transportation costs*,

18) *estate and land ownership taxes*,

19) *zoning*.

How could we forget these elements within our model?

But to take account of these elements complicates the calculability terribly. If the intervention of these other factors are analysed one by one - while the model keeps its simplest form, or while the extensions are also dealt with one by one - it is possible to achieve a theoretical configuration that in some way is effective, although abstract. But if all of these variables enter the field simultaneously, a free-for-all is created of which we cannot assure the governance, even through the most advanced and potent of the analytical and mathematical formulations and formalizations.

F.   Despite all of this, the reality is still *much more complex* then described above, and it escapes any effort to capture it easily within a web. With all of the variables introduced, we have worked with the assumption (in this case it would be more correct to call this a premise or postulate) that all individuals or households be of only one type: all similar and of similar behaviour (a postulate that is also less than realistic).

In this way, it restarts from the beginning toward the introduction of the model and in its formalization of the,

20) *typological multiplicity* of the decision makers.[33] The function of the "bid rent" of the household type has been displayed according to a "curve" of the same bid rent based on testing the existence and uniqueness of the equilibrated and optimal land use (as in the case of the unique subject).

However, all this has required other assumptions, for instance, that

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[31] But in this case, we enter into another general problematical area which is extended much beyond the objective function of the location: that of the validity in itself of a social welfare function, as has been theorized by modern "welfare economics". Without even lightly touching on the general problem in this setting of "social welfare" (for which we refer the reader to the positions taken by Frisch or Johansen that we consider to be definitive), some critical adaptations of the welfare economic theorems to the case of the urban economy deserve to be remembered (always in the ambit of the path which we are occupying): the recurrent sophistication of the models of the spatial/urban equalibrium. In fact, while in welfare economics the social welfare function is considered as the sum of the utilities of the individual households (but even in this case with the assumption of a sum of identical households), in the spatial/urban economics the utility levels (and therefore the social welfare) of households, even identical, are dependent on the location, and this produces "an unequal treatment of equals". Supposing, as is obvious, that an objective level of utility (or welfare objective function) is chosen regardless of the different household locations, then the instruments (for instance, territorially motivated taxes or subventions) are found according to whether the household's utilities are at a higher or lower level than the predefined objective level.

[32] See paragraph 3 below.

[33] And we are still and uniquely dealing with the institutional decision maker, the "*household*". But, as we have already said, there are also the institutional decision makers, the "firms" and the "state (or government)" that, even within themselves, are not always equal and of equal behaviour

21) *bid rent functions are ordered and obedient*. The problem seems to be, by itself, only mathematical[34]: at which ("formal") condition can the bid rent function, and the related lot size function, be acceptable as determinants of locational choice, and in this way, of the theoretic validity of the model?[35]

G. The desire, in any event, to fix the law of development of land use on the basis of theoretical assumptions related to subject behaviour[36] has not stopped here. In fact, the reasoning coming from the behaviour of the household and firms with respect to land use and locational choices has assumed an enormous quantity of hypotheses and simplifying assumptions all founded on the assumption (quite abstract and unrealistic) of only one "centre", in a world without competitive centres. This is the *monocentric* hypothesis. In such a way, it has been obligatory also to introduce the principle of spatial aggregation by itself, or the "city function".

Here the theory of urban economics approaches our problem a little closer. An explanation of the city through the principle of the economies of scale and the externalities produced by it has begun. In relation to what? Who knows! In relation to the *non-city*[37] or - more reasonably - to a range of many possible and effective centres of different sizes that produce economies of scale and different externalities: so that we have a curve of economies of scale and externalities for each type of cost and benefit taken into account (or in other words, we have as many curves as we have types of costs and benefits taken into account.)

From a substantial point of view, this side of the path of "regional science" approaches, as we have said, the problem of optimal centrality as we have posed it. But even here it is necessary to clarify in which sense and with what limits this connection could be acceptable[38].

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[34] On this point, see Chapter 4 of the work of Fujita (1989) and also Fujita and Smith (1987).

[35] But here the question emerges again: if the theoretical validity of the model (even in iself!) is so difficult to achieve, and only on the basis of very complex mental and formalistic acrobatics, what can we say about its practical validity? And at the conclusion of this path another question emerges: are we sufficiently aware of the point to which we have arrived, dragged only by this mental exercise? We are pushed to ask ourselves if it would not be more reasonable (even if terribly counter-current) to invoke a return to a critical Kantian spirit, against whatever manifests itself as a real meta-physics of the urban phenomenon; against a theory on the basis of which we build models, without any capacity to be quantified and that seem good only for academic exercises and useful only to exercise the minds of students, through mathematical equation solutions (only symbolic) but certainly with scarce operational utility.

[36] Right now we have spoken about households, but the same criteria could be applied to other subjects such as firms, or the state or government, although for the last there are behavioural and choice problems and thus decision making problems that are much more complex, and based on objective functions which are much less simple compared to those of the household, firm or institute; problems that are less psycological and more sociological.

[37] In fact, a good deal of abstract reasoning or modelling of this type has used, antinomically, the concept of "country": but is it reasonable in the western countries today to think about the existence of a "country" that is not part of the city function?

[38] Which means a clarification of the way the optimal centrality is concieved in the "regional sciences" and in "Planology". For a more extended examination of the relationship between "regional science" and "Planology", see Archibugi (1993).

3.2 The Standard Theory of Agglomeration and Urban Size

The standard theory of the advantages, or benefits, of agglomeration tend to group such advantages in the following categories:
1. advantages in the field of available resource and transport
2. economies of scale
3. externalities and costless interactions
4. the variety of choices in consumption
5. production

Each of these categories constitutes, for the theory of urban economics, a component of the "urban function".

Normally, such advantages are counterbalanced by the disadvantages or costs that the urban agglomeration produces in terms of *time and nodes of accessibility*, and thus, in terms of *transport costs*. One of the more current assumptions is that the transport cost increases proportionally to the commuting distance between residences and the "urban" central place.

Usually, it is assumed that the presence of localised natural resources (minerals, natural harbours, natural beauty, etc.) favours (but it would be better to say that it favoured, in the past) the formation of urban agglomerations. We cannot ignore, in fact, that by now - in the face of the pre-existence of cities in the urban structure of the territory (and this is valid overall for the western countries but it is also valid for those non-western countries that have new territories to develop) - these factors are strongly superseded by other factors, most importantly the simple fact of urban pre-existence; and their (the 'natural resources') impact has almost completely vanished.

The *economies of scale* (in consumption and production) are, instead, the most important factors. And it is well known that such economies of scale pertain, essentially, to the indivisibility of certain exchanges of goods (persons, residences, factories, infrastructure, public utilities). The indivisibility of persons produces a labour specialisation; and the infrastructure cannot be used effectively if not on a large scale. The efficient coordination of many specialised persons, of infrastructure, and of production processes requires the proximity of all such factors, always improved by communication services and helped by the savings in transportation of products and raw material. From all this, it follows that the median, comprehensive, production cost of a good will be less to some extent if it can be obtained on a large scale and within contiguous localisations. And even the relationship of productive "interdependencies" between different sectors can give advantages through the proximity of the productive process. Furthermore, even many public services (such as schools, hospitals, electricity, water, gas and other utilities; and even roads) are factors that are susceptible to economies of scale.

Even the "*technological externalities*" represent an important urban function. It is a question of advantages being collected without paying a price. And the same is true for those intangible externalities that come from the larger quantity of cultural and recreational exchanges; in other words, from the higher social interaction that the scale of the city offers.

Finally, the variety of opportunities and choices that the scale of the city offers is another important and recognised factor of agglomeration. The higher freedom of choice produces (at an equal price) a greater utility for consumers; and thus, a greater

income (to the extent to which "utility" means "income" - which it is not always wise to assume).

All of these "factors" of increasing utility converge in the production of a "complementary effect", economically advantageous, which - along with others that are by nature also intangible and always more present in determining the behaviours and motivations of the users of the city - can be called, as we have done, the "city effect".

In urban economics, of course, more in-depth study has been conducted on the city size under the profile of the functions of economy of scale and externalities. For simplicity, we will speak only about *externalities*.[39] And, even in this case, the use of the expression certainly is not satisfying if we do not also clarify the reference framework of the analysis.

Indeed, since the institutions of the economic system are (from the point of view of modern system analysis) *interdependent*, what is an "externality" for one institution can be an "internality" for another. This fact is often neglected in the use of the expressions, neglecting, also in this way, to make explicit *from which (institutional) point of view* we are proceeding in the analysis.

Since we have internalities and externalities that are reciprocally both positive and negative, we know well that a positive externality from the point of view of a firm can be specularly negative for the household or for the community and vice-versa. However, this is not necessarily true: we must see case by case. In fact, a *complementary effect* can occur which operates not only for the benefit of the individual unities of each institution, but even between unities belonging to institutions that are not only by nature *competitive* as those of the same institution normally are (household vs. household, firm vs. firm, community vs. community), but even *conflicting* as happens to the unities belonging to different institutions (households vs. firms, and firms vs. communities).

Besides, even overtaking in a certain way the logical semantic problem mentioned above, there continues to be even more substantial defects of approach in conventional urban economics. Even accepting that it could be possible to set (and at the same time to solve) the problem of making explicit the concept of *positive externality* (that we have called *city effect*) and the concept of *negative externality* (that we have called *overload*); and even taking care to make explicit the institutional point of view from which we are looking; until we have defined the *positivity and negativity thresholds* of the externalities, it will not be possible to confront the *operational problem* of giving an optimal size to the city. And neither will it be possible to evaluate the policies of intervention or the corrective measures to restore an eventual theoretical condition of equilibrium.

In such a manner, operationally (always in conformity with the objective function that must be predefined as in any elementary scheme of operational research) we must define the optimal level of the city at that level of urban goods for which it would be meaningful to research the *complementary effect* that we have called *city effect*.

In the abstract models of "explanation" of the city, for example, attempts have been

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[39] The first functions can be distinguished from the last (in the Marshallian sense of the expression) with the fact the first are "internal" and the second "external" to the individual *firms*. This is less conceivable if the reference is made to the single unities of the *institution -household* instead of to the *institution-firm.* (The question becomes even more complex if the reference is made to the *institution-state, -government,* or -*community*).

made to introduce - as said above - the externalities.[40] But on this point, the concepts are not at all clear in the literature, and poor references are made to the contents and the empirical correlatives that we have called *indicators*. At this point, it seems to be very necessary to make a bridge between the urban economics and the empirical analysis of the indicators (and their relative selection).

3.3 A Policy-Oriented (Planological) Approach to the Definition of the Optimal Size of the City

At this point, we can ask ourselves questions regarding the standard path of urban economic theory.

The first question is the following: given the current modelling[41] and taking into account all the "principles" of the spatial economy, already abundantly elaborated[42], *would it not be better* (in the sense of more useful and more practical) *to start from objective functions or preference functions*, based on the real conditions facing us and directly expressed by the decision makers, *without making a "theory" about them founded on abstract assumptions*? And, obviously, *is it not better to adapt the procedure to the future decision makers concerned* (households, groups, responsible politicians) *and adapt it to the environmental and spatial level at which we are studying such choices and decisions (programming, projecting, or planning)*? (We mean, choices and decisions on which goods or services to consume, on times and ways with which to access such goods and services, on the places in which to develop activities, etc.)

This last approach, that I will call policy oriented (or programmatic, planologic, or decision oriented), marks a turning point in the traditional and dominant approach of economics, into an analytical/positivistic approach since it legitimises this process only within the limits of an intellectual exercise which - if prolonged without critical spirit - becomes superfluous and with no way out, i.e. a sterile exercise.

This type of approach produces what I have elsewhere been compelled to call (with a

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[40] This problem has been the subject of several formalized descriptions in literature: some general, others applied to single portions of territory or urban function. For the general formalized descriptions see, for instance, two essays of Papageorgiou (1978) and all the second part of the work by Fujita (1989) which includes numerous bibliographical references.

[41] A very well informed and critical illustration of the modelling developed by urban economic theory is in the second and third parts of the work by R. Camagni (1992). Here the models are grouped as follows: A. Static Model: a. "of continuous space"; b. "of discrete space" (more adaptable for decisional modalities); c. "hierarchical"; B. Dynamic Models: a. "aggregate models" (macroeconomic and ecological/biological); b. "disaggregate models".

[42] In this case, we again recommend the illustration of R. Camagni in the first part of the already quoted work, which enumerates the "principles" (as he, very opportunely, called them, where others might use the improper term, "laws", and still others the even more improper terms, "factors" or "criteria") of spatial economy. Camagni's principles are listed as follows: 1. Principle of Agglomeration; 2. Principle of Accessibility (or Spatial Competitiveness); 3. Principle of Spatial Interaction (or Mobility and Contact Demand); 4. Principle of Hierarchy (or City Order); 5. Principle of Competitiveness (or Export Base). The modalities with which these principles are interwoven is not discussed, even if many models described later in the second part of the work (see preceding note) are strongly based on one and often more of the above principles. In reality, the effort to enucleate these principles from the spatial economy literature is an end in itself; it is didactic and taxonomic; and as such it is useful to put in order a literature that is somewhat in disorder. Toward this effort, we do not apply the reserves that we have pronounced about the heuristic (and even less operational) capacity of the behavioural models which try to replicate the functioning of reality. The principles serve not to interprete reality (as the models claim to do), but only to classify the logical categories that govern the knowledge of reality itself, and no more.

certain amount of roughness) the syndrome or neurosis of *casuistics*. Starting from elementary functions, people are induced - from their evident incapacity to represent reality in its complexity - to introduce ever more numerous complications in the attempt to trap reality in its multiple manifestations and "cases". But this process, by its nature endless, never will be able to give reliable answers. What is tried, in effect, is to trap (or "explain") reality within interpretative models which try to give an account of *all cases* that have not been included in the basic (simplified) model until, finally, the result is a proliferation of models, complicated and sophisticated, which actually are used only to decree the dissolution of every model.

Moreover, the tool of mathematics is today at our disposal to give to the language the aspect of a logical rigorousness in this endless and circular cognitive process, achieving the maximum scientific appearance with the minimum of operational utility and truth.[43] Two profound connoisseurs of mathematical epistemology and its applications to the social sciences and especially to economics, Frisch and De Finetti, have, irreverently, called this syndrome: "*playometrics*" (translated into Italian by De Finetti as "*Baloccometria*").[44]

The trouble is that in the evolution of economic thinking (and in the other social sciences) this syndrome is increasing, perhaps because of a scarce familiarity with economic studies that have foundations in logic and philosophy; and it is not by chance that the persons most sceptical of the theorems of the neo-classical economics have been the very mathematicians that have occupied themselves with epistemology.

In contrast, little attention has been given to the fact that the variables on which any function or modelling is based in the economic and social sciences are variables relative to "human" behaviour, subject to the liberty of evaluation and choice; i.e. behaviour sufficiently unpredictable *ex ante* in positive terms, and only determinable *ex ante* in decisional terms.

In sum, in the social and economic sciences, the most important variables (on which all modelling is based) are those of human preferences (of individuals, groups, cultures, nations, etc.). And these preferences are determinable only as functions of value judgements, which change with time, and which are possible to assume as effective only in the moment in which they are expressed and influence concrete decisions. It is doubtful that rational behaviour could be determined (by who?) on the desk through abstract hypotheses in models, and it is doubtful that these choices can prejudice, in the decisional phase, the choice between alternatives that the models themselves put on the desk.

The structure of the variables in play, and therefore the structure of the models in use, must reflect - in the selection of the variables themselves, or in the selection of relationships between those variables, or in the assumptions of the parameters on the basis of which are registered such relationships - the nature of the problems in the field; and must reflect, overall, the values on which basis the decision makers (of whichever kind and level) make their decisions, given the constraints that those values will

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[43] "The utility of this model is purely theoretical and didactic by nature," the already quoted Camagni states (1992, p. 175), and he acknowledges that the most recent contributions on these themes, "are becoming often merely excercises of mathematical virtuosism." (ib., p. 176).

[44] For the special criticism of the conventional "econometric" approach by Frisch, see some specific contributions (Frisch 1964, and 1970); but for the general planological conception of Frisch, see his last, more meaningful contributions, postumously published (Frisch 1976) and for the critical work of De Finetti, largely convergent with (and in part referential to) that of Frisch, see at least two works (De Finetti 1965 and 1969).

represent.

It follows then that our problem of the search for an optimal centrality, albeit assimilated to that of optimal urban size in the logical formulation developed in urban economic theorems, diverges from it strongly. Thus is taken for granted that the search itself will implicate the search for welfare indicators, not in the sense of possible variables of a positive analysis, but in the sense of possible variables of a decisional analysis. As such they will be indicators which some hypothetical decision makers must select and apply in a certain way in order to achieve the plan objectives. The research work that we are designing is not other than propedeutical, and at the same time a proxy, of the decisional work. In other terms, we prepare ourselves for this work in this decisional setting and phase.

4. Some features of a proposed alternative policy approach (based on the concept of the optimal city)

Taking account of the relative uselessness of the theorems of urban economics, we return to the analysis of how best to organize a study aimed at finding the optimal centrality in urban planning and design.

A recent study directed by myself has implemented the approach described above in subsections 2.8 and 2.9.[45]

The main cognitive instrument necessary for the implementation of an optimal centrality approach to urban planning is the collection (and eventual negotiation with "stakeholders") of a system of urban indicators (of the city effect and of city sustainability) which will allow us to locate, through the proper parameters and within the proper "ambit" or "basin", our planning procedure and design . Within such an ambit or basin will be contained the appropriate conditions (numbers, quantities, and critical mass) which allow the realisation of the city welfare (the city effect and the sustainability) which we have envisioned.

The study in question investigated the conditions of twenty European cities, each of a different character (five cities for each of the four countries in the study). The final result of this study was the establishment of the urban indicators and values of optimal centrality, herein exhibited in Table 1.

Based on these indicators and values, which were used as the criteria and parameters, the study derived the territorial distribution of all actual cities and urban agglomerations in each of the four countries through their aggregation into complete "urban systems" (or "ambits", or "basins"). Each one of these distributions represents the best fit (as determined through the analysis and the testing of alternative scenarios) with the requirements of the optimal state centrality determined on the basis of the criteria and parameters listed in Table 1.

The results of this study are the four maps attached, one for each country.

Of course, the research is far from complete or exhaustive. It represents a first, provocative, and demonstrative step. It suggests the outline of a methodology.

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[45] This research, for which I was the coordinator and the Planning Studies Centre (PSC) of Rome was the acting agency, was concluded in 1996 in the framework of a Research Programme of the European Commission called 'City Action Research' (*Actvill Programme*). The main results of the PSC research are available on the PSC website [**htpp://www.planningstudies.org**]. A book is being prepared summarizing the research findings. A draft edition of the *Research Report* to the EC is also available (Planning Studies Centre, 1996).

This is an outline of what could serve as an implemented procedure of planning and planning negotiation, based on an obvious rationality of method, and guaranteeing at least a minimum chance of consistency and success.

Table 1 - City Effect Indicators and Standards, and Overload Indicators and Acceptable Thresholds

City Effect Indicators

Indicator	Reference value	Comment
Demographic dimension	361,000 inhabitants	City-Effect increases with urban size up to a certain point (361,000 inhabitants) and then decreases.
Population density	10.50 persons per hectare	Average value
Headquarters location: Number of trading premises (headquarters sites of commercial companies located in the area relative to population size)	4,800 persons per companies	Average value
New firm formation	0.00300 registrations per head of population	Average value
Number of applications for firm birth loans	8 per 10,000 heads of population	Average value
Level of employment in the tertiary sector	Over 75%	Average value (national)
R&D Employment	10 per 1000 heads of population	Average value
Occupation in the art market	13 per 10000 heads of population	Average value
Art galleries	33,400 persons per service unit	Exemplary urban system value
Share of population that can reach the following facilities within 10 minutes (%):		Average value
Retail shop/supermarket	Over 90%	
Physician	90%	
School	Over 80%	
Kindergarten	Over 75%	
Public transportation connection	99%	
Pub	Over 95%	
Park	Over 85%	
Retail sale area	Over 1.5 sq.m. per inhabitant	Average value
Night time entertainment	One unit every 30,000 inhabitants	Average value
Number of seats in performance venues	22.24 seats per 1,000 population	Average value
Seats in cinemas and theaters	20 per 1000 inhabitants	Average value
Average time to reach an international airport	45 minutes	Average value
Public transportation closing time	After midnight	Maximum value
Number of beds in surgical services	2.8 per 1,000 population	Average value
Medical specialists	20 per 10,000 inhabitants	Average value
CAT scanners availability	One every 100,000 inhabitants	Average value
Percentage of pupils under five in nursery and primary schools and classes	100%	Theoretical value
Provision of open space	300 persons per hectare open space	Average value
Herbalists	One per 180,000 persons	Average value

Overload Indicators

Indicator	Threshold value	Comment
Demographic dimension	55,000	Urban overload effect shows an increasing trend over this value
Degree of concentration of NO_2	30 parts per billion (ppb)	EU standard
Public transportation average speed		
Peak	15.45 m.p.h.	Best value
Off peak	22.6 m.p.h	Best value
Share of derelict land	0.5%	Adjusted national average
Unemployment ratio	6.4%	Best value
Long term unemployment	24.3%	Best value
Income support rate	4.4%	Best value
Reported offenses (except larcenies)	83.9 every 1,000 inhabitants	Best value
Reported larcenies	43.6 every 1,000 inhabitants	Best value
Violent crimes per 1,000	3.48	Best value
Waiting time for surgery	3.2 months	Best value
Delay before criminal trial	15.3 weeks	Best value
Maximum traveling distance between two points whatever of the metropolitan area	80 minutes	Theoretical threshold

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